SAR TEST REPORT

No. 2011SAR00124

For

Sierra Wireless Inc.

USB Modem

AirCard 330U

With

Hardware Version: DV1.1

Software Version: SWI9200X_03.00.06.05AP

FCCID : N7NAC330U

IC : 2417C-AC330U

Issued Date: 2012-02-15

No. **DGA-PL-114/01-02**

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of TMC Beijing.

Test Laboratory:

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Revision Version

Report Number	Revision	Date	Memo
2011SAR00124	00	2011/11/02	Initial creation of test report
2011SAR00124	01	2011/11/16	Update the conducted power
2011SAR00124	02	2011/11/22	Remove the picture of sample
2011SAR00124	03	2011/12/16	Add annex G
2011SAR00124	04	2011/12/22	Update the standard and the dielectric of the tissue simulating liquid
2011SAR00124	05	2012/01/13	Add the LTE test for some positions
2011SAR00124	06	2012/01/27	Add the detailed explanation of the software version and the frequency validity
2011SAR00124	07	2012/01/31	Retest the SAR value for some positions and add annex H
2011SAR00124	08	2012/02/15	Add the KDB 450824 in section 4.2

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1 Test Laboratory

1.1 Testing Location

Company Name:	TMC Beijing, Telecommunication Metrology Center of MIIT
Address:	No 52, Huayuan beilu, Haidian District, Beijing,P.R.China
Postal Code:	100191
Telephone:	+86-10-62304633
Fax:	+86-10-62304793

1.2 Testing Environment

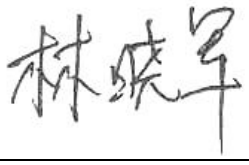
Temperature:	18°C~25 °C,
Relative humidity:	30%~ 70%
Ground system resistance:	< 0.5 Ω

Ambient noise is checked and found very low and in compliance with requirement of standards.
Reflection of surrounding objects is minimized and in compliance with requirement of standards.

1.3 Project Data

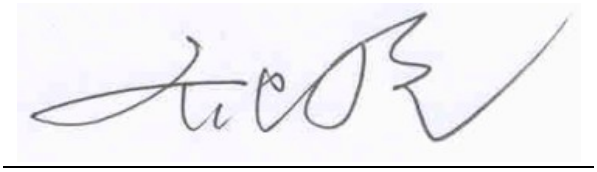
Project Leader:	Qi Dianyuan
Test Engineer:	Lin Xiaojun
Testing Start Date:	October 18, 2011
Testing End Date:	January 29, 2012

1.4 Signature



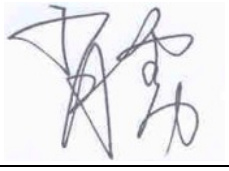
Lin Xiaojun

(Prepared this test report)



Qi Dianyuan

(Reviewed this test report)



Xiao Li

Deputy Director of the laboratory

(Approved this test report)

2 Client Information

2.1 Applicant Information

Company Name:	Sierra Wireless Inc.
Address /Post:	13811 Wireless Way Richmond, British Columbia, Canada, V6V 3A4.
City:	/
Postal Code:	/
Country:	Canada
Contact:	Ying Wang
Email:	ywang@sierrawireless.com
Telephone:	+ 1 604 232 1440
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2.2 Manufacturer Information

Company Name:	Sierra Wireless Inc.
Address /Post:	13811 Wireless Way Richmond, British Columbia, Canada, V6V 3A4.
City:	/
Postal Code:	/
Country:	Canada
Contact:	Ying Wang
Email:	ywang@sierrawireless.com
Telephone:	+ 1 604 232 1440
Fax:	/

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

3.1 About EUT

Description:	USB Modem
Model Name:	AirCard 330U
Frequency Band:	LTE FDD4/7

3.2 Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	0521	DV1.1	SWI9200X_03.00.06.05AP

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

4 CHARACTERISTICS OF THE TEST

4.1 Applicable Limit Regulations

ANSI C95.1–1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.
It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

4.2 Applicable Measurement Standards

IEEE 1528–2003: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices: Experimental Techniques.
KDB 447498 D01: Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies v03r02
KDB 447498 D02: SAR Measurement Procedures for USB Dongle Transmitters
KDB 941225 D05: SAR Test Considerations for LTE Handsets and Data Modems
KDB 450824 D01: SAR Probe Calibration and System Verification considerations for measurements from 150 MHz to 3 GHz
KDB 450824 D02: Dipole Requirements for SAR System Validation and Verification

5 OPERATIONAL CONDITIONS DURING TEST

5.1 Schematic Test Configuration

During SAR test of the EUT, it is in continuous emission Mode (Channel Allocated) at normal voltage condition and maximum transmitting power.

Power Measurement

The maximum average conducted output power is measured for the uplink burst in the different modulations. The same setup and device operating configurations used for SAR measurement are also used for the power measurements. Power is measured with a spectrum analyzer (model & specifics etc.) and the device is connected to the vector signal generator through a directional

coupler. The average power is measured for the uplink bursts through triggering and gating. A resolution bandwidth of 100 kHz and a sweep time of ms are used to ensure power is measured correctly.

Maximum Power Reduction (MPR) is allowed due to higher order modulation and transmit bandwidth configurations. There MPR levels reduce the lower limit of each output power by the either 1 or 2dB. The limits for there power levels can be found in Table 6.2.3.5-1 of 3GPP 36.521.

Modulation	Channel Bandwidth / Transmission Bandwidth Configuration (RB)						MPR (dB)
	1.4MHz	3.0MHz	5.0MHz	10 MHz	15MHz	20MHz	
QPSK	＞5	＞4	＞8	＞12	＞16	＞18	≤1
16QAM	≤5	≤4	≤8	≤12	≤16	≤18	≤1
16QAM	＞5	＞4	＞8	＞12	＞16	＞18	≤2

The conducted power measurement results for QPSK

Band 4				
Bandwidth (MHz)	RB	Frequency (MHz)	Actual output power (dBm)	MPR (dB)
10MHz	1RB-Low	1750	22.26	0
		1732.5	22.47	0
		1715	22.13	0
	1RB-High	1750	22.36	0
		1732.5	22.55	0
		1715	22.45	0
	25RB	1750	21.16	1
		1732.5	21.43	1
		1715	21.20	1
	50RB	1750	21.09	1
		1732.5	21.40	1
		1715	21.13	1
20MHz	1RB-Low	1745	22.33	0
		1732.5	22.44	0
		1720	21.85	0
	1RB-High	1745	22.34	0
		1732.5	22.08	0
		1720	22.54	0
	50RB	1745	21.43	1
		1732.5	21.55	1
		1720	21.49	1
	100RB	1745	21.36	1
		1732.5	21.39	1
		1720	21.37	1
Band 7				
Bandwidth (MHz)	RB	Frequency (MHz)	Actual output power (dBm)	MPR (dB)
10MHz	1RB-Low	2565	21.80	0
		2535	21.63	0
		2505	21.51	0

	1RB-High	2565	21.65	0
		2535	21.83	0
		2505	21.71	0
	25RB	2565	20.57	1
		2535	20.76	1
		2505	20.46	1
	50RB	2565	20.69	1
		2535	20.75	1
		2505	20.54	1
20MHz	1RB-Low	2560	21.16	0
		2535	21.57	0
		2510	21.45	0
	1RB-High	2560	21.48	0
		2535	21.77	0
		2510	22.12	0
	50RB	2560	20.67	1
		2535	20.76	1
		2510	20.94	1
	100RB	2560	20.50	1
		2535	20.83	1
		2510	20.66	1

The conducted power measurement results for 16QAM

Band 4				
Bandwidth (MHz)	RB	Frequency (MHz)	Actual output power (dBm)	MPR (dB)
10MHz	1RB-Low	1750	20.97	1
		1732.5	21.43	1
		1715	21.27	1
	1RB-High	1750	21.22	1
		1732.5	21.40	1
		1715	21.34	1
	25RB	1750	20.07	2
		1732.5	20.35	2
		1715	20.12	2
	50RB	1750	20.30	2
		1732.5	20.68	2
		1715	20.39	2
20MHz	1RB-Low	1745	21.00	1
		1732.5	21.09	1
		1720	21.18	1
	1RB-High	1745	21.01	1
		1732.5	21.05	1
		1720	21.01	1

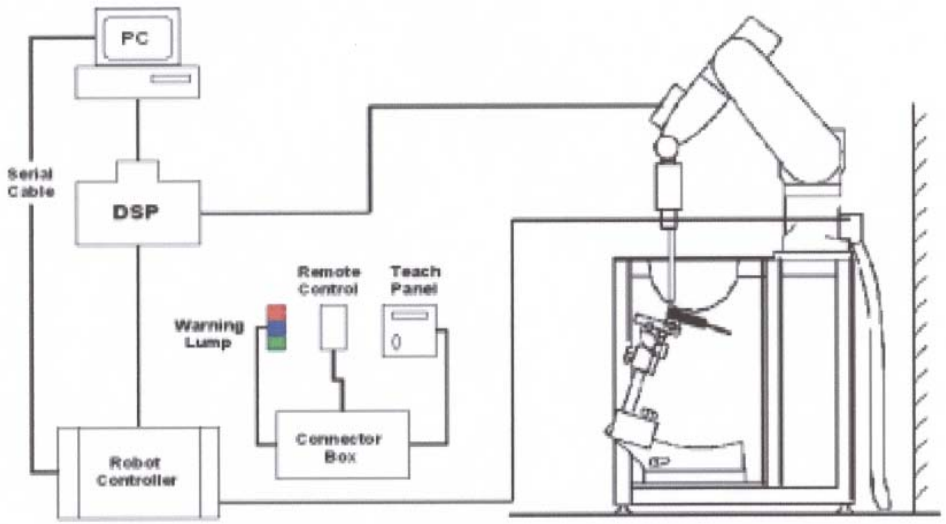
	50RB	1745	20.17	2
		1732.5	20.35	2
		1720	20.29	2
	100RB	1745	20.06	2
		1732.5	20.11	2
		1720	20.16	2
Band 7				
Bandwidth (MHz)	RB	Frequency (MHz)	Actual output power (dBm)	MPR (dB)
10MHz	1RB-Low	2565	20.09	1
		2535	20.59	1
		2505	19.66	1
	1RB-High	2565	20.43	1
		2535	20.65	1
		2505	20.18	1
	25RB	2565	19.61	2
		2535	19.75	2
		2505	19.69	2
	50RB	2565	19.10	2
		2535	19.96	2
		2505	19.06	2
20MHz	1RB-Low	2560	20.16	1
		2535	20.28	1
		2510	20.27	1
	1RB-High	2560	20.33	1
		2535	20.03	1
		2510	20.12	1
	50RB	2560	20.39	2
		2535	19.96	2
		2510	20.07	2
	100RB	2560	19.54	2
		2535	19.75	2
		2510	19.28	2

5.2 SAR Measurement Set-up

These measurements were performed with the automated near-field scanning system DASY4 Professional from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot (working range greater than 0.9m), which positions the probes with a positional repeatability of better than ± 0.02mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines (length =300mm) to the data acquisition unit.

A cell controller system contains the power supply, robot controller, teaches pendant (Joystick),

and remote control, is used to drive the robot motors. The PC consists of the Micron Pentium III 800 MHz computer with Windows 2000 system and SAR Measurement Software DASY4 Professional, A/D interface card, monitor, mouse, and keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.



Picture 1: SAR Lab Test Measurement Set-up

The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer.

5.3 Dasy4 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe has been calibrated according to the standard procedure with an accuracy of better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB.

EX3DV4 Probe Specification

Construction	Symmetrical design with triangular core
	Interleaved sensors
	Built-in shielding against static charges
	PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Basic Broad Band Calibration in air
	Conversion Factors (CF) for HSL 2300
	Additional CF for other liquids and frequencies upon request

Picture 2: EX3DV4 E-field

Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in tissue material (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones

Picture3:EX3DV4 E-field probe

5.4 E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.
E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where: Δt = Exposure time (30 seconds),
C = Heat capacity of tissue (brain or muscle),
ΔT = Temperature increase due to RF exposure.

Or

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

Where:
σ = Simulated tissue conductivity,
ρ = Tissue density (kg/m^3).

Picture 4: Device Holder

5.5 Other Test Equipment

5.5.1 Device Holder for Transmitters

In combination with the Generic Twin Phantom V3.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatable positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

5.5.2 Phantom

The Generic Twin Phantom is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot.

Shell Thickness	2±0. l mm
Filling Volume	Approx. 20 liters
Dimensions	810 x l000 x 500 mm (H x L x W)
Available	Special

Picture 5: Generic Twin Phantom

5.6 Equivalent Tissues

The liquid used for the frequency range of 800-3000 MHz consisted of water, Glycol monobutyl, and salt. The liquid has been previously proven to be suited for worst-case. The Table 1 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528.

Table 1: Composition of the Body Tissue Equivalent Matter

1750 MHz	
MIXTURE%	FREQUENCY 1750 MHz
Water	69.91
Glycol monobutyl	29.96
Salt	0.13
Dielectric Parameters Target Value	f=1750 MHz ε=53.4 σ=1.49
2550 MHz	
MIXTURE %	FREQUENCY 2550MHz
Water	72.37
Tween 20	27.55
Salt	0.08
Dielectric Parameters Target Value	f=2550MHz ε=52.6 σ=2.09

5.7 System Specifications

Specifications

Positioner: Stäubli Unimation Corp. Robot Model: RX90L
Repeatability: ±0.02 mm
No. of Axis: 6

Data Acquisition Electronic (DAE) System

Cell Controller

Processor: Pentium III
Clock Speed: 800 MHz
Operating System: Windows 2000

Data Converter

Features: Signal Amplifier, multiplexer, A/D converter, and control logic
Software Version: DASY4.7 build 80
Connecting Lines: Optical downlink for data and status info.
Optical uplink for commands and clock

6 TEST RESULTS

6.1 Dielectric Performance

Table 2: Dielectric Performance of Body Tissue Simulating Liquid

Measurement is made at temperature 23.0 °C and relative humidity 40%. Measurement Date: 2550 MHz **October 18, 2011**			
/	**Frequency**	**Permittivity ε**	**Conductivity σ (S/m)**
Target value	2550 MHz	52.6	2.09
Measurement value (Average of 10 tests)	2550 MHz	51.8	2.07
Deviation	2550 MHz	-1.52%	-0.96%

Measurement is made at temperature 23.0 °C and relative humidity 35%. Measurement Date: 1750 MHz **December 26, 2011**			
/	**Frequency**	**Permittivity ε**	**Conductivity σ (S/m)**
Target value	1750 MHz	53.4	1.49
Measurement value (Average of 10 tests)	1750 MHz	52.9	1.47
Deviation	1750 MHz	-0.94%	-1.34%

Measurement is made at temperature 23.0 °C and relative humidity 35%. Measurement Date: 2550 MHz **December 27, 2011**			
/	**Frequency**	**Permittivity ε**	**Conductivity σ (S/m)**
Target value	2550 MHz	52.6	2.09
Measurement value (Average of 10 tests)	2550 MHz	51.9	2.06
Deviation	2550 MHz	-1.33%	-1.44%

Measurement is made at temperature 23.0 °C and relative humidity 36%. Measurement Date: 1750 MHz **January 29, 2012**			
/	**Frequency**	**Permittivity ε**	**Conductivity σ (S/m)**
Target value	1750 MHz	53.4	1.49
Measurement value (Average of 10 tests)	1750 MHz	52.8	1.48
Deviation	1750 MHz	-1.12%	-0.67%

6.2 System Validation

Table 3: System Validation of Body

Measurement is made at temperature 23.0 °C and relative humidity 40%. Measurement Date: 2550 MHz **October 18, 2011**							
Liquid parameters	Dipole calibration Target value	**Frequency**		**Permittivity ε**		**Conductivity σ(S/m)**	
		2550 MHz		52.3		2.04	
	Actual Measurement value	2550 MHz		51.8		2.07	
	Deviation	2550 MHz		-0.96%		1.47%	
Verification results	**Frequency**	**Target value(W/kg)**		**Measured value(W/kg)**		**Deviation**	
		10 g Average	**1 g Average**	**10 g Average**	**1 g Average**	**10 g Average**	**1 g Average**
	2550 MHz	24.8	55.3	25.5	56.0	2.82%	1.27%

Measurement is made at temperature 23.0 °C and relative humidity 35%. Measurement Date: 1750 MHz **December 26, 2011**				
Liquid parameters	Dipole calibration Target value	**Frequency**	**Permittivity ε**	**Conductivity σ(S/m)**
		1750 MHz	53.1	1.45
	Actual Measurement value	1750 MHz	52.9	1.47
	Deviation	1750 MHz	-0.38%	1.38%

Verification results	Frequency	Target value(W/kg)		Measured value(W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
	1750 MHz	20.3	38.0	20.4	38.7	0.49%	1.84%

Measurement is made at temperature 23.0 °C and relative humidity 35%. Measurement Date: 2550 MHz **December 27, 2011**				
Liquid parameters	Dipole calibration Target value	**Frequency**	**Permittivity ε**	**Conductivity σ(S/m)**
		2550 MHz	52.3	2.04
	Actual Measurement value	2550 MHz	51.9	2.06
	Deviation	2550 MHz	-0.76%	0.98%

Verification results	Frequency	Target value(W/kg)		Measured value(W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
	2550 MHz	24.8	55.3	25.12	55.6	1.29%	0.54%

Measurement is made at temperature 23.0 °C and relative humidity 36%. Measurement Date: 1750 MHz **January 29, 2012**				
Liquid parameters	Dipole calibration Target value	**Frequency**	**Permittivity ε**	**Conductivity σ(S/m)**
		1750 MHz	53.1	1.45
	Actual Measurement value	1750 MHz	52.8	1.48
	Deviation	1750 MHz	0.56%	2.07%

Verification results	Frequency	Target value(W/kg)		Measured value(W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
	1750 MHz	20.3	38.0	20.16	38.48	-0.69%	1.26%

6.3 Summary of Measurement Results

Table 4: SAR Values – LTE BAND 4

Limit of SAR (W/kg)		10 g Average	1 g Average	Power Drift (dB)
		2.0	1.6	
Test Case		Measurement Result (W/kg)		
		10 g Average	1 g Average	
Position 1	QPSK_20MHz_50RB, High frequency (See Figure 1)	0.649	1.11	0.074
	QPSK_20MHz_50RB, Mid frequency (See Figure 2)	0.636	1.09	0.058
	QPSK_20MHz_50RB, Low frequency (See Figure 3)	0.697	1.20	0.091
	QPSK_20MHz_1RB_High, Low frequency (See Figure 4)	0.726	1.23	-0.115
	QPSK_20MHz_1RB_Low, Mid frequency (See Figure 5)	0.705	1.22	-0.044
	16QAM_20MHz_50RB, Low frequency (See Figure 6)	0.560	0.983	0.071
	16QAM _20MHz_1RB_High, Mid frequency (See Figure 7)	0.586	1.01	-0.068
	16QAM _20MHz_1RB_Low, Low frequency (See Figure 8)	0.808	1.41	-0.024
Position 2	QPSK_20MHz_50RB, Mid frequency (See Figure 9)	0.374	0.622	0.072
	QPSK_20MHz_1RB_High, Low frequency (See Figure 10)	0.362	0.585	0.066
	QPSK_20MHz_1RB_Low, Mid frequency (See Figure 11)	0.465	0.752	-0.010
	16QAM_20MHz_50RB, Mid frequency (See Figure 12)	0.224	0.364	-0.138
	16QAM _20MHz_1RB_High, Mid frequency (See Figure 13)	0.352	0.568	0.098
	16QAM _20MHz_1RB_Low, Low frequency (See Figure 14)	0.396	0.645	0.163
Position 3	QPSK_20MHz_50RB, Mid frequency (See Figure 15)	0.052	0.084	-0.095
	QPSK_20MHz_1RB_High, Low frequency (See Figure 16)	0.075	0.119	0.110
	QPSK_20MHz_1RB_Low, Mid frequency (See Figure 17)	0.070	0.110	0.111
	16QAM_20MHz_50RB, Mid frequency (See Figure 18)	0.044	0.070	0.145
	16QAM _20MHz_1RB_High, Mid frequency (See Figure 19)	0.062	0.100	-0.129
	16QAM _20MHz_1RB_Low, Low frequency (See Figure 20)	0.065	0.104	0.117
Position 4	QPSK_20MHz_50RB, Mid frequency (See Figure 21)	0.256	0.451	0.052
	QPSK_20MHz_1RB_High, Low frequency (See Figure 22)	0.418	0.735	-0.100
	QPSK_20MHz_1RB_Low, Mid frequency (See Figure 23)	0.361	0.637	-0.026
	16QAM_20MHz_50RB, Mid frequency (See Figure 24)	0.216	0.381	-0.028
	16QAM _20MHz_1RB_High, Mid frequency (See Figure 25)	0.295	0.522	0.137
	16QAM _20MHz_1RB_Low, Low frequency (See Figure 26)	0.403	0.705	-0.001
Position 5	QPSK_20MHz_50RB, Mid frequency (See Figure 27)	0.335	0.616	-0.018
	QPSK_20MHz_1RB_High, Low frequency (See Figure 28)	0.482	0.867	-0.071
	QPSK_20MHz_1RB_Low, Mid frequency (See Figure 29)	0.455	0.803	-0.069
	16QAM_20MHz_50RB, Mid frequency (See Figure 30)	0.269	0.479	0.146
	16QAM _20MHz_1RB_High, Mid frequency (See Figure 31)	0.326	0.574	-0.139
	16QAM _20MHz_1RB_Low, Low frequency (See Figure 32)	0.553	0.995	-0.170

Table 5: SAR Values – LTE BAND 7

Limit of SAR (W/kg)		10 g Average	1 g Average	Power Drift (dB)
		2.0	1.6	
Test Case		Measurement Result (W/kg)		
		10 g Average	1 g Average	
Position 1	QPSK_20MHz_50RB, High frequency (See Figure 33)	0.527	1.09	0.014
	QPSK_20MHz_50RB, Mid frequency (See Figure 34)	0.642	1.36	-0.057
	QPSK_20MHz_50RB, Low frequency (See Figure 35)	0.530	1.16	0.101
	QPSK_20MHz_1RB_High, Low frequency (See Figure 36)	0.669	1.43	-0.051
	QPSK_20MHz_1RB_Low, Mid frequency (See Figure 37)	0.682	1.41	0.007
	16QAM_20MHz_50RB, Mid frequency (See Figure 38)	0.493	1.05	0.018
	16QAM _20MHz_1RB_High, Mid frequency (See Figure 39)	0.678	1.4	-0.171
	16QAM _20MHz_1RB_Low, Mid frequency (See Figure 40)	0.660	1.39	0.117
Position 2	QPSK_20MHz_50RB, Mid frequency (See Figure 41)	0.225	0.390	-0.058
	QPSK_20MHz_1RB_High, Low frequency (See Figure 42)	0.229	0.412	-0.122
	QPSK_20MHz_1RB_Low, Mid frequency (See Figure 43)	0.300	0.539	-0.042
	16QAM_20MHz_50RB, Mid frequency (See Figure 44)	0.199	0.358	0.016
	16QAM _20MHz_1RB_High, Mid frequency (See Figure 45)	0.258	0.454	-0.163
	16QAM _20MHz_1RB_Low, Mid frequency (See Figure 46)	0.248	0.449	0.032
Position 3	QPSK_20MHz_50RB, Mid frequency (See Figure 47)	0.064	0.122	0.088
	QPSK_20MHz_1RB_High, Low frequency (See Figure 48)	0.051	0.098	0.007
	QPSK_20MHz_1RB_Low, Mid frequency (See Figure 49)	0.067	0.125	-0.165
	16QAM_20MHz_50RB, Mid frequency (See Figure 50)	0.042	0.078	0.052
	16QAM _20MHz_1RB_High, Mid frequency (See Figure 51)	0.064	0.120	0.154
	16QAM _20MHz_1RB_Low, Mid frequency (See Figure 52)	0.055	0.103	0.129
Position 4	QPSK_20MHz_50RB, Mid frequency (See Figure 53)	0.264	0.562	-0.021
	QPSK_20MHz_1RB_High, Low frequency (See Figure 54)	0.283	0.578	-0.099
	QPSK_20MHz_1RB_Low, Mid frequency (See Figure 55)	0.305	0.650	-0.170
	16QAM_20MHz_50RB, Mid frequency (See Figure 56)	0.200	0.428	-0.079
	16QAM _20MHz_1RB_High, Mid frequency (See Figure 57)	0.237	0.503	-0.109
	16QAM _20MHz_1RB_Low, Mid frequency (See Figure 58)	0.260	0.556	-0.084
Position 5	QPSK_20MHz_50RB, Mid frequency (See Figure 59)	0.168	0.328	-0.183
	QPSK_20MHz_1RB_High, Low frequency (See Figure 60)	0.126	0.241	-0.047
	QPSK_20MHz_1RB_Low, Mid frequency (See Figure 61)	0.193	0.372	-0.078
	16QAM_20MHz_50RB, Mid frequency (See Figure 62)	0.127	0.245	0.016
	16QAM _20MHz_1RB_High, Mid frequency (See Figure 63)	0.162	0.314	0.029
	16QAM _20MHz_1RB_Low, Mid frequency (See Figure 64)	0.158	0.303	0.019

6.4 Conclusion

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 4.2 of this report. Maximum localized SAR is below exposure limits specified in the relevant standards cited in Clause 4.1 of this test report.

The maximum SAR values are obtained at the case of **LTE BAND 7**, **QPSK_20MHz_1RB_High Position 1, Low frequency (Table 5)**, and the value is: **0.669(10g), 1.43(1g).**

7 Measurement Uncertainty

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	5.5	N	1	1	1	5.5	5.5	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
4	Probe modulation response	B	2.4	R	$\sqrt{3}$	1	1	1.4	1.4	∞
5	Detection limit	B	1	N	1	1	1	0.6	0.6	∞
6	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
7	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
8	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
9	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
10	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
12	Probe positioned mech. restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
13	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
14	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample related										
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
17	Power scaling	B	0	R	$\sqrt{3}$	1	1	0	0	∞
18	Drift of output	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞

	power									
Phantom and set-up										
19	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
20	Algorithm for correcting SAR for deviations in permittivity and conductivity	B	1.9	R	$\sqrt{3}$	1	0.84	1.1	0.9	∞
21	Liquid conductivity (meas.)	A	2.06	N	1	0.78	0.71	1.61	1.46	43
22	Liquid permittivity (meas.)	A	1.6	N	1	0.26	0.26	0.4	0.4	521
23	Liquid conductivity -temperature uncertainty	B	1.42	R	$\sqrt{3}$	0.78	0.71	0.64	0.58	∞
24	Liquid permittivity - temperature uncertainty	B	0.55	R	$\sqrt{3}$	0.23	0.26	0.07	0.08	∞
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{24} c_i^2 u_i^2}$						9.33	9.27	265
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						18.7	18.5	

8 MAIN TEST INSTRUMENTS

Table 6: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	E5071C	MY46110673	February 15, 2011	One year
02	Power meter	NRVD	102083	September 11, 2011	One year
03	Power sensor	NRV-Z5	100595		
04	Signal Generator	E4438C	MY49070393	November 12, 2011	One Year
05	Amplifier	VTL5400	0505	No Calibration Requested	
06	E-field Probe	SPEAG EX3DV4	3617	July 8, 2011	One year
07	E-field Probe	SPEAG ES3DV3	3149	September 24, 2011	One year
08	DAE	SPEAG DAE4	771	November 20, 2011	One year
09	Dipole Validation Kit	SPEAG D1750V2	1003	September 29,2011	Three years
10	Dipole Validation Kit	SPEAG D2550V2	1002	September 27,2010	Three years

END OF REPORT BODY

ANNEX A MEASUREMENT PROCESS

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the reference point was measured and was used as a reference value for assessing the power drop.

Step 2: The SAR distribution at the exposed side of the phantom was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the flat phantom and the horizontal grid spacing was 10 mm x 10 mm. Based on this data, the area of the maximum absorption was determined by spline interpolation.

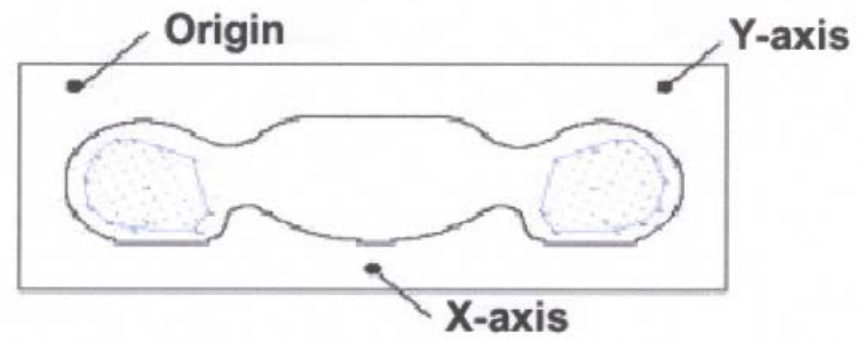
Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7 x 7x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

b. The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 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 integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

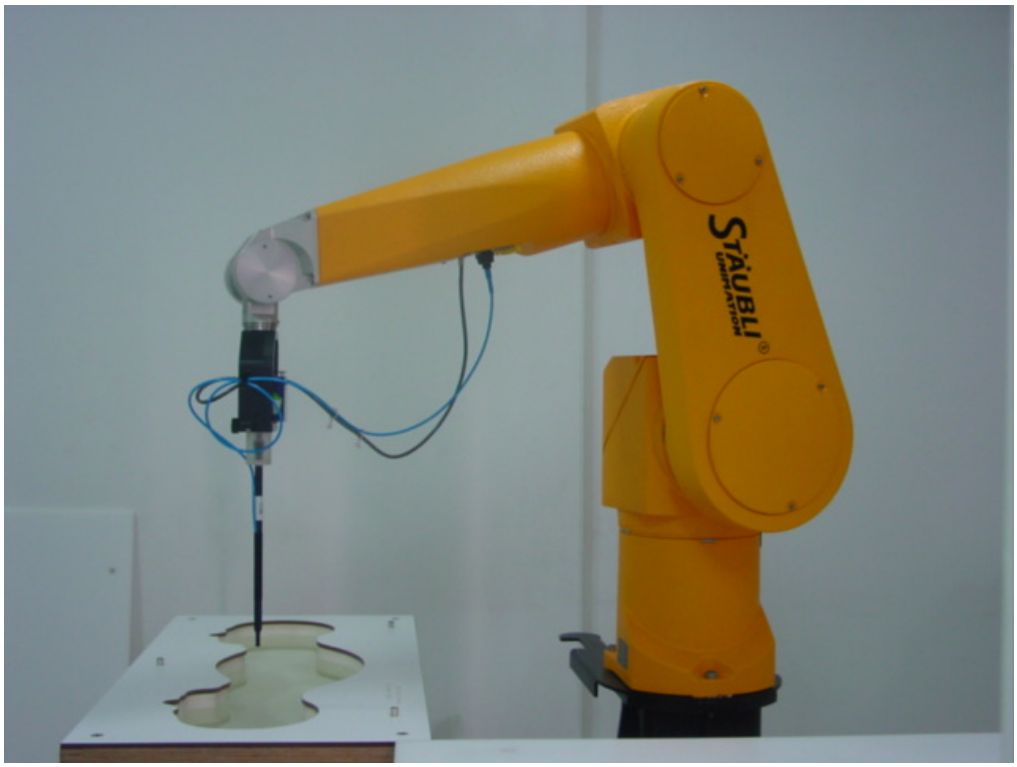
c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation is repeated.



Picture A: SAR Measurement Points in Area Scan

ANNEX B TEST LAYOUT



Picture B1: Specific Absorption Rate Test Layout

ANNEX C GRAPH RESULTS

LTE BAND 4, Position 1 High Frequency QPSK_20MHz_50RB

Date/Time: 2012-1-29 8:26:35
Electronics: DAE4 Sn771
Medium: Body 1800 MHz
Medium parameters used: f = 1745 MHz; σ = 1.48 mho/m; εr = 52.8; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1745 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 1/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.27 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.3 V/m; Power Drift = 0.074 dB
Peak SAR (extrapolated) = 1.78 W/kg
SAR(1 g) = 1.11 mW/g; SAR(10 g) = 0.649 mW/g
Maximum value of SAR (measured) = 1.20 mW/g

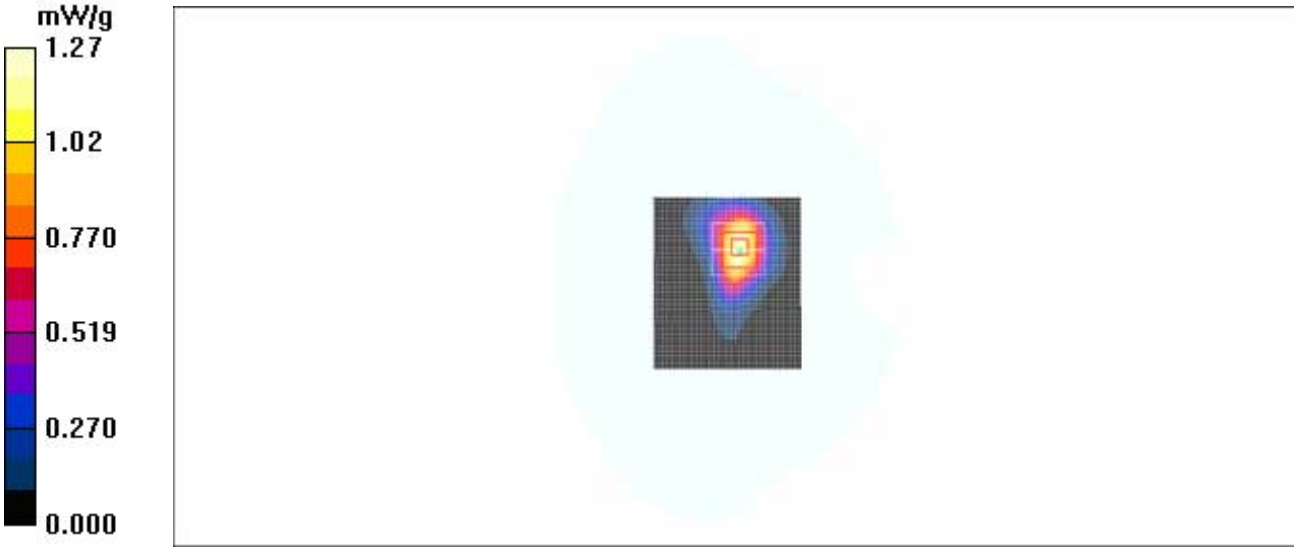


Fig.1 LTE BAND 4 High

LTE BAND 4, Position 1 Middle Frequency QPSK_20MHz_50RB
Date/Time: 2012-1-29 8:11:08
Electronics: DAE4 Sn771
Medium: Body 1800 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.47 mho/m; εr = 52.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 1/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.24 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.5 V/m; Power Drift = 0.058 dB
Peak SAR (extrapolated) = 1.77 W/kg
SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.636 mW/g
Maximum value of SAR (measured) = 1.19 mW/g

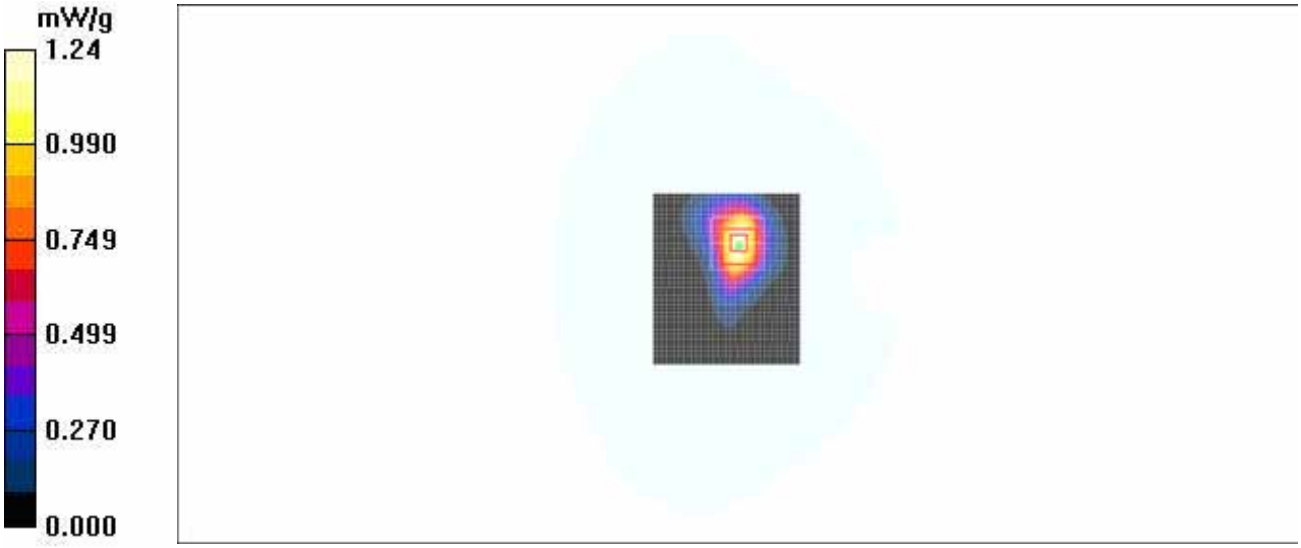


Fig.2 LTE BAND 4 Middle

LTE BAND 4, Position 1 Low Frequency QPSK_20MHz_50RB
Date/Time: 2012-1-29 8:41:57
Electronics: DAE4 Sn771
Medium: Body 1800 MHz
Medium parameters used: f = 1720 MHz; σ = 1.47 mho/m; εr = 53; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1720 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 1/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.35 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.9 V/m; Power Drift = 0.091 dB
Peak SAR (extrapolated) = 1.93 W/kg
SAR(1 g) = 1.20 mW/g; SAR(10 g) = 0.697 mW/g
Maximum value of SAR (measured) = 1.31 mW/g

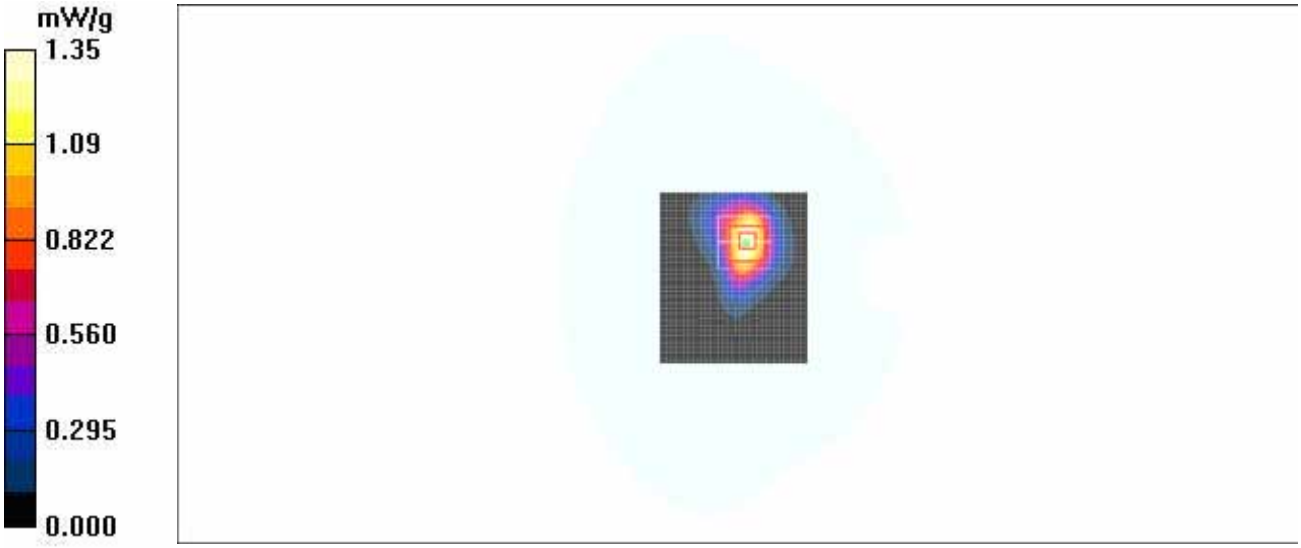


Fig.3 LTE BAND 4 Low

LTE BAND 4, Position 1 Low Frequency QPSK_20MHz_1RB_High
Date/Time: 2012-1-29 10:05:42
Electronics: DAE4 Sn771
Medium: Body 1800 MHz
Medium parameters used: f = 1720 MHz; σ = 1.47 mho/m; εr = 53; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1720 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 1/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.39 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.1 V/m; Power Drift = -0.115 dB
Peak SAR (extrapolated) = 1.95 W/kg
SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.726 mW/g
Maximum value of SAR (measured) = 1.32 mW/g

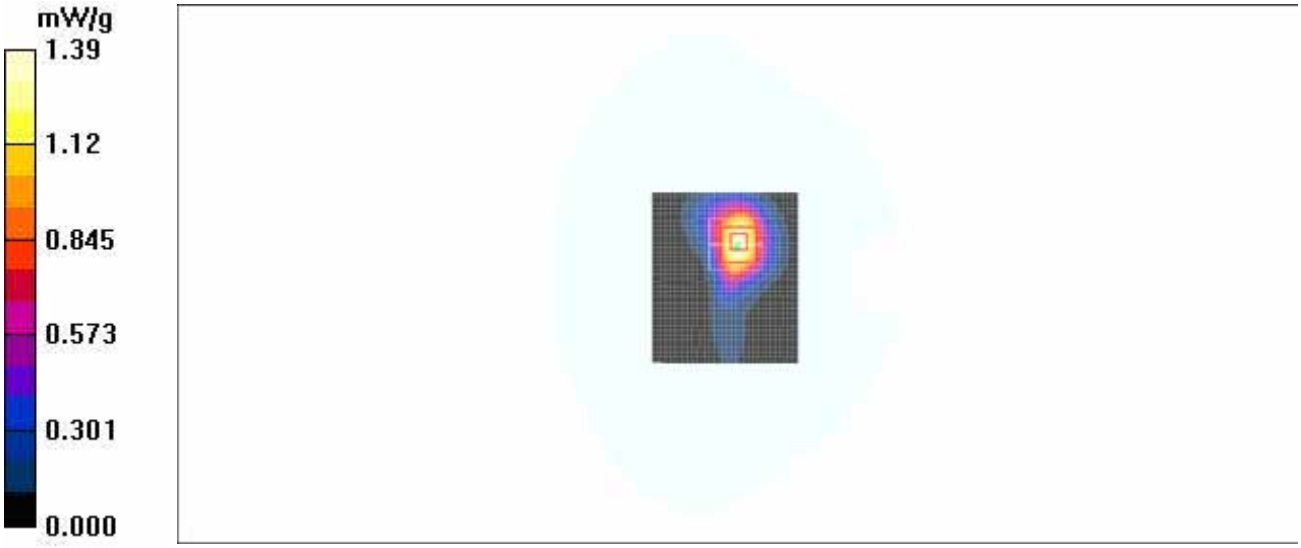


Fig.4 LTE BAND 4 Low

LTE BAND 4, Position 1 Middle Frequency QPSK_20MHz_1RB_Low
Date/Time: 2012-1-29 13:22:16
Electronics: DAE4 Sn771
Medium: Body 1800 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.47 mho/m; εr = 52.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 1/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.42 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 25.6 V/m; Power Drift = -0.044 dB
Peak SAR (extrapolated) = 1.97 W/kg
SAR(1 g) = 1.22 mW/g; SAR(10 g) = 0.705 mW/g
Maximum value of SAR (measured) = 1.31 mW/g

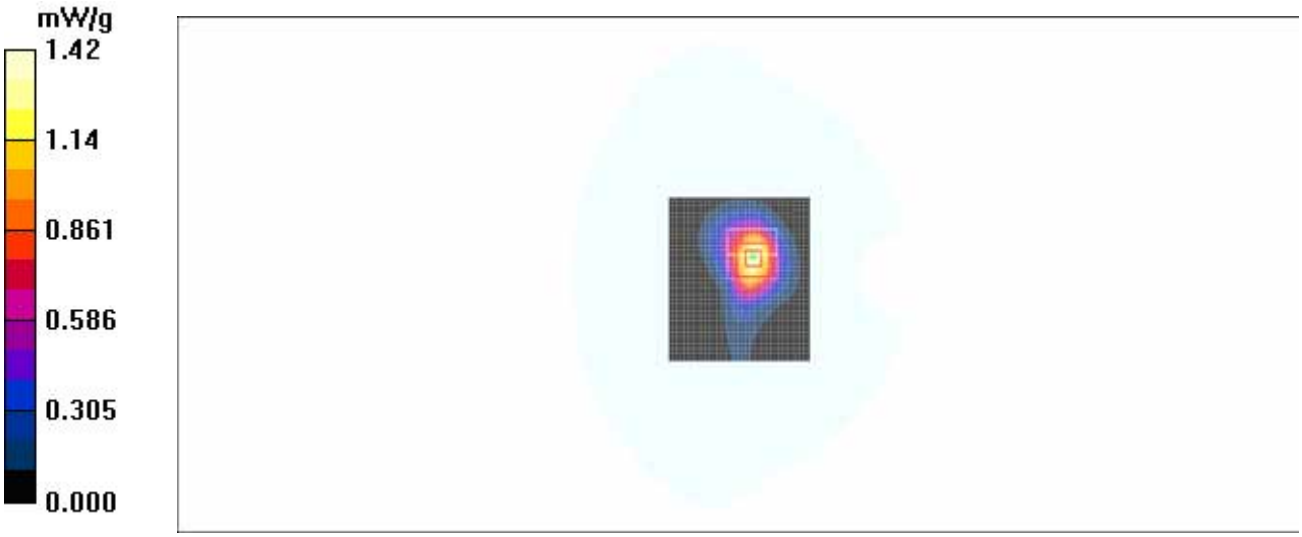


Fig.5 LTE BAND 4 Middle

LTE BAND 4, Position 1 Low Frequency 16QAM_20MHz_50RB
Date/Time: 2012-1-29 10:42:10
Electronics: DAE4 Sn771
Medium: Body 1800 MHz
Medium parameters used: f = 1720 MHz; σ = 1.47 mho/m; εr = 53; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1720 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 1/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.13 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.5 V/m; Power Drift = 0.071 dB
Peak SAR (extrapolated) = 1.58 W/kg
SAR(1 g) = 0.983 mW/g; SAR(10 g) = 0.560 mW/g
Maximum value of SAR (measured) = 1.08 mW/g

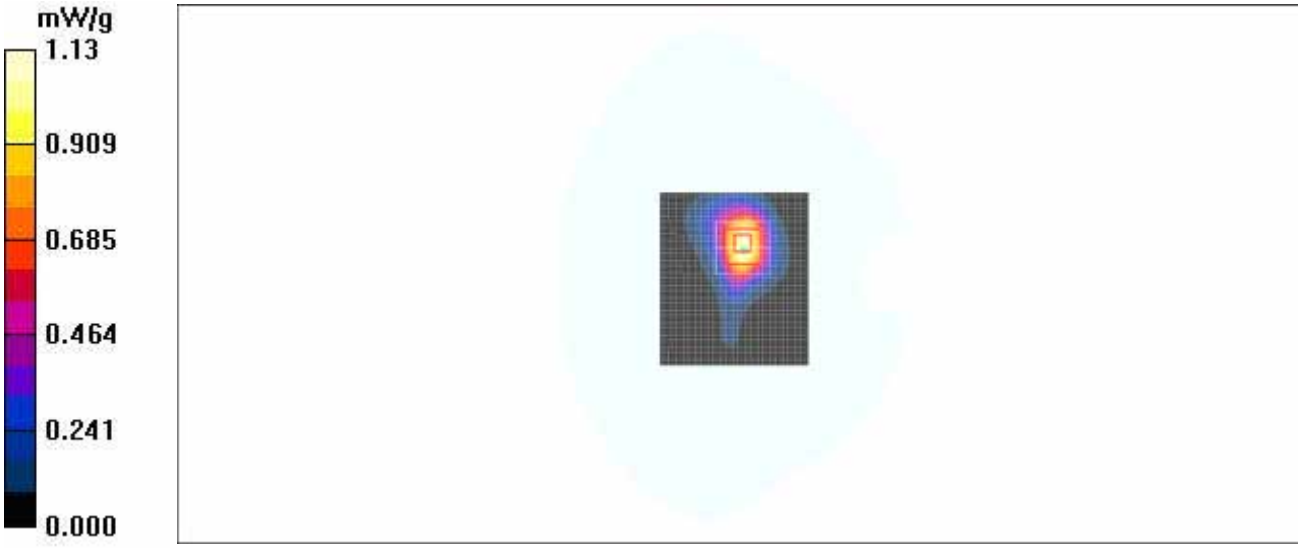


Fig.6 LTE BAND 4 Low

LTE BAND 4, Position 1 Middle Frequency 16QAM_20MHz_1RB_High
Date/Time: 2012-1-29 13:50:24
Electronics: DAE4 Sn771
Medium: Body 1800 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.47 mho/m; εr = 52.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 1/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.18 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.0 V/m; Power Drift = -0.068 dB
Peak SAR (extrapolated) = 1.64 W/kg
SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.586 mW/g
Maximum value of SAR (measured) = 1.10 mW/g

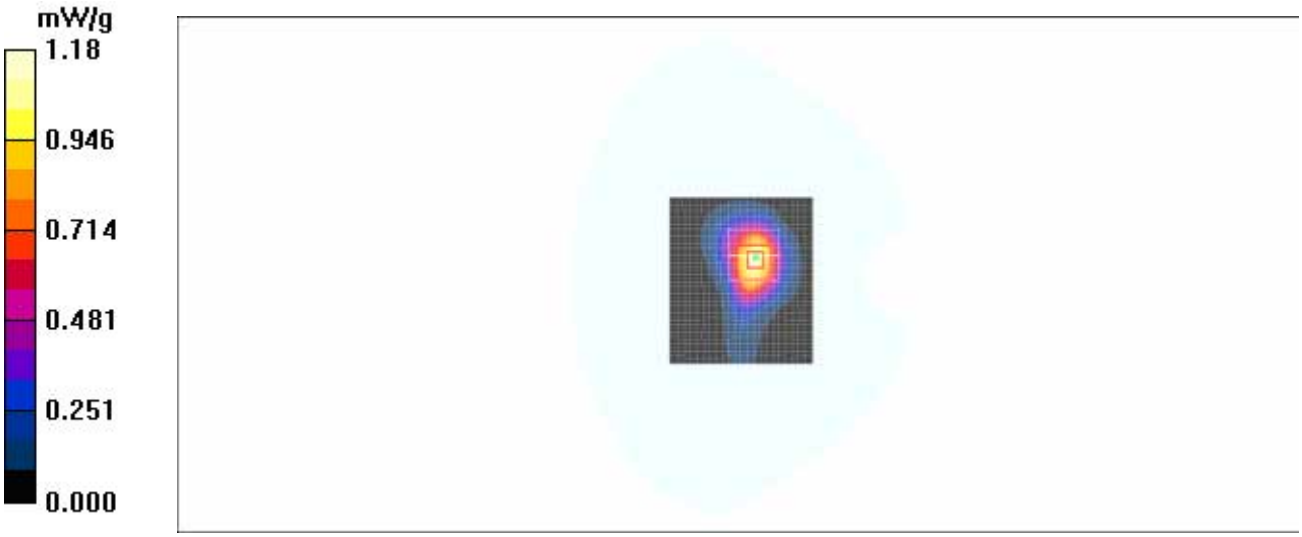


Fig.7 LTE BAND 4 Middle

LTE BAND 4, Position 1 Low Frequency 16QAM_20MHz_1RB_Low
Date/Time: 2012-1-29 11:15:17
Electronics: DAE4 Sn771
Medium: Body 1800 MHz
Medium parameters used: f = 1720 MHz; σ = 1.47 mho/m; εr = 53; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1720 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 1/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.63 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 26.5 V/m; Power Drift = -0.024 dB
Peak SAR (extrapolated) = 2.29 W/kg
SAR(1 g) = 1.41 mW/g; SAR(10 g) = 0.808 mW/g
Maximum value of SAR (measured) = 1.53 mW/g

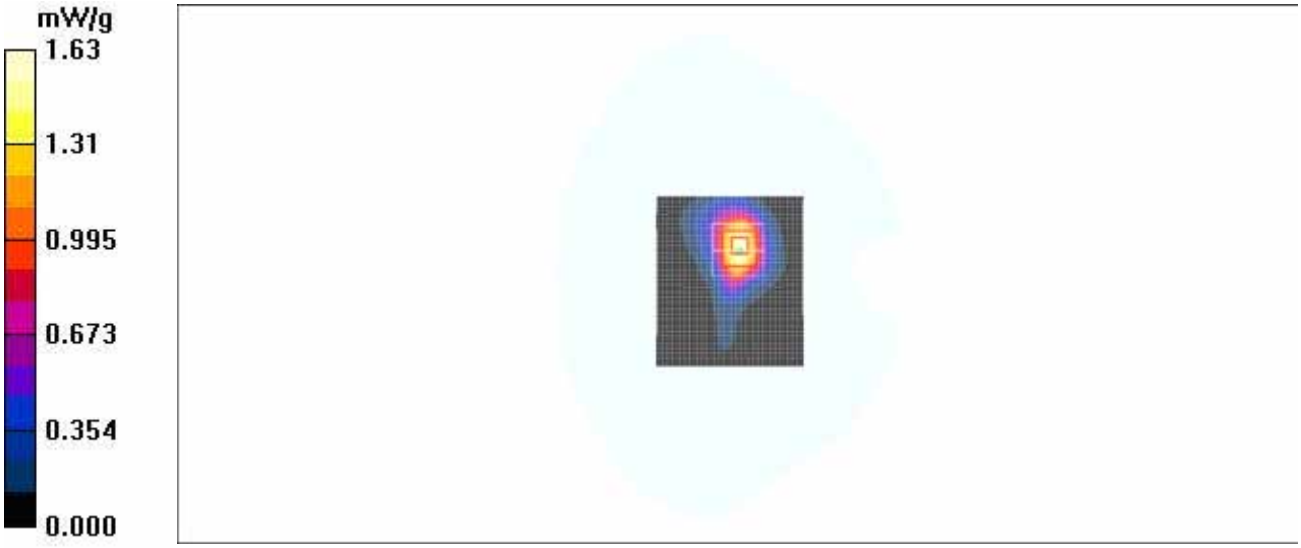


Fig.8 LTE BAND 4 Low

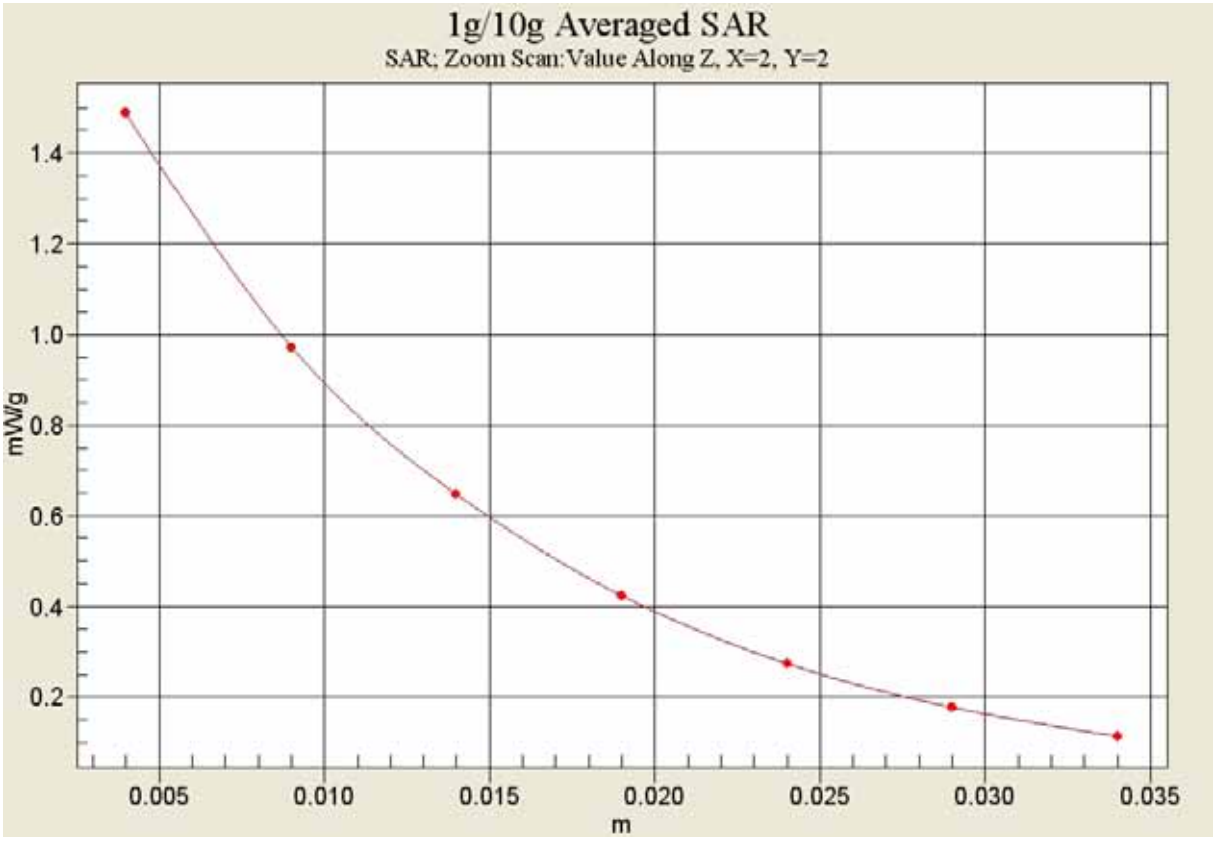


Fig. 8-1 Z-Scan at power reference point (LTE BAND 4 Low)

LTE BAND 4, Position 2 Middle Frequency QPSK_20MHz_50RB
Date/Time: 2012-1-29 8:58:26
Electronics: DAE4 Sn771
Medium: Body 1800 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.47 mho/m; εr = 52.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 2/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.688 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.3 V/m; Power Drift = 0.072 dB
Peak SAR (extrapolated) = 0.956 W/kg
SAR(1 g) = 0.622 mW/g; SAR(10 g) = 0.374 mW/g
Maximum value of SAR (measured) = 0.669 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.3 V/m; Power Drift = 0.072 dB
Peak SAR (extrapolated) = 0.791 W/kg
SAR(1 g) = 0.472 mW/g; SAR(10 g) = 0.259 mW/g
Maximum value of SAR (measured) = 0.525 mW/g

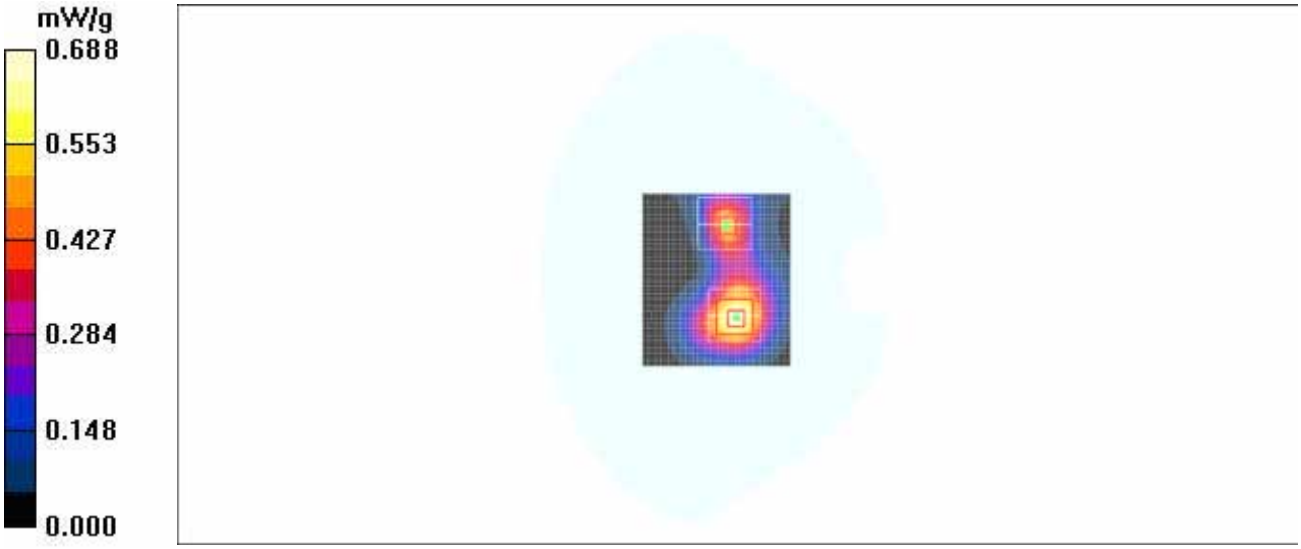


Fig.9 LTE BAND 4 Middle

LTE BAND 4, Position 2 Low Frequency QPSK_20MHz_1RB_High
Date/Time: 2011-12-26 17:05:13
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1720 MHz; σ = 1.45 mho/m; εr = 53.1; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1720 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 2/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.618 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.6 V/m; Power Drift = 0.066 dB
Peak SAR (extrapolated) = 0.926 W/kg
SAR(1 g) = 0.585 mW/g; SAR(10 g) = 0.362 mW/g
Maximum value of SAR (measured) = 0.631 mW/g

Test Position 2 Low 20M-1RB-High/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.6 V/m; Power Drift = 0.066 dB
Peak SAR (extrapolated) = 0.737 W/kg
SAR(1 g) = 0.439 mW/g; SAR(10 g) = 0.252 mW/g
Maximum value of SAR (measured) = 0.476 mW/g

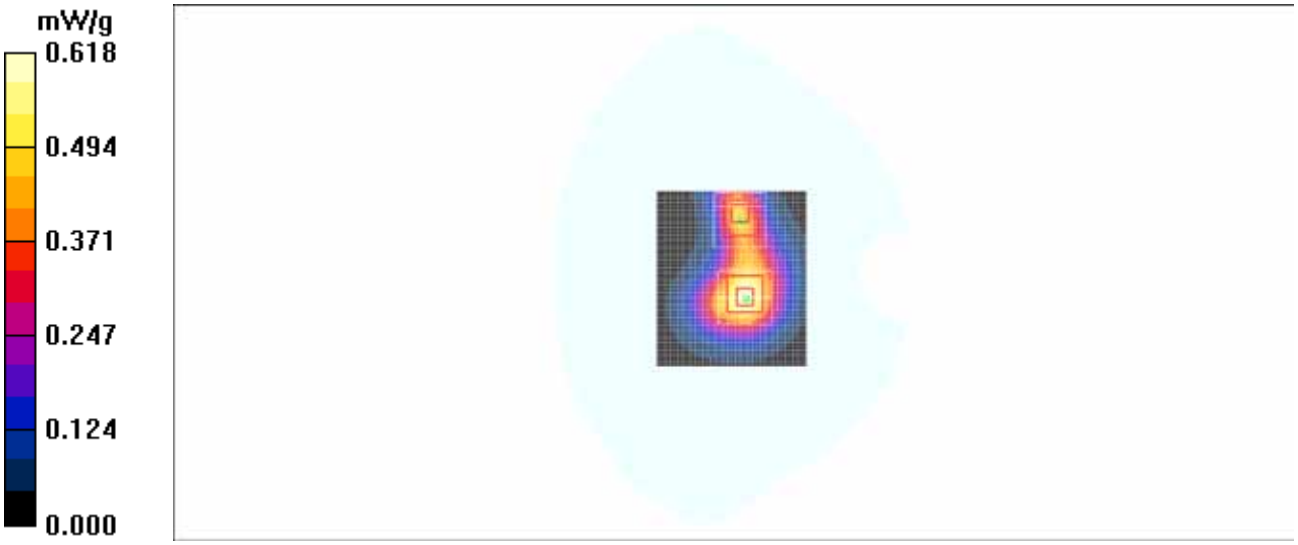


Fig.10 LTE BAND 4 Low

LTE BAND 4, Position 2 Middle Frequency QPSK_20MHz_1RB_Low
Date/Time: 2011-12-26 17:21:18
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.46 mho/m; εr = 53; ρ = 1000 kg/m3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 2/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.829 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.5 V/m; Power Drift = -0.010 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.752 mW/g; SAR(10 g) = 0.465 mW/g
Maximum value of SAR (measured) = 0.807 mW/g

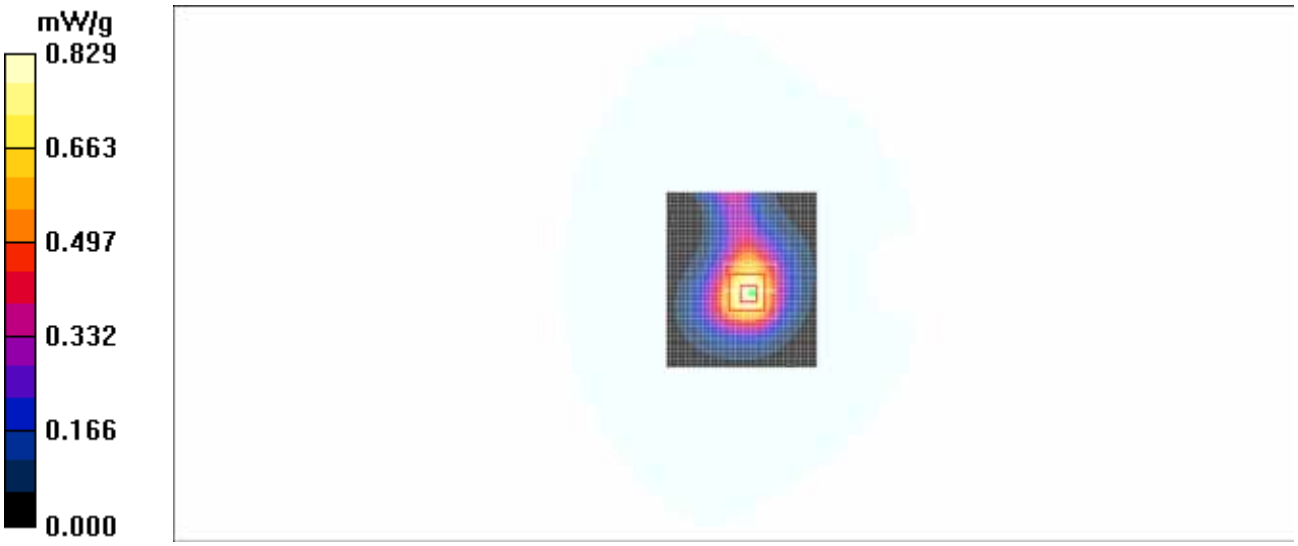


Fig.11 LTE BAND 4 Middle

LTE BAND 4, Position 2 Middle Frequency 16QAM_20MHz_50RB
Date/Time: 2011-12-26 17:37:26
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.46 mho/m; εr = 53; ρ = 1000 kg/m3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 2/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.428 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.4 V/m; Power Drift = -0.138 dB
Peak SAR (extrapolated) = 0.567 W/kg
SAR(1 g) = 0.364 mW/g; SAR(10 g) = 0.224 mW/g
Maximum value of SAR (measured) = 0.391 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.4 V/m; Power Drift = -0.138 dB
Peak SAR (extrapolated) = 0.415 W/kg
SAR(1 g) = 0.254 mW/g; SAR(10 g) = 0.157 mW/g
Maximum value of SAR (measured) = 0.275 mW/g

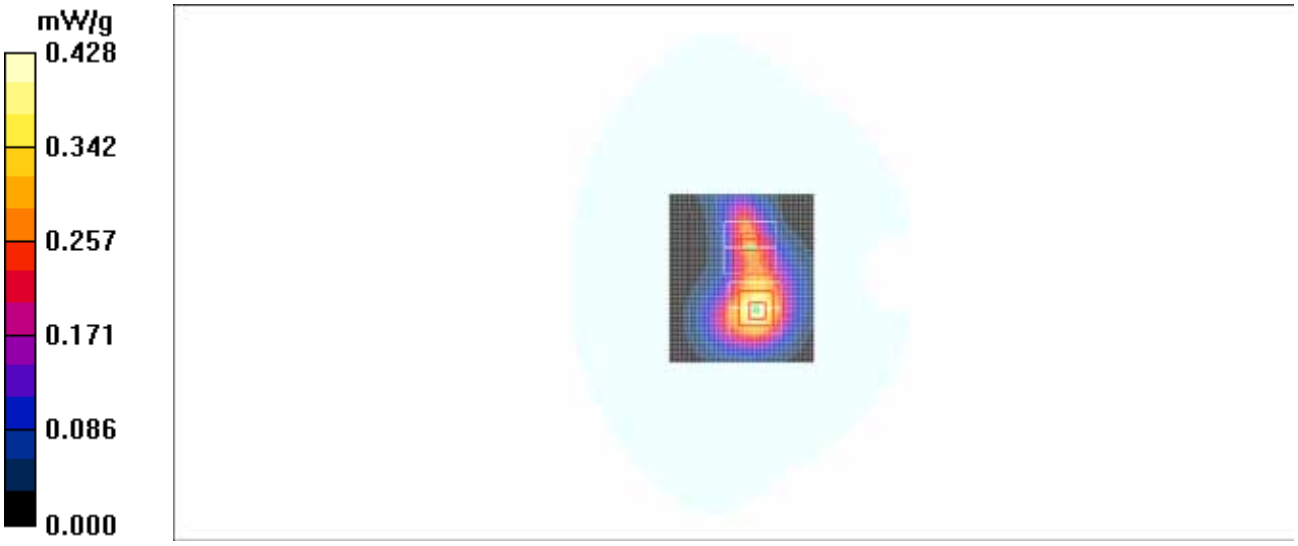


Fig.12 LTE BAND 4 Middle

LTE BAND 4, Position 2 Middle Frequency 16QAM_20MHz_1RB_High
Date/Time: 2011-12-26 17:53:33
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.46 mho/m; εr = 53; ρ = 1000 kg/m3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 2/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.625 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.8 V/m; Power Drift = 0.098 dB
Peak SAR (extrapolated) = 0.903 W/kg
SAR(1 g) = 0.568 mW/g; SAR(10 g) = 0.352 mW/g
Maximum value of SAR (measured) = 0.607 mW/g

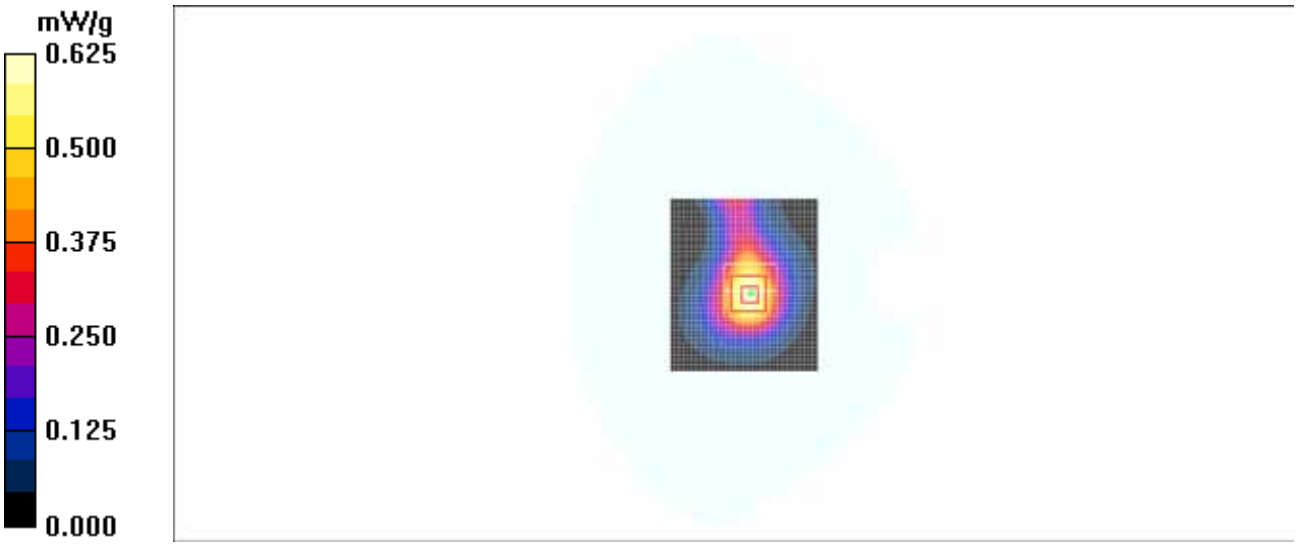


Fig.13 LTE BAND 4 Middle

LTE BAND 4, Position 2 Low Frequency 16QAM_20MHz_1RB_Low

Date/Time: 2011-12-26 18:09:50
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1720 MHz; σ = 1.45 mho/m; εr = 53.1; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1720 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 2/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.734 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.2 V/m; Power Drift = 0.163 dB
Peak SAR (extrapolated) = 1.01 W/kg
SAR(1 g) = 0.645 mW/g; SAR(10 g) = 0.396 mW/g
Maximum value of SAR (measured) = 0.702 mW/g

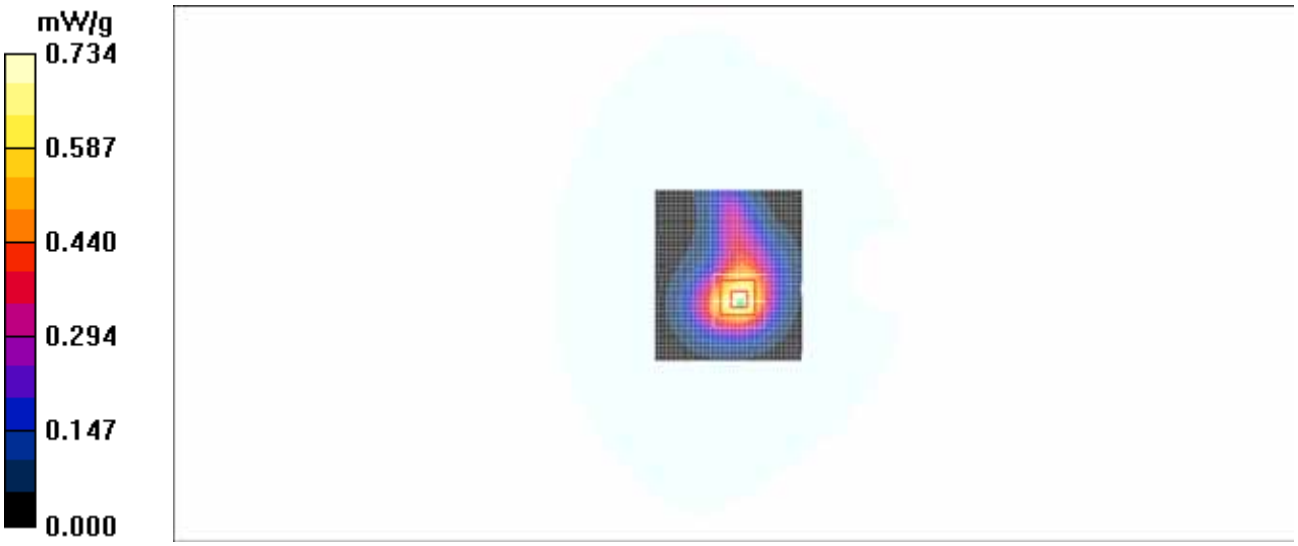


Fig.14 LTE BAND 4 Low

LTE BAND 4, Position 3 Middle Frequency QPSK_20MHz_50RB
Date/Time: 2012-1-29 9:14:55
Electronics: DAE4 Sn771
Medium: Body 1800 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.47 mho/m; εr = 52.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 3/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.092 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.87 V/m; Power Drift = -0.095 dB
Peak SAR (extrapolated) = 0.131 W/kg
SAR(1 g) = 0.084 mW/g; SAR(10 g) = 0.052 mW/g
Maximum value of SAR (measured) = 0.091 mW/g

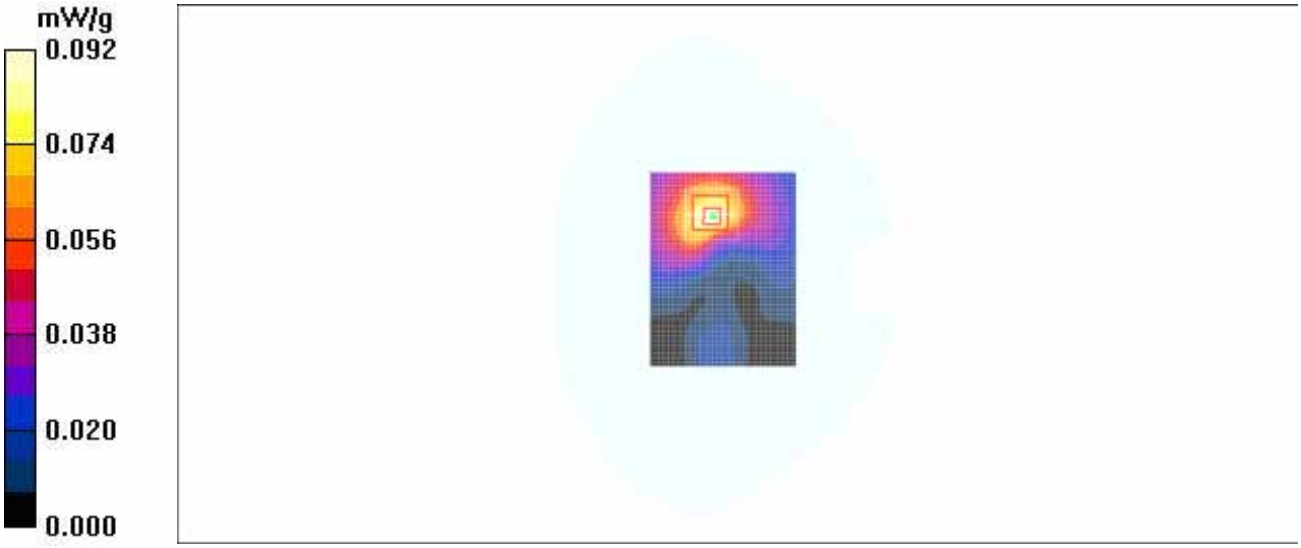


Fig.15 LTE BAND 4 Middle

LTE BAND 4, Position 3 Low Frequency QPSK_20MHz_1RB_High
Date/Time: 2011-12-26 18:26:02
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1720 MHz; σ = 1.45 mho/m; εr = 53.1; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1720 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 3/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.126 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.29 V/m; Power Drift = 0.110 dB
Peak SAR (extrapolated) = 0.188 W/kg
SAR(1 g) = 0.119 mW/g; SAR(10 g) = 0.075 mW/g
Maximum value of SAR (measured) = 0.126 mW/g

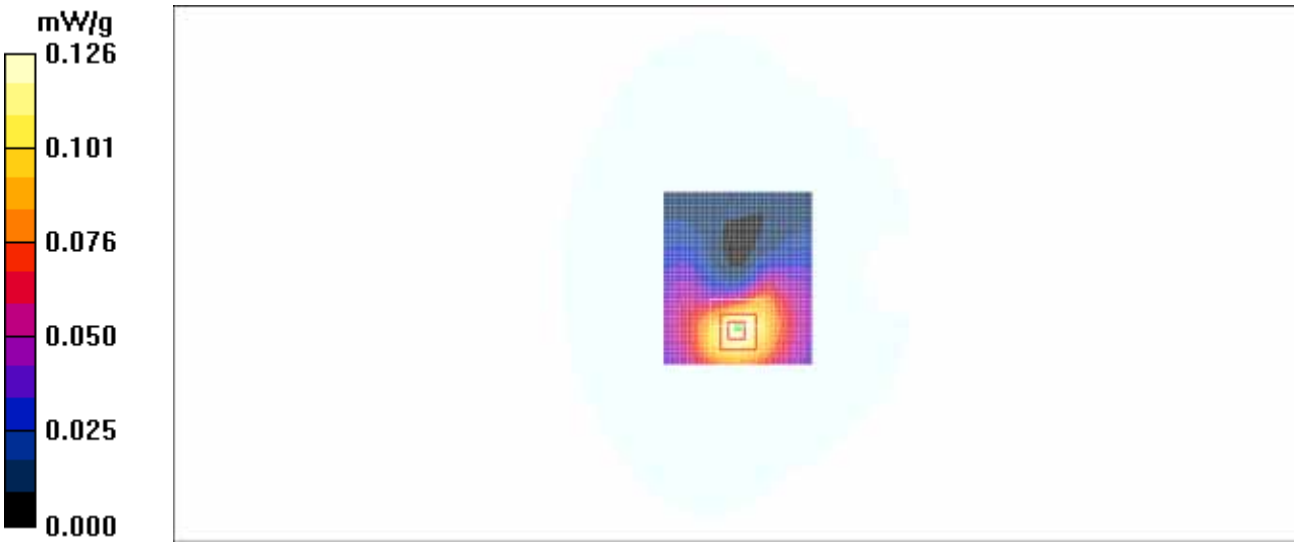


Fig.16 LTE BAND 4 Low

LTE BAND 4, Position 3 Middle Frequency QPSK_20MHz_1RB_Low
Date/Time: 2011-12-26 18:42:11
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.46 mho/m; εr = 53; ρ = 1000 kg/m3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 3/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.114 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.84 V/m; Power Drift = 0.111 dB
Peak SAR (extrapolated) = 0.172 W/kg
SAR(1 g) = 0.110 mW/g; SAR(10 g) = 0.070 mW/g
Maximum value of SAR (measured) = 0.118 mW/g

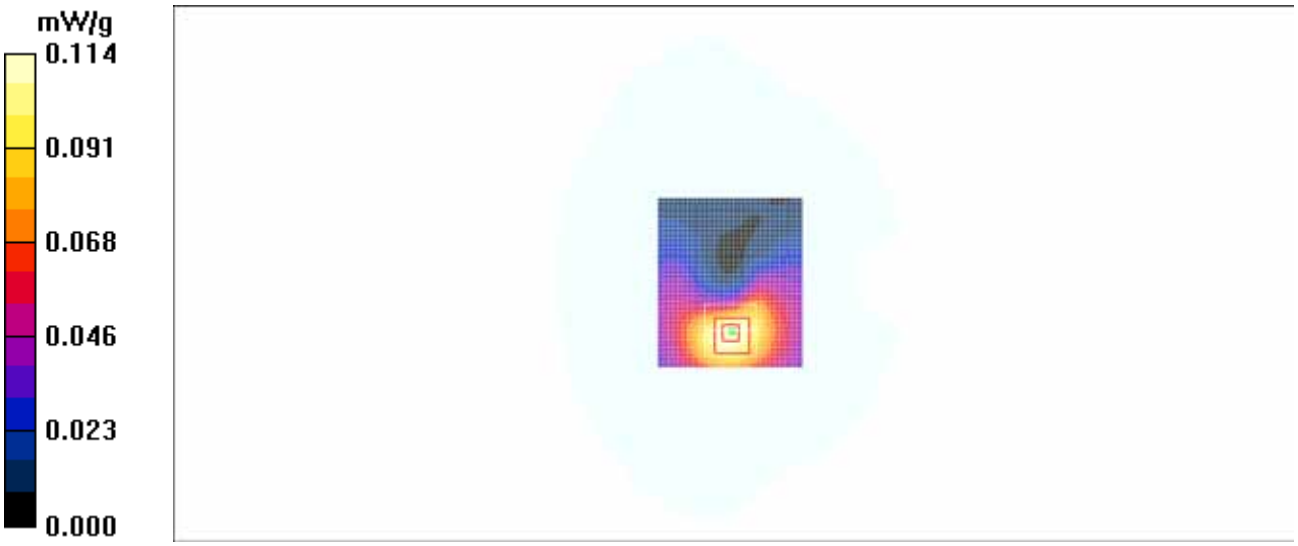


Fig.17 LTE BAND 4 Middle

LTE BAND 4, Position 3 Middle Frequency 16QAM_20MHz_50RB
Date/Time: 2011-12-26 18:57:49
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.46 mho/m; εr = 53; ρ = 1000 kg/m3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 3/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.074 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.27 V/m; Power Drift = 0.145 dB
Peak SAR (extrapolated) = 0.111 W/kg
SAR(1 g) = 0.070 mW/g; SAR(10 g) = 0.044 mW/g
Maximum value of SAR (measured) = 0.075 mW/g

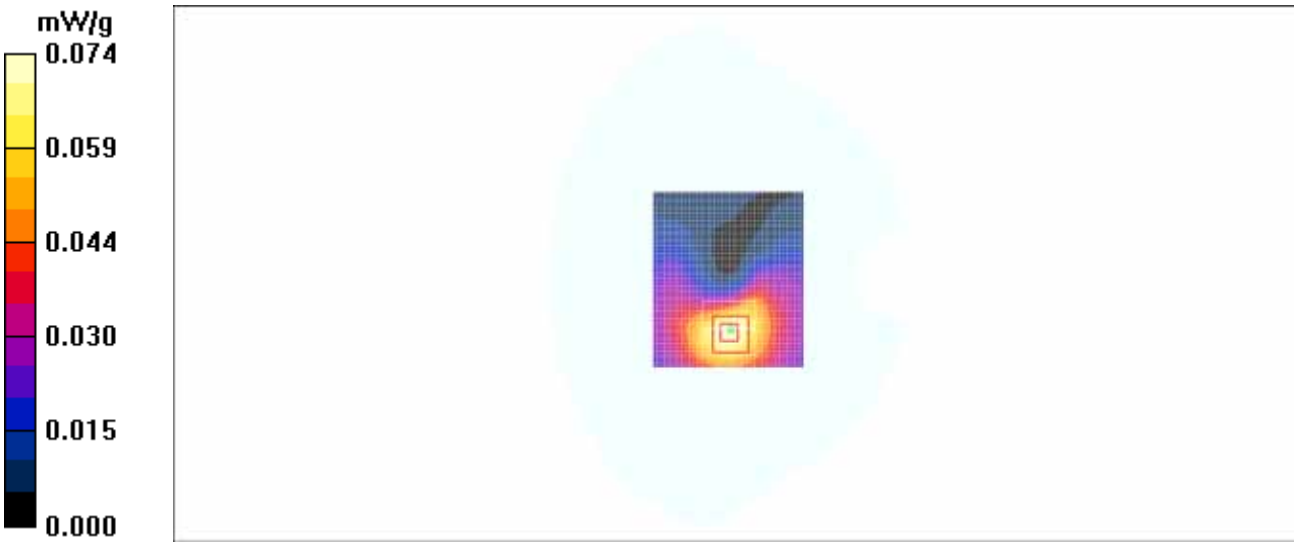


Fig.18 LTE BAND 4 Middle

LTE BAND 4, Position 3 Middle Frequency 16QAM_20MHz_1RB_High
Date/Time: 2011-12-26 19:13:08
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.46 mho/m; εr = 53; ρ = 1000 kg/m3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 3/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.110 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.85 V/m; Power Drift = -0.129 dB
Peak SAR (extrapolated) = 0.158 W/kg
SAR(1 g) = 0.100 mW/g; SAR(10 g) = 0.062 mW/g
Maximum value of SAR (measured) = 0.107 mW/g

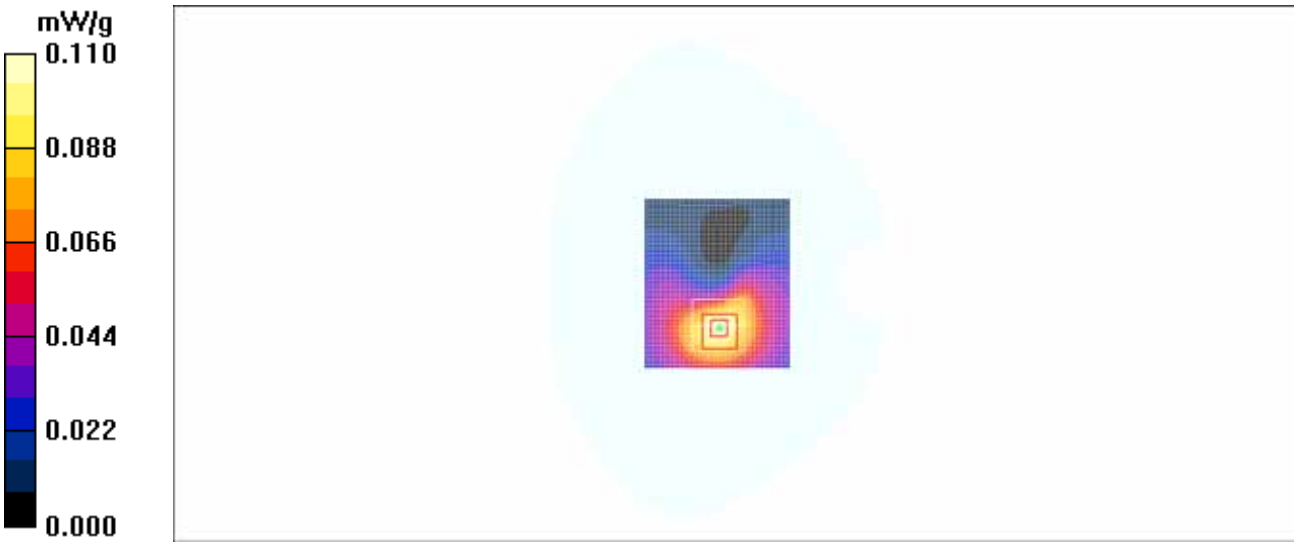


Fig.19 LTE BAND 4 Middle

LTE BAND 4, Position 3 Low Frequency 16QAM_20MHz_1RB_Low
Date/Time: 2011-12-26 19:28:40
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1720 MHz; σ = 1.45 mho/m; εr = 53.1; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1720 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 3/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.100 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.63 V/m; Power Drift = 0.117 dB
Peak SAR (extrapolated) = 0.167 W/kg
SAR(1 g) = 0.104 mW/g; SAR(10 g) = 0.065 mW/g
Maximum value of SAR (measured) = 0.112 mW/g

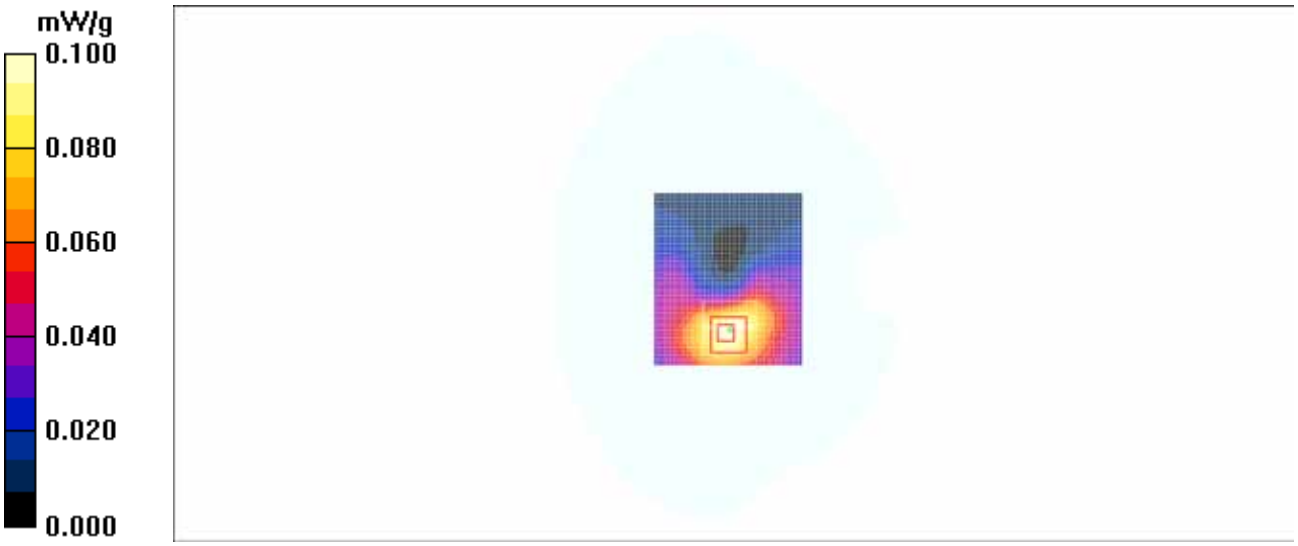


Fig.20 LTE BAND 4 Low

LTE BAND 4, Position 4 Middle Frequency QPSK_20MHz_50RB
Date/Time: 2012-1-29 9:31:29
Electronics: DAE4 Sn771
Medium: Body 1800 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.47 mho/m; εr = 52.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 4/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.509 mW/g

Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.1 V/m; Power Drift = 0.052 dB
Peak SAR (extrapolated) = 0.740 W/kg
SAR(1 g) = 0.451 mW/g; SAR(10 g) = 0.256 mW/g
Maximum value of SAR (measured) = 0.490 mW/g

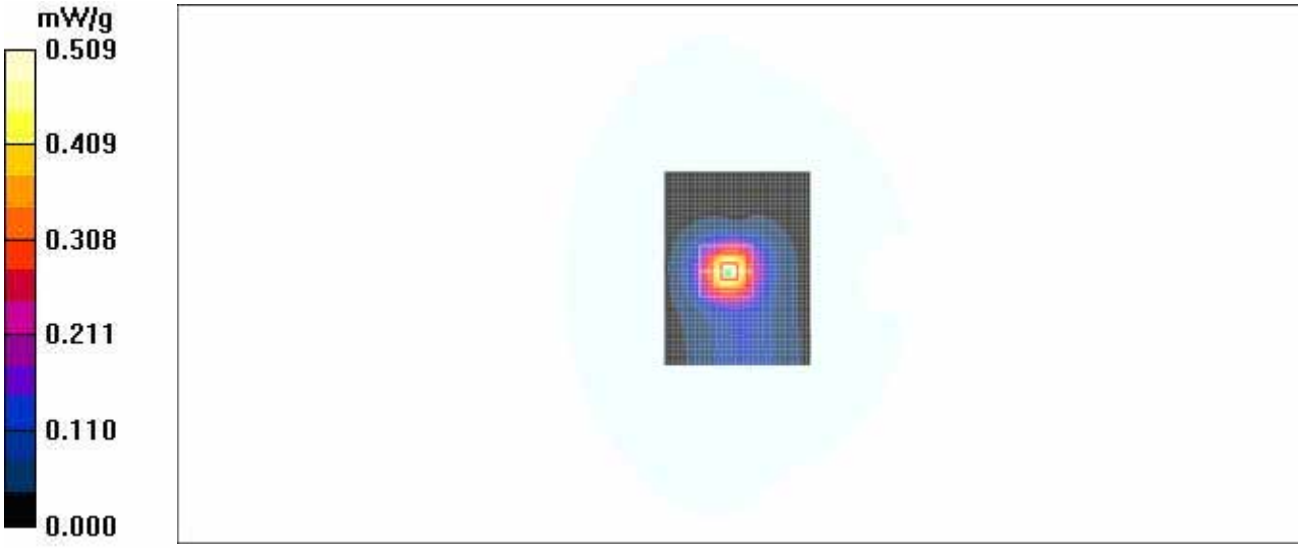


Fig.21 LTE BAND 4 Middle

LTE BAND 4, Position 4 Low Frequency QPSK_20MHz_1RB_High
Date/Time: 2011-12-26 19:45:06
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1720 MHz; σ = 1.45 mho/m; εr = 53.1; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1720 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 4/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.871 mW/g

Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.4 V/m; Power Drift = -0.100 dB
Peak SAR (extrapolated) = 1.23 W/kg
SAR(1 g) = 0.735 mW/g; SAR(10 g) = 0.418 mW/g
Maximum value of SAR (measured) = 0.811 mW/g

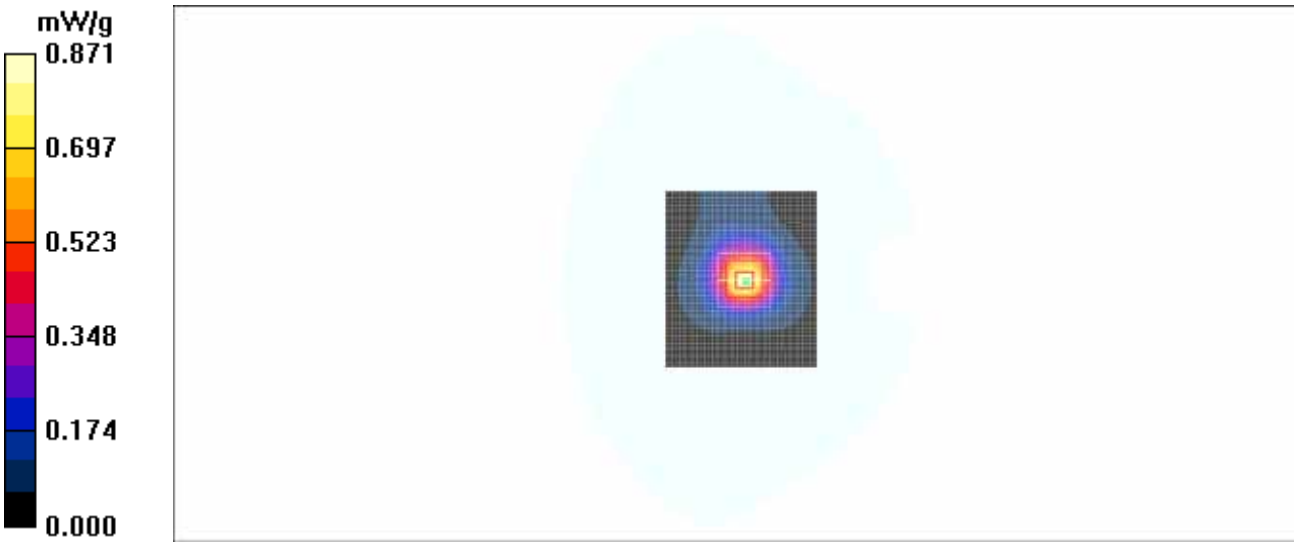


Fig.22 LTE BAND 4 Low

LTE BAND 4, Position 4 Middle Frequency QPSK_20MHz_1RB_Low
Date/Time: 2011-12-26 20:00:42
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.46 mho/m; εr = 53; ρ = 1000 kg/m3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 4/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.752 mW/g

Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.4 V/m; Power Drift = -0.026 dB
Peak SAR (extrapolated) = 1.06 W/kg
SAR(1 g) = 0.637 mW/g; SAR(10 g) = 0.361 mW/g
Maximum value of SAR (measured) = 0.696 mW/g

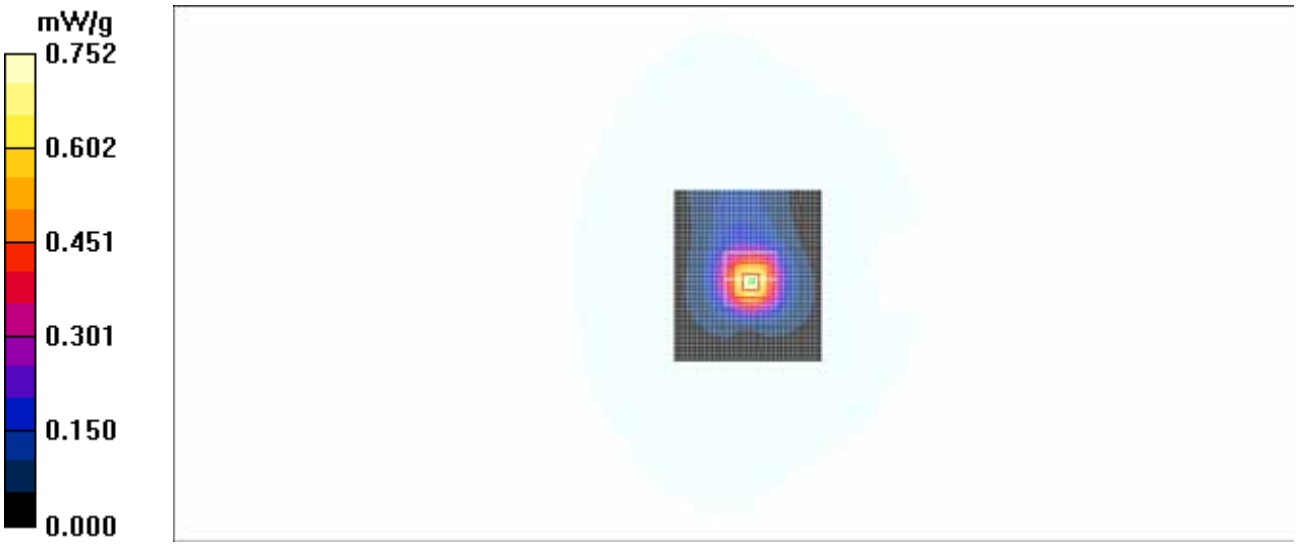


Fig.23 LTE BAND 4 Middle

LTE BAND 4, Position 4 Middle Frequency 16QAM_20MHz_50RB
Date/Time: 2011-12-26 20:16:04
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.46 mho/m; εr = 53; ρ = 1000 kg/m3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 4/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.443 mW/g

Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.4 V/m; Power Drift = -0.028 dB
Peak SAR (extrapolated) = 0.634 W/kg
SAR(1 g) = 0.381 mW/g; SAR(10 g) = 0.216 mW/g
Maximum value of SAR (measured) = 0.413 mW/g

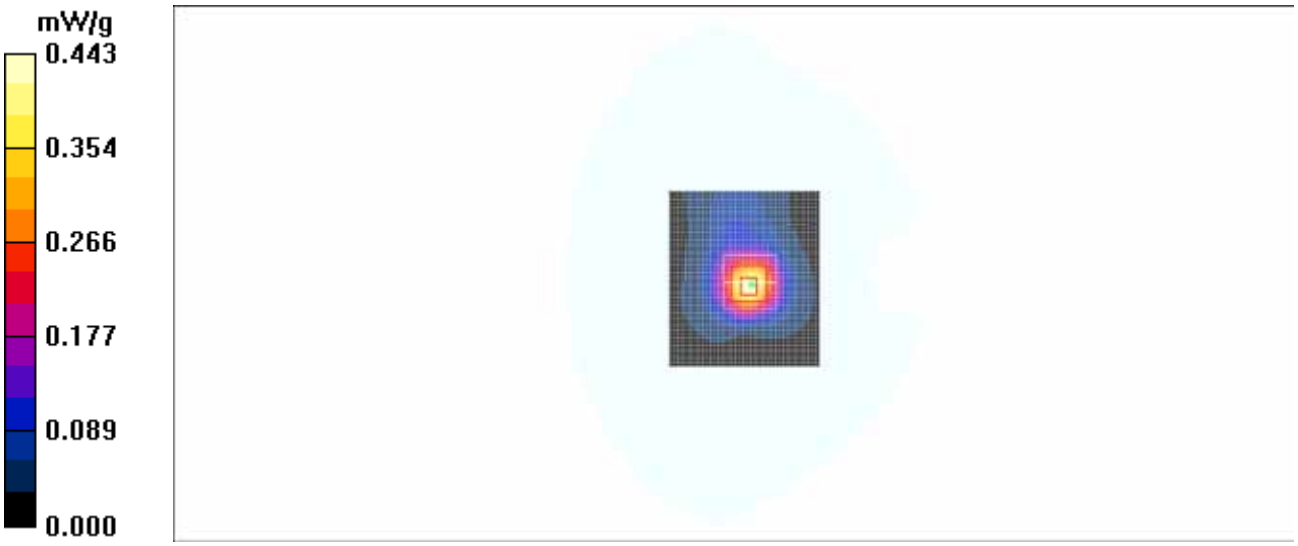


Fig.24 LTE BAND 4 Middle

LTE BAND 4, Position 4 Middle Frequency 16QAM_20MHz_1RB_High
Date/Time: 2011-12-26 20:31:46
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.46 mho/m; εr = 53; ρ = 1000 kg/m3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 4/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.562 mW/g

Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.1 V/m; Power Drift = 0.137 dB
Peak SAR (extrapolated) = 0.876 W/kg
SAR(1 g) = 0.522 mW/g; SAR(10 g) = 0.295 mW/g
Maximum value of SAR (measured) = 0.564 mW/g

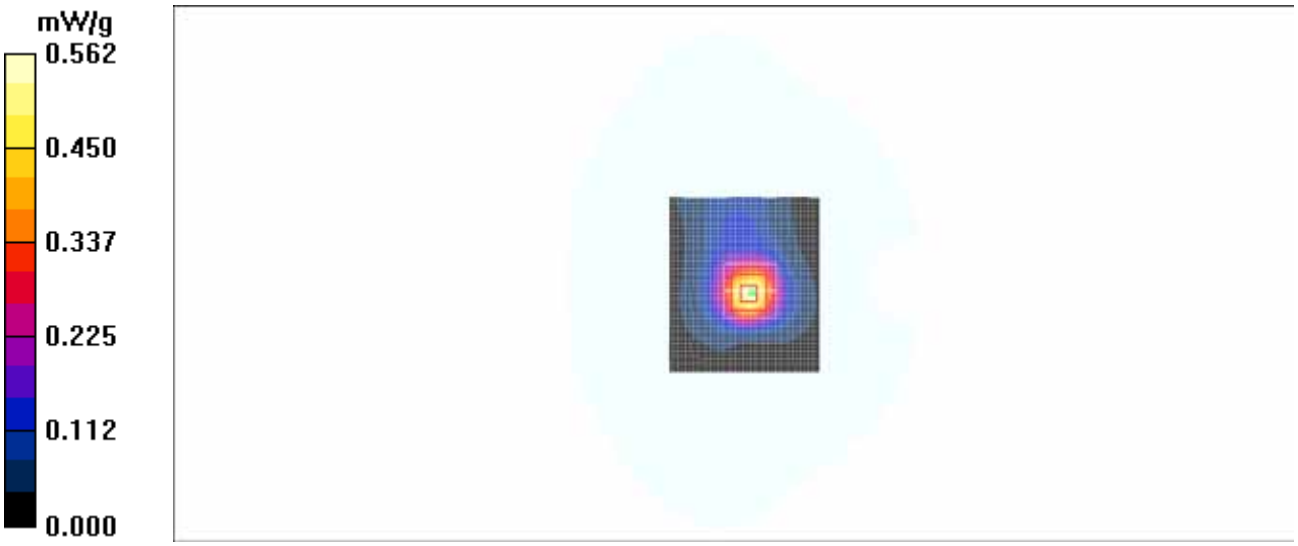


Fig.25 LTE BAND 4 Middle

LTE BAND 4, Position 4 Low Frequency 16QAM_20MHz_1RB_Low
Date/Time: 2011-12-26 20:47:10
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1720 MHz; σ = 1.45 mho/m; εr = 53.1; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1720 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 4/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.852 mW/g

Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.8 V/m; Power Drift = -0.001 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.705 mW/g; SAR(10 g) = 0.403 mW/g
Maximum value of SAR (measured) = 0.775 mW/g

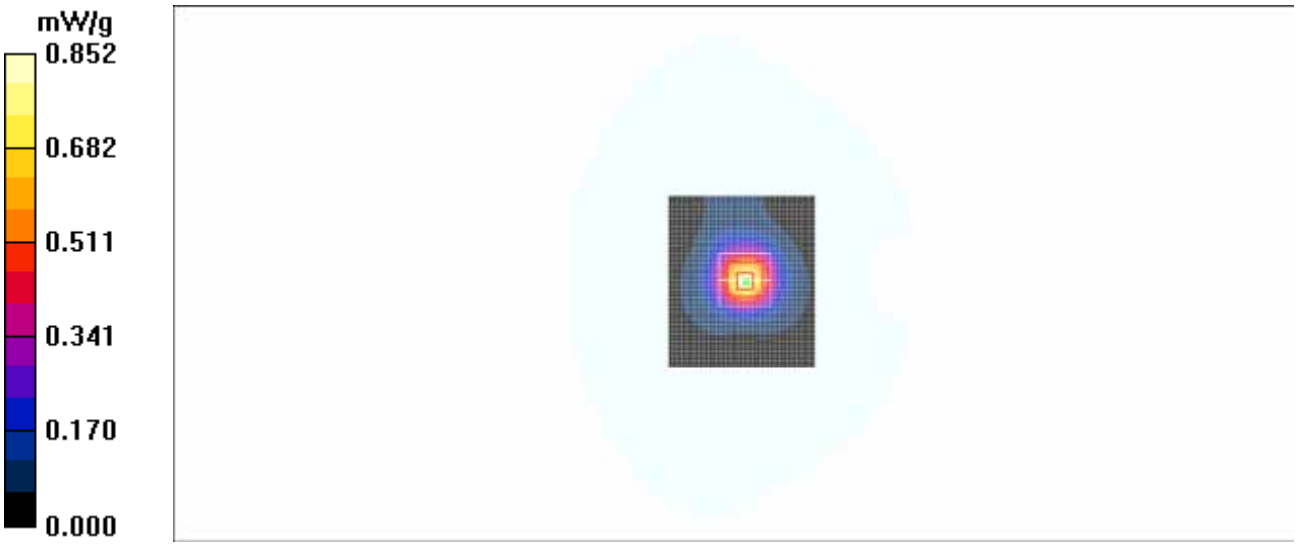


Fig.26 LTE BAND 4 Low

LTE BAND 4, Position 5 Middle Frequency QPSK_20MHz_50RB
Date/Time: 2012-1-29 9:48:05
Electronics: DAE4 Sn771
Medium: Body 1800 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.47 mho/m; εr = 52.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 5/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.724 mW/g

Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.4 V/m; Power Drift = -0.018 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.616 mW/g; SAR(10 g) = 0.335 mW/g
Maximum value of SAR (measured) = 0.681 mW/g

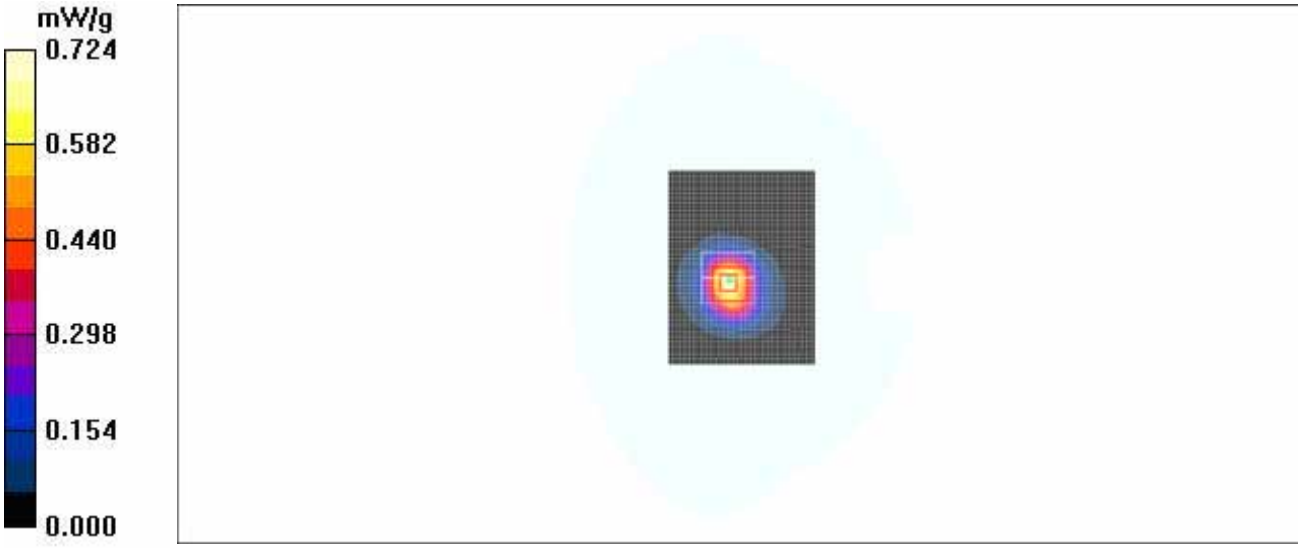


Fig.27 LTE BAND 4 Middle

LTE BAND 4, Position 5 Low Frequency QPSK_20MHz_1RB_High
Date/Time: 2011-12-26 21:04:01
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1720 MHz; σ = 1.45 mho/m; εr = 53.1; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1720 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 5/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.979 mW/g

Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.6 V/m; Power Drift = -0.071 dB
Peak SAR (extrapolated) = 1.51 W/kg
SAR(1 g) = 0.867 mW/g; SAR(10 g) = 0.482 mW/g
Maximum value of SAR (measured) = 0.936 mW/g

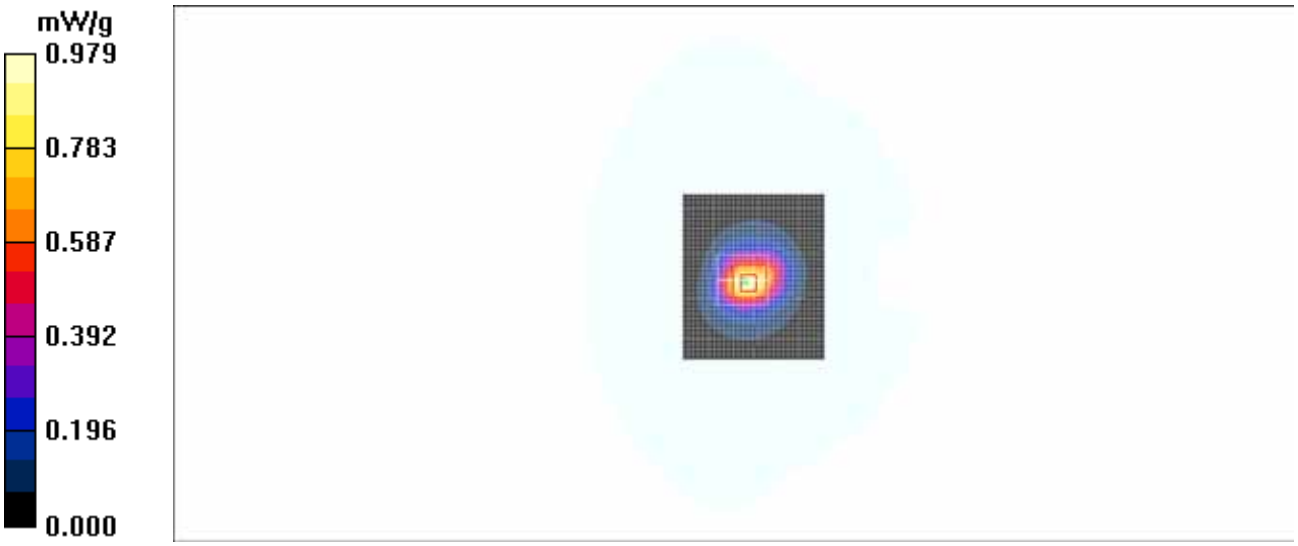


Fig.28 LTE BAND 4 Low

LTE BAND 4, Position 5 Middle Frequency QPSK_20MHz_1RB_Low
Date/Time: 2011-12-26 21:19:52
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.46 mho/m; εr = 53; ρ = 1000 kg/m3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 5/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.908 mW/g

Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.6 V/m; Power Drift = -0.069 dB
Peak SAR (extrapolated) = 1.34 W/kg
SAR(1 g) = 0.803 mW/g; SAR(10 g) = 0.455 mW/g
Maximum value of SAR (measured) = 0.883 mW/g

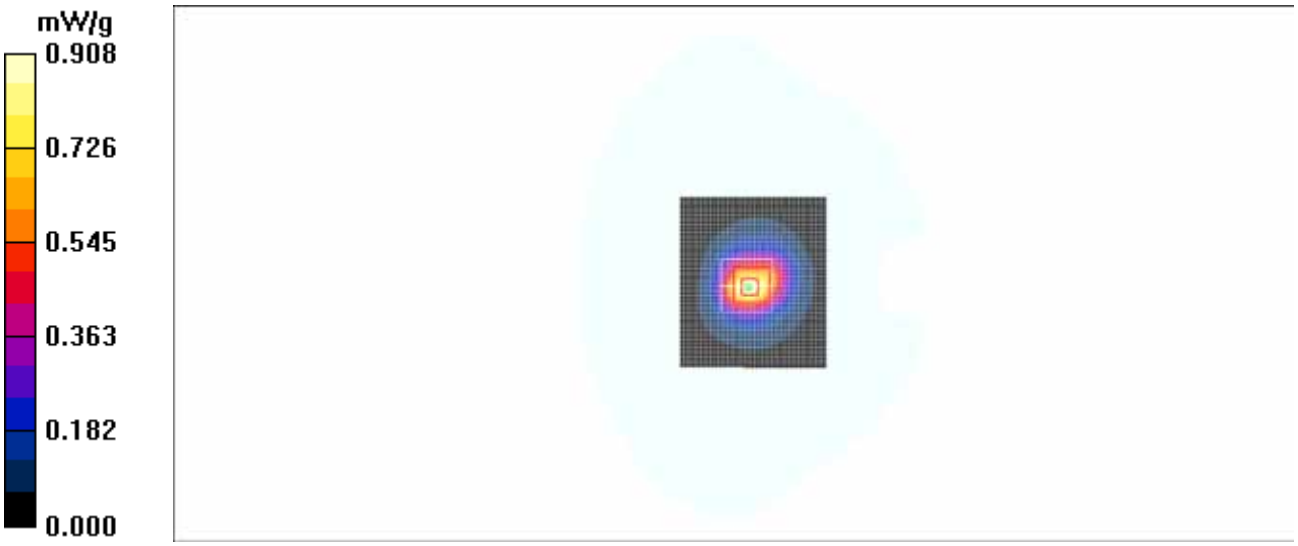


Fig.29 LTE BAND 4 Middle

LTE BAND 4, Position 5 Middle Frequency 16QAM_20MHz_50RB
Date/Time: 2011-12-26 21:35:27
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.46 mho/m; εr = 53; ρ = 1000 kg/m3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 5/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.521 mW/g

Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.4 V/m; Power Drift = 0.146 dB
Peak SAR (extrapolated) = 0.817 W/kg
SAR(1 g) = 0.479 mW/g; SAR(10 g) = 0.269 mW/g
Maximum value of SAR (measured) = 0.533 mW/g

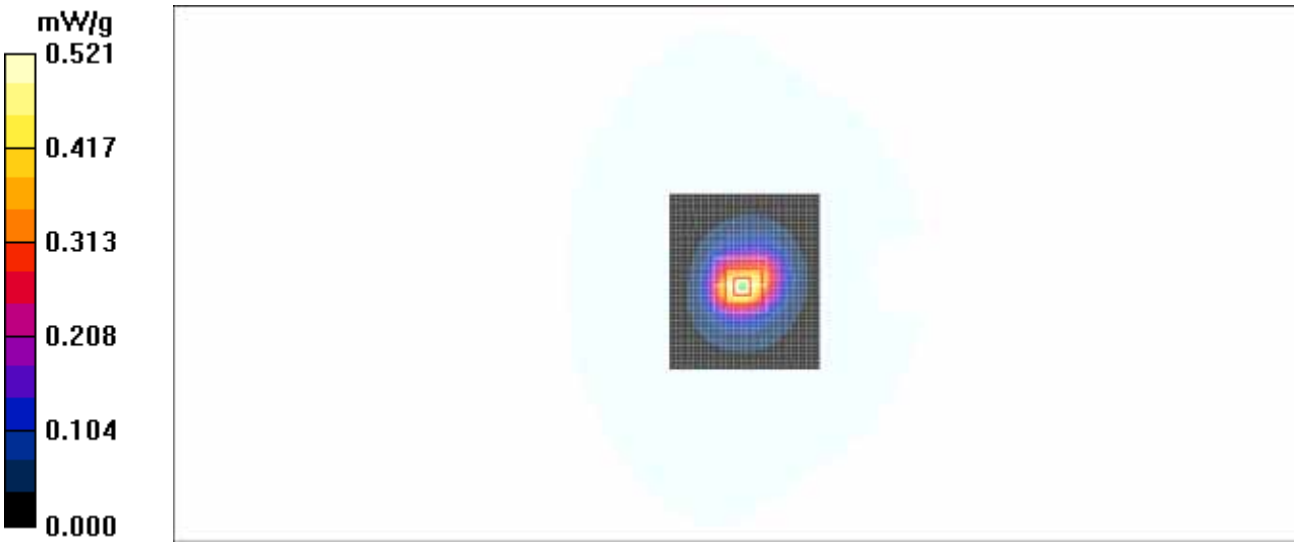


Fig.30 LTE BAND 4 Middle

LTE BAND 4, Position 5 Middle Frequency 16QAM_20MHz_1RB_High
Date/Time: 2011-12-26 21:51:03
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1732.5 MHz; σ = 1.46 mho/m; εr = 53; ρ = 1000 kg/m3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1732.5 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 5/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.655 mW/g

Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.8 V/m; Power Drift = -0.139 dB
Peak SAR (extrapolated) = 0.964 W/kg
SAR(1 g) = 0.574 mW/g; SAR(10 g) = 0.326 mW/g
Maximum value of SAR (measured) = 0.629 mW/g

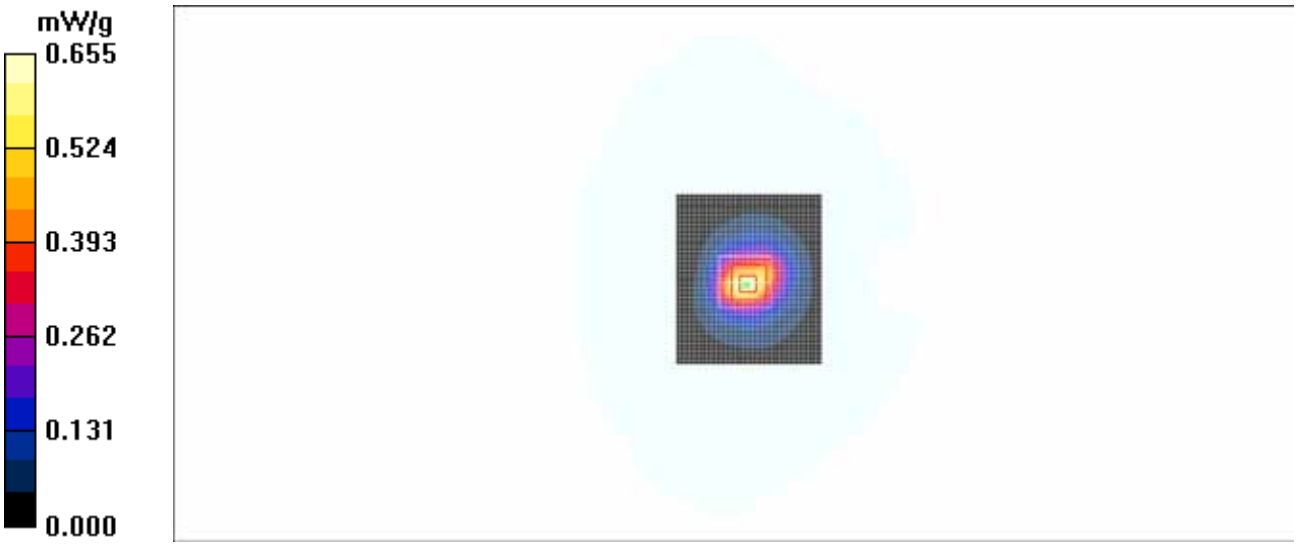


Fig.31 LTE BAND 4 Middle

LTE BAND 4, Position 5 Low Frequency 16QAM_20MHz_1RB_Low
Date/Time: 2011-12-26 22:07:23
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1720 MHz; σ = 1.45 mho/m; εr = 53.1; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band4 Frequency: 1720 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

Test Position 5/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.10 mW/g

Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 26.0 V/m; Power Drift = -0.170 dB
Peak SAR (extrapolated) = 4.03 W/kg
SAR(1 g) = 0.995 mW/g; SAR(10 g) = 0.553 mW/g
Maximum value of SAR (measured) = 1.07 mW/g

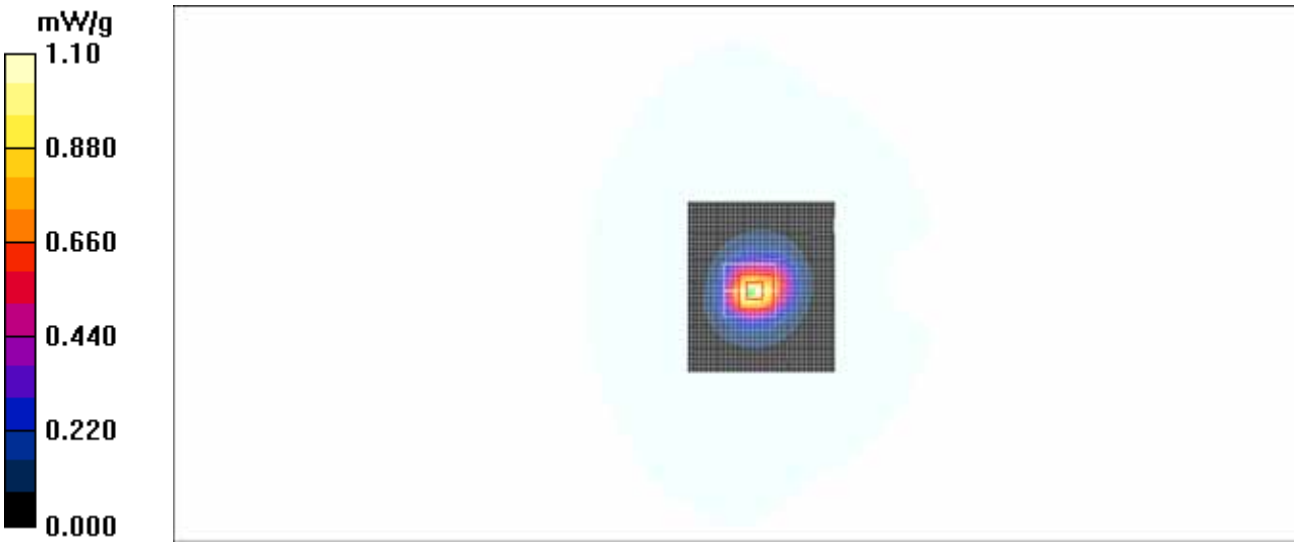


Fig.32 LTE BAND 4 Low

LTE BAND 7, Position 1 High Frequency QPSK_20MHz_50RB
Date/Time: 2011-10-18 8:30:25
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2560 MHz; σ = 2.09 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2560 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 1/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.31 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.1 V/m; Power Drift = 0.014 dB
Peak SAR (extrapolated) = 2.39 W/kg
SAR(1 g) = 1.09 mW/g; SAR(10 g) = 0.527 mW/g
Maximum value of SAR (measured) = 1.26 mW/g

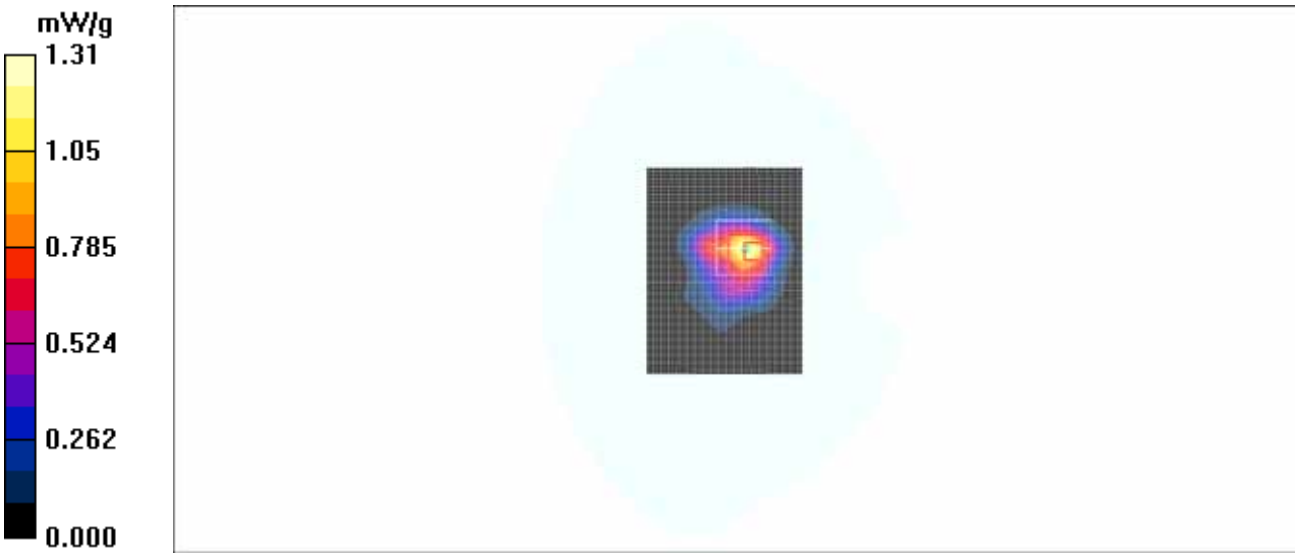


Fig.33 LTE BAND 7 High

LTE BAND 7, Position 1 Middle Frequency QPSK_20MHz_50RB
Date/Time: 2011-10-18 8:14:38
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.05 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 1/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.61 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.8 V/m; Power Drift = -0.057 dB
Peak SAR (extrapolated) = 2.94 W/kg
SAR(1 g) = 1.36 mW/g; SAR(10 g) = 0.642 mW/g
Maximum value of SAR (measured) = 1.56 mW/g

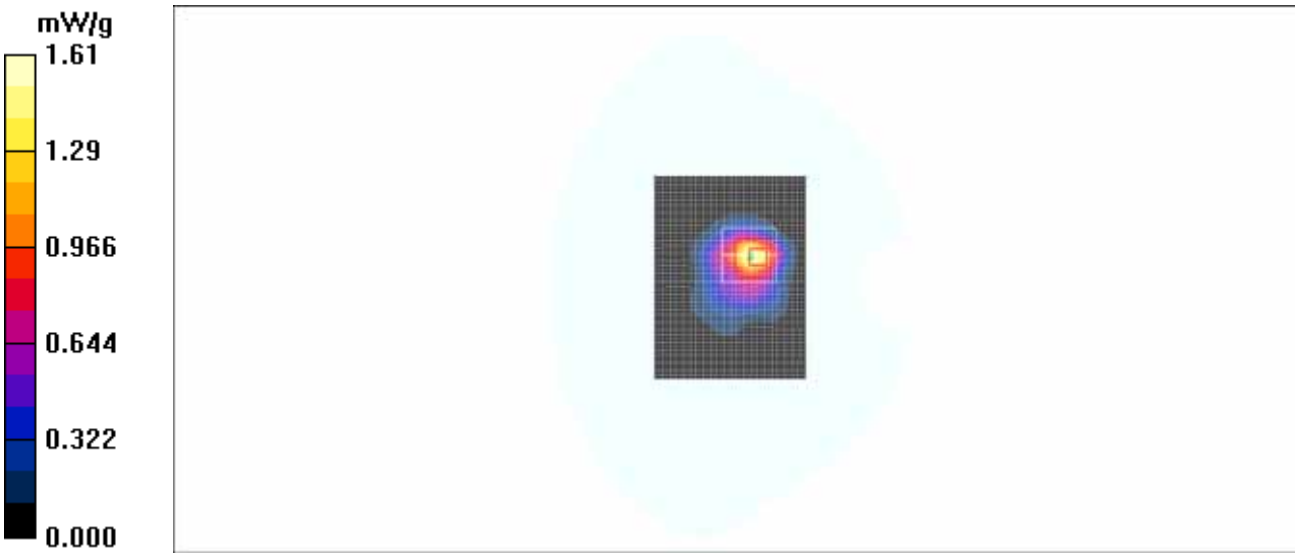


Fig.34 LTE BAND 7 Middle

LTE BAND 7, Position 1 Low Frequency QPSK_20MHz_50RB
Date/Time: 2011-10-18 8:46:41
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2510 MHz; σ = 2.02 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2510 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 1/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.27 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.5 V/m; Power Drift = 0.101 dB
Peak SAR (extrapolated) = 2.54 W/kg
SAR(1 g) = 1.16 mW/g; SAR(10 g) = 0.530 mW/g
Maximum value of SAR (measured) = 1.33 mW/g

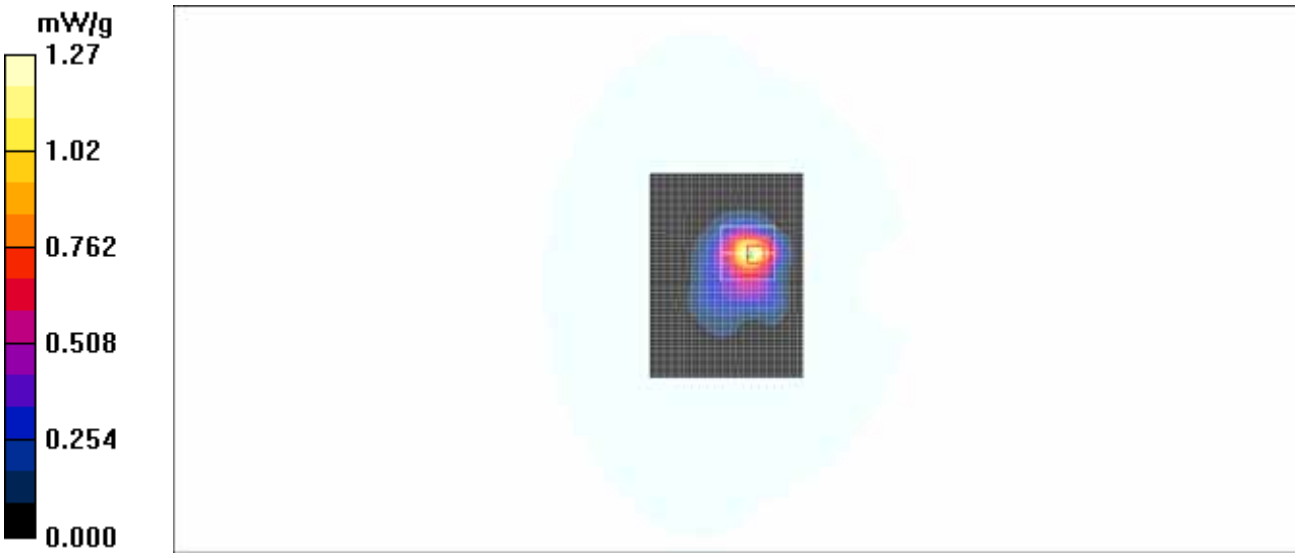


Fig.35 LTE BAND 7 Low

LTE BAND 7, Position 1 Low Frequency QPSK_20MHz_1RB_High
Date/Time: 2011-10-18 13:36:11
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2510 MHz; σ = 2.02 mho/m; ε_r = 52; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2510 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 1/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.71 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.2 V/m; Power Drift = -0.051 dB
Peak SAR (extrapolated) = 2.90 W/kg
SAR(1 g) = 1.43 mW/g; SAR(10 g) = 0.669 mW/g
Maximum value of SAR (measured) = 1.69 mW/g

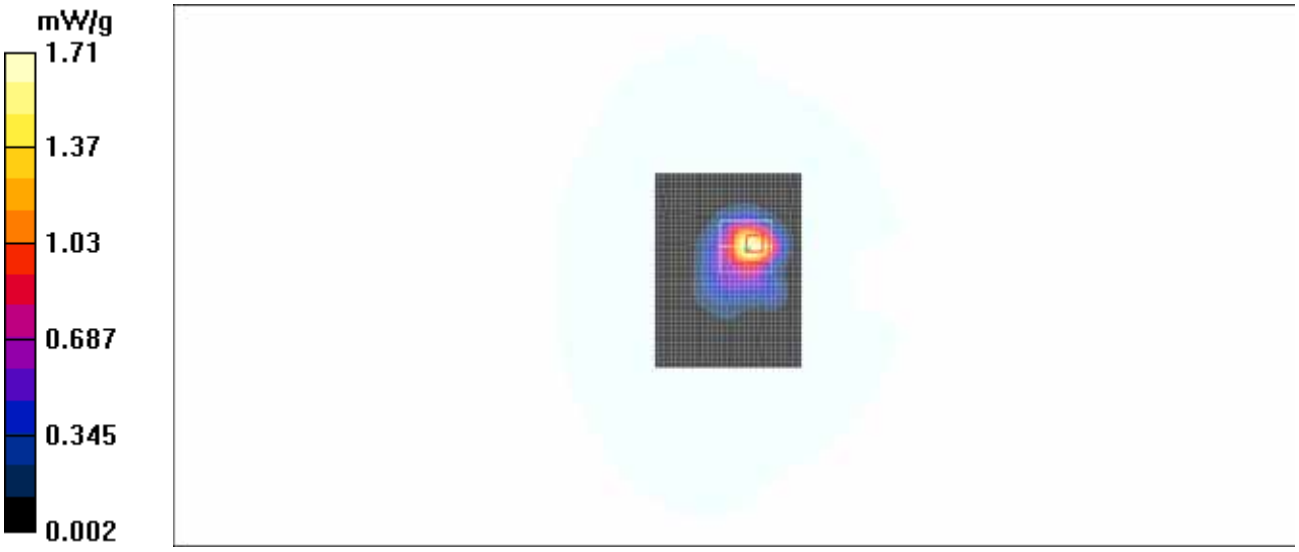


Fig.36 LTE BAND 7 Low

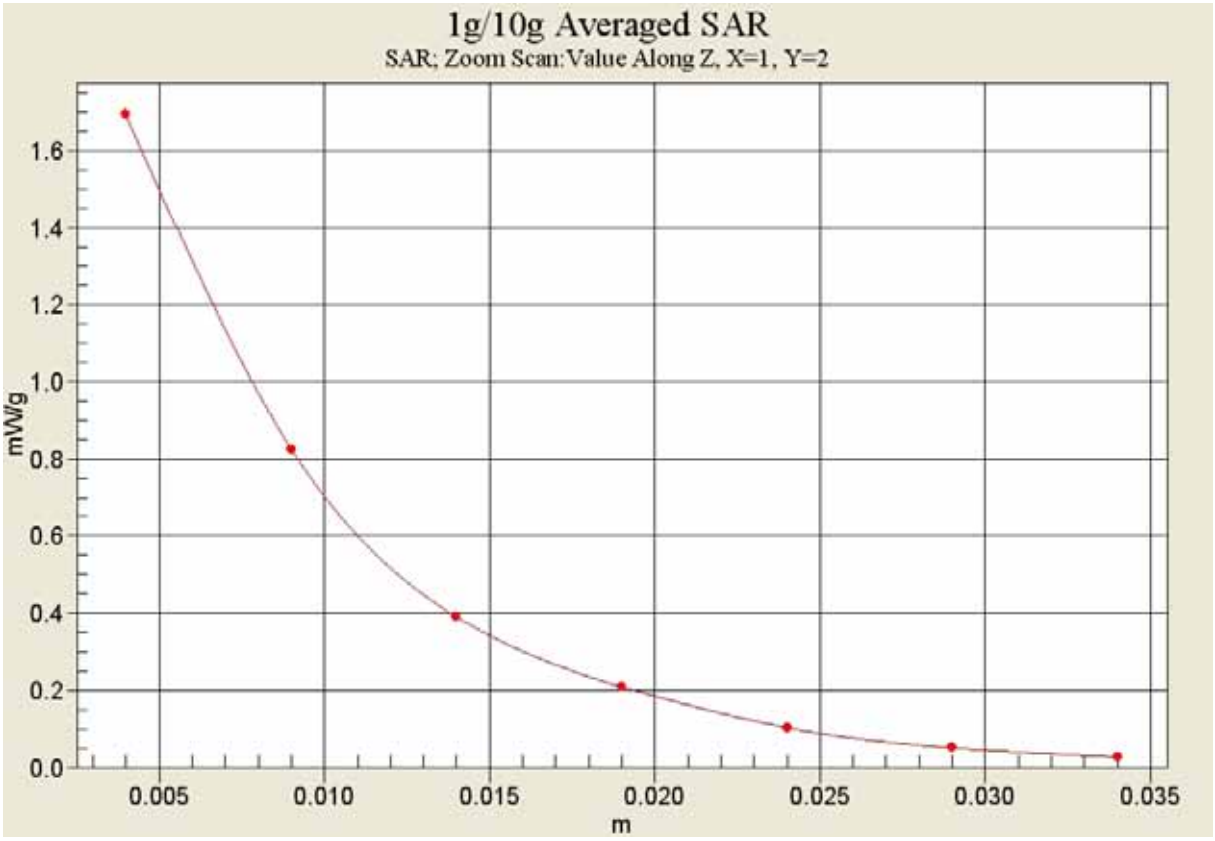


Fig. 36-1 Z-Scan at power reference point (LTE BAND 7 Low)

LTE BAND 7, Position 1 Middle Frequency QPSK_20MHz_1RB_Low
Date/Time: 2011-10-18 10:27:48
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.05 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 1/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.62 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.8 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 3.00 W/kg
SAR(1 g) = 1.41 mW/g; SAR(10 g) = 0.682 mW/g
Maximum value of SAR (measured) = 1.64 mW/g

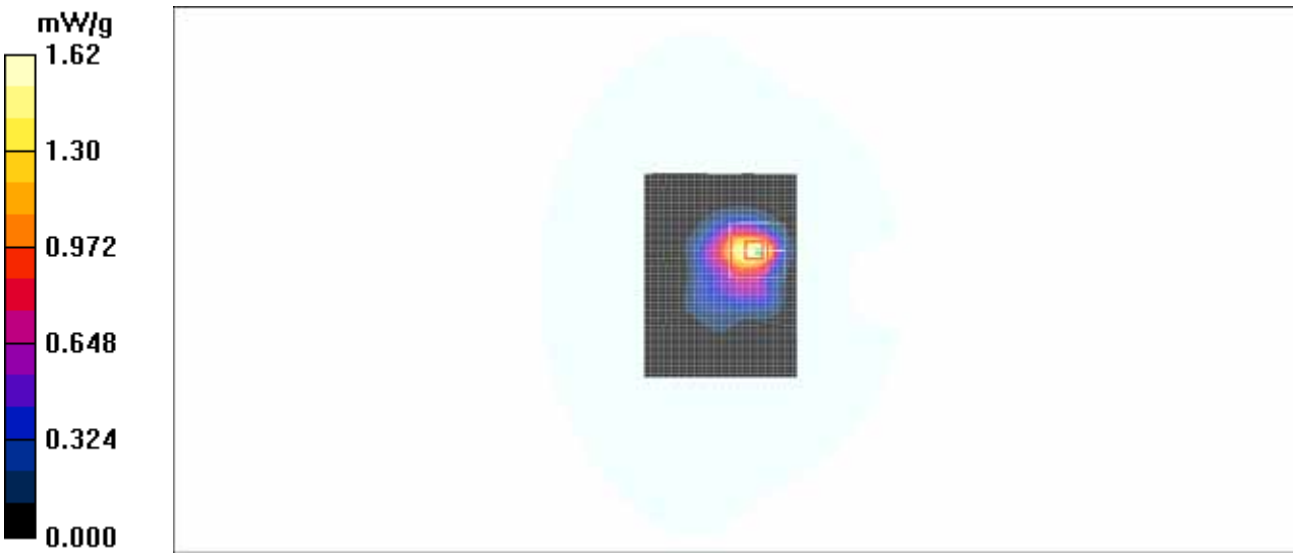


Fig.37 LTE BAND 7 Middle

LTE BAND 7, Position 1 Middle Frequency 16QAM_20MHz_50RB
Date/Time: 2011-10-18 10:46:14
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.05 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 1/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.23 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.6 V/m; Power Drift = 0.018 dB
Peak SAR (extrapolated) = 2.28 W/kg
SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.493 mW/g
Maximum value of SAR (measured) = 1.21 mW/g

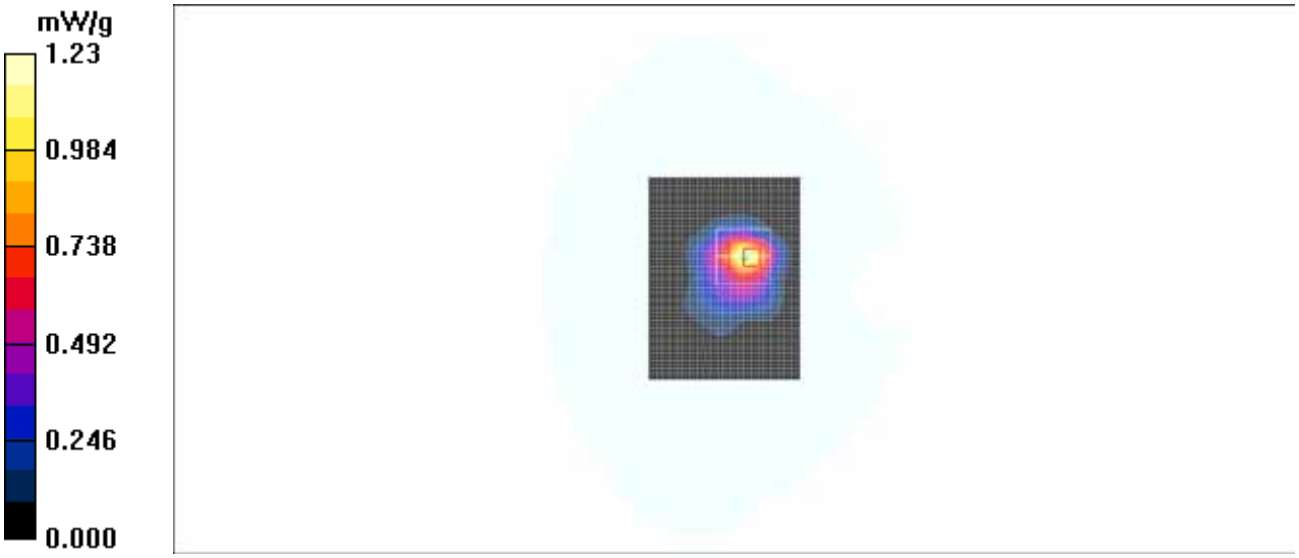


Fig.38 LTE BAND 7 Middle

LTE BAND 7, Position 1 Middle Frequency 16QAM_20MHz_1RB_High
Date/Time: 2011-10-18 11:03:42
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.05 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 1/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.63 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.2 V/m; Power Drift = -0.171 dB
Peak SAR (extrapolated) = 3.09 W/kg
SAR(1 g) = 1.4 mW/g; SAR(10 g) = 0.678 mW/g
Maximum value of SAR (measured) = 1.66 mW/g

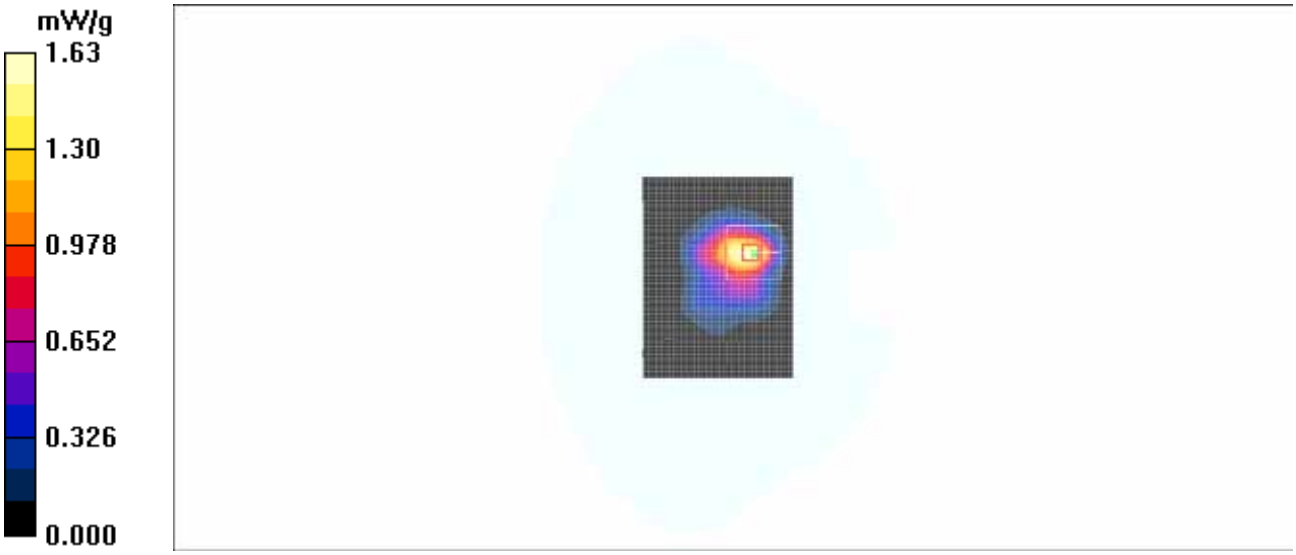


Fig.39 LTE BAND 7 Middle

LTE BAND 7, Position 1 Middle Frequency 16QAM_20MHz_1RB_Low
Date/Time: 2011-10-18 11:20:55
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.05 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 1/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.50 mW/g

Test Position 1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.7 V/m; Power Drift = 0.117 dB
Peak SAR (extrapolated) = 3.01 W/kg
SAR(1 g) = 1.39 mW/g; SAR(10 g) = 0.660 mW/g
Maximum value of SAR (measured) = 1.62 mW/g

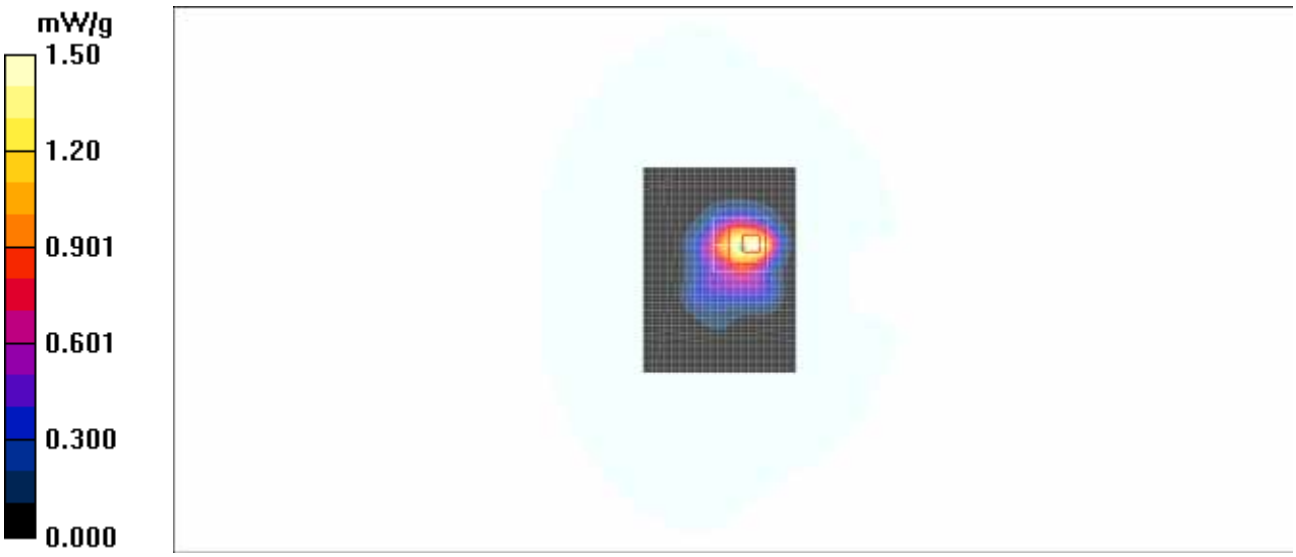


Fig.40 LTE BAND 7 Middle

LTE BAND 7, Position 2 Middle Frequency QPSK_20MHz_50RB
Date/Time: 2011-10-18 9:03:21
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.05 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 2/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.459 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.5 V/m; Power Drift = -0.058 dB
Peak SAR (extrapolated) = 0.702 W/kg
SAR(1 g) = 0.390 mW/g; SAR(10 g) = 0.225 mW/g
Maximum value of SAR (measured) = 0.411 mW/g

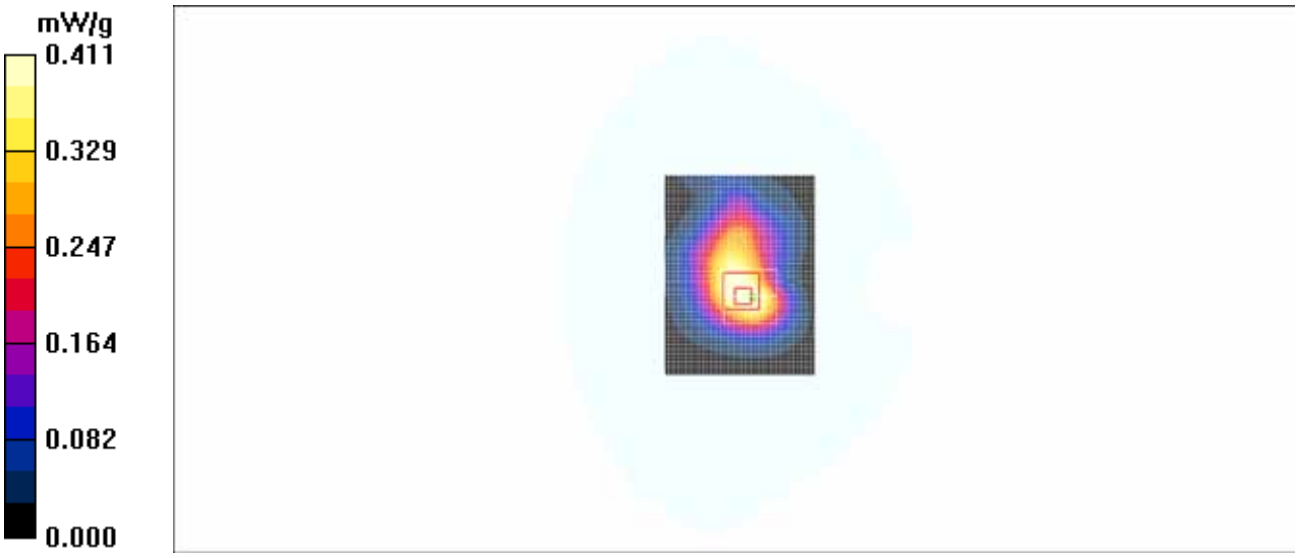


Fig.41 LTE BAND 7 Middle

LTE BAND 7, Position 2 Low Frequency QPSK_20MHz_1RB_High
Date/Time: 2011-12-27 17:21:15
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2510 MHz; σ = 2.01 mho/m; εr = 52.1; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2510 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 2/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.477 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.2 V/m; Power Drift = -0.122 dB
Peak SAR (extrapolated) = 0.771 W/kg
SAR(1 g) = 0.412 mW/g; SAR(10 g) = 0.229 mW/g
Maximum value of SAR (measured) = 0.439 mW/g

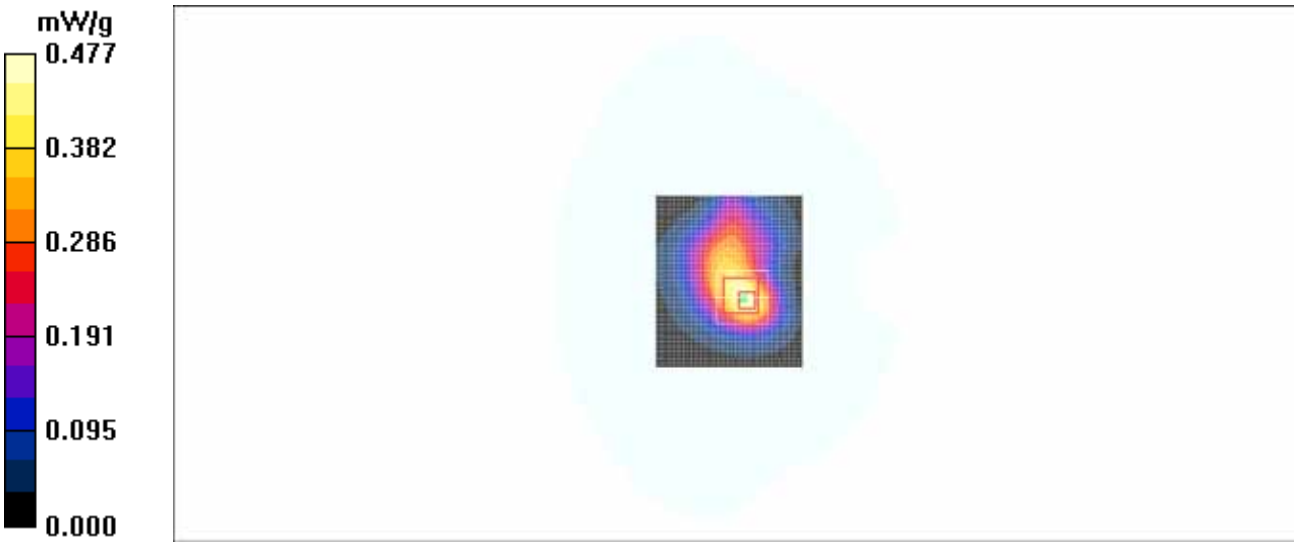


Fig.42 LTE BAND 7 Low

LTE BAND 7, Position 2 Middle Frequency QPSK_20MHz_1RB_Low
Date/Time: 2011-12-27 17:36:47
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 2/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.617 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.4 V/m; Power Drift = -0.042 dB
Peak SAR (extrapolated) = 1.000 W/kg
SAR(1 g) = 0.539 mW/g; SAR(10 g) = 0.300 mW/g
Maximum value of SAR (measured) = 0.575 mW/g

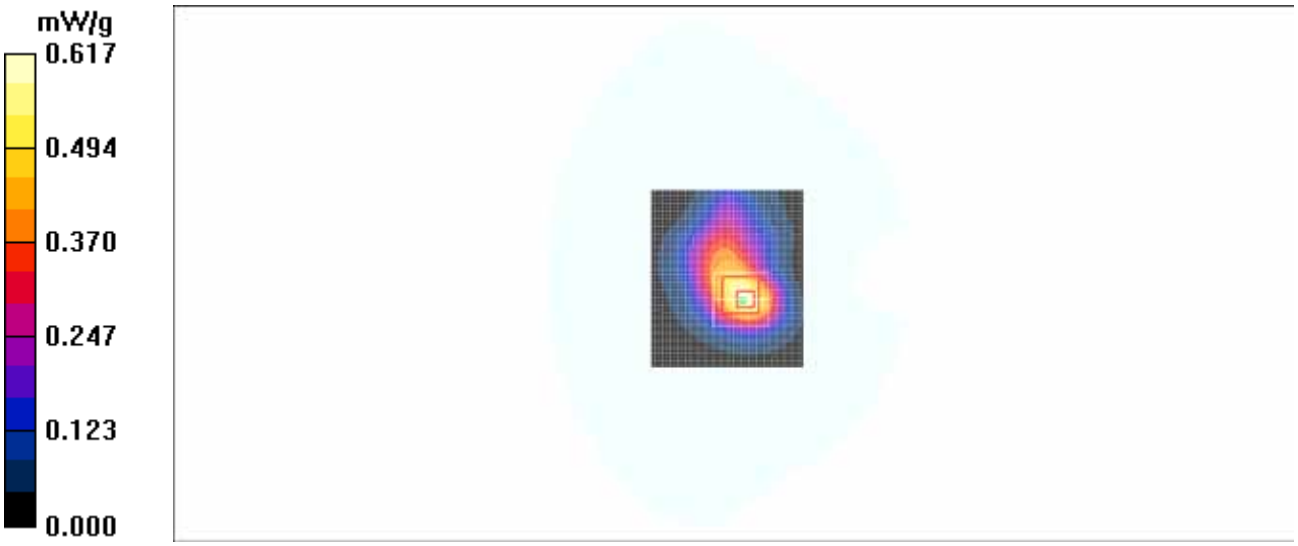


Fig.43 LTE BAND 7 Middle

LTE BAND 7, Position 2 Middle Frequency 16QAM_20MHz_50RB
Date/Time: 2011-12-27 17:52:14
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 2/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.410 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.6 V/m; Power Drift = 0.016 dB
Peak SAR (extrapolated) = 0.666 W/kg
SAR(1 g) = 0.358 mW/g; SAR(10 g) = 0.199 mW/g
Maximum value of SAR (measured) = 0.384 mW/g

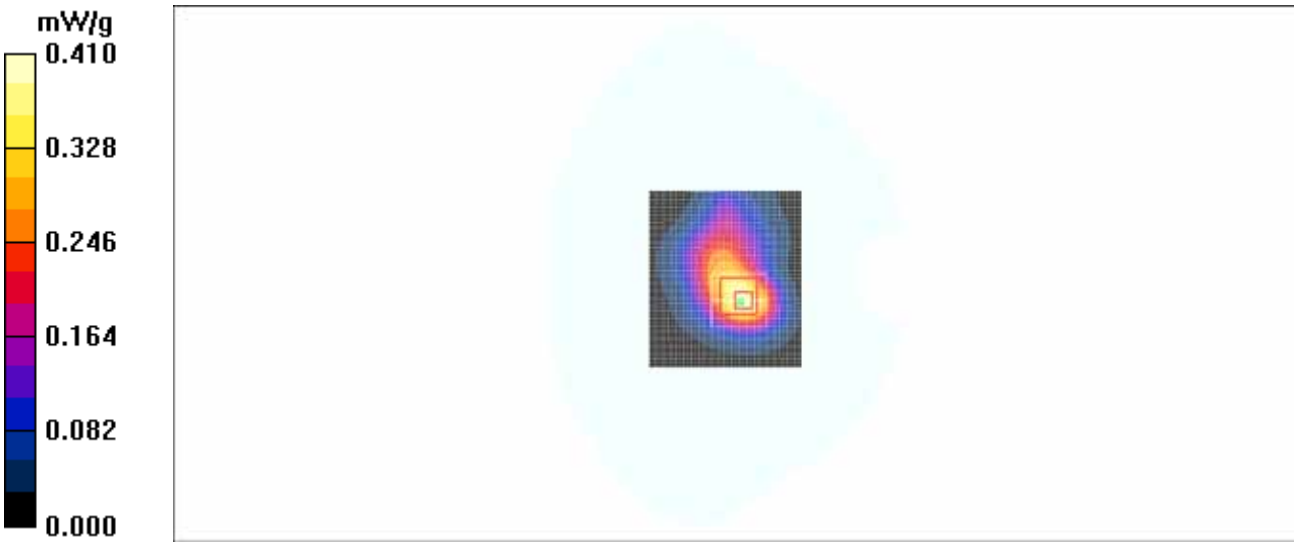


Fig.44 LTE BAND 7 Middle

LTE BAND 7, Position 2 Middle Frequency 16QAM_20MHz_1RB_High
Date/Time: 2011-12-27 18:07:50
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 2/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.533 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.8 V/m; Power Drift = -0.163 dB
Peak SAR (extrapolated) = 0.775 W/kg
SAR(1 g) = 0.454 mW/g; SAR(10 g) = 0.258 mW/g
Maximum value of SAR (measured) = 0.500 mW/g

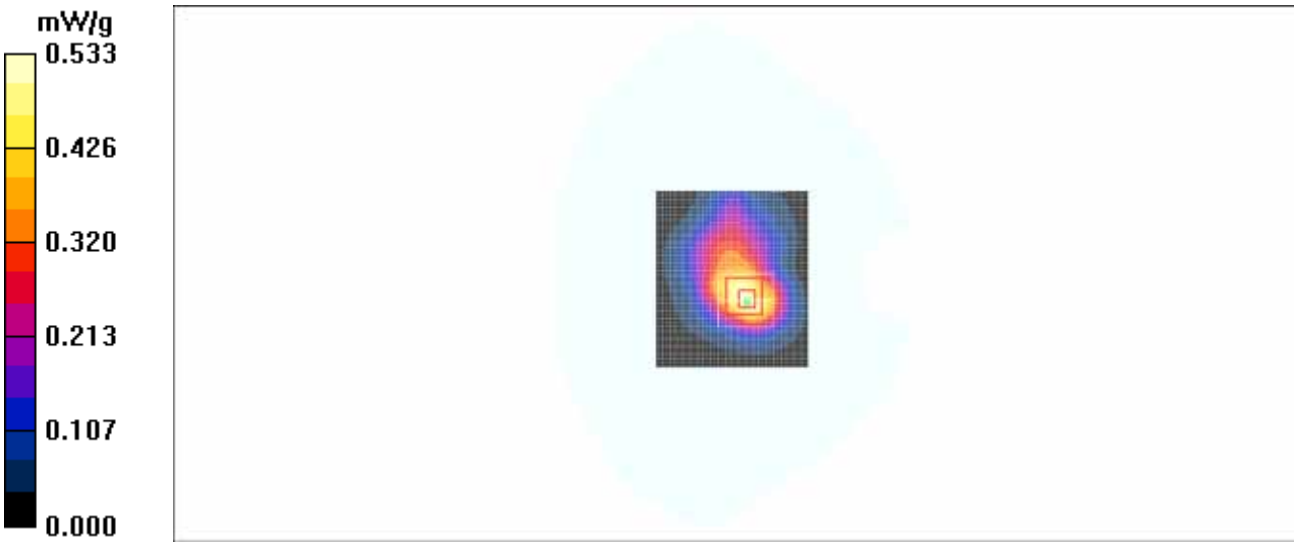


Fig.45 LTE BAND 7 Middle

LTE BAND 7, Position 2 Middle Frequency 16QAM_20MHz_1RB_Low
Date/Time: 2011-12-27 18:23:16
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 2/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.509 mW/g

Test Position 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.0 V/m; Power Drift = 0.032 dB
Peak SAR (extrapolated) = 0.838 W/kg
SAR(1 g) = 0.449 mW/g; SAR(10 g) = 0.248 mW/g
Maximum value of SAR (measured) = 0.489 mW/g

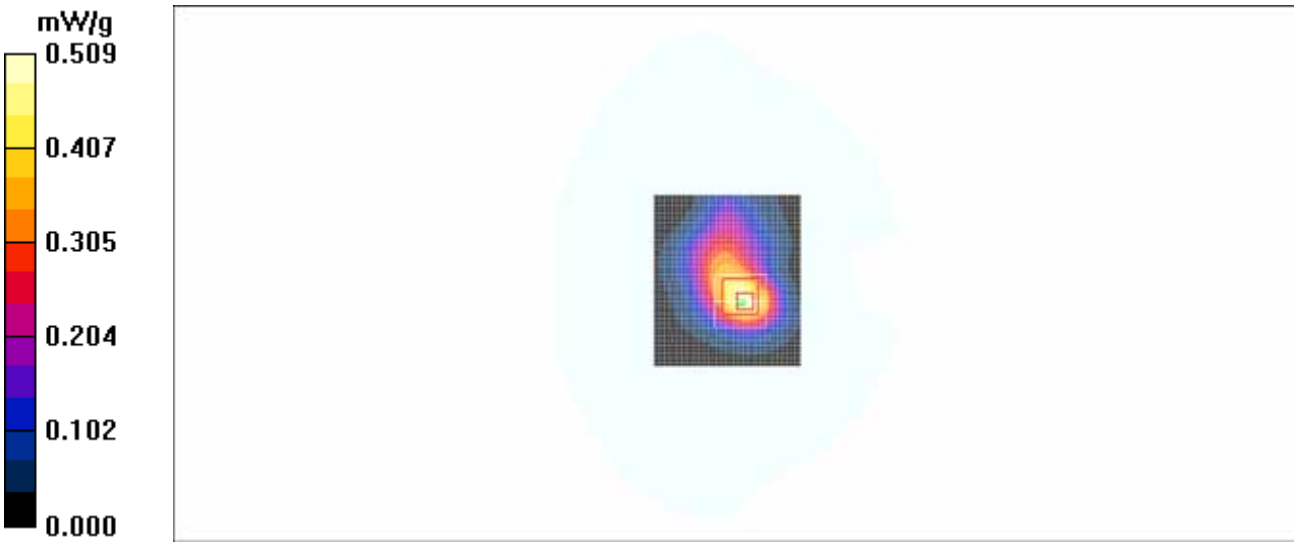


Fig.46 LTE BAND 7 Middle

LTE BAND 7, Position 3 Middle Frequency QPSK_20MHz_50RB
Date/Time: 2011-10-18 9:20:17
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.05 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 3/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.135 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.91 V/m; Power Drift = 0.088 dB
Peak SAR (extrapolated) = 0.243 W/kg
SAR(1 g) = 0.122 mW/g; SAR(10 g) = 0.064 mW/g
Maximum value of SAR (measured) = 0.138 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.91 V/m; Power Drift = 0.088 dB
Peak SAR (extrapolated) = 0.181 W/kg
SAR(1 g) = 0.094 mW/g; SAR(10 g) = 0.047 mW/g
Maximum value of SAR (measured) = 0.105 mW/g

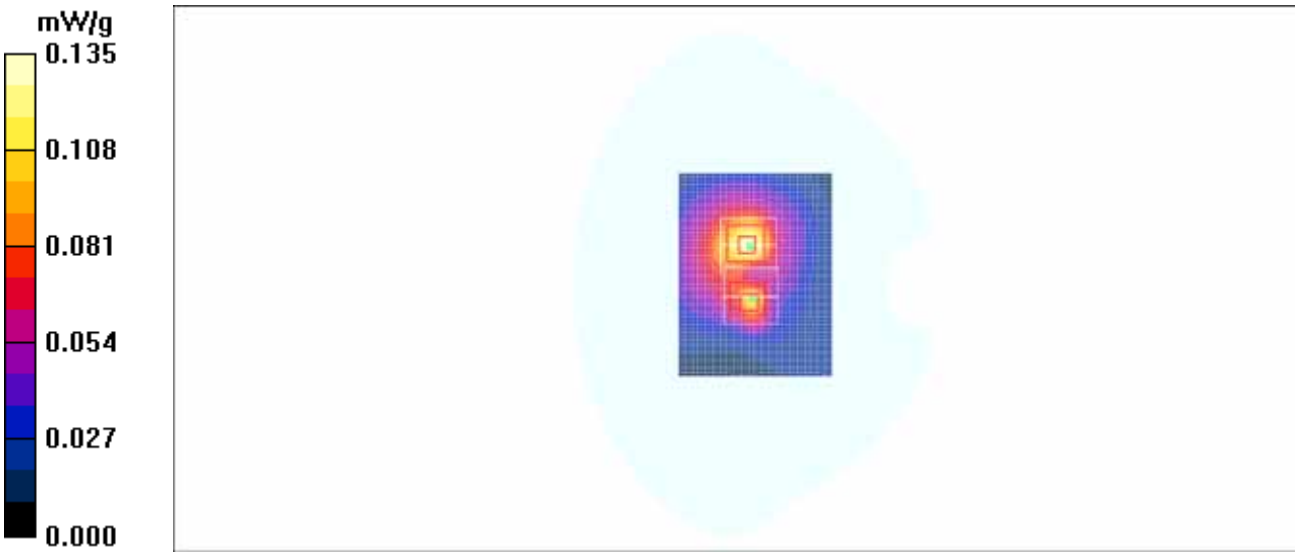


Fig.47 LTE BAND 7 Middle

LTE BAND 7, Position 3 Low Frequency QPSK_20MHz_1RB_High
Date/Time: 2011-12-27 18:39:28
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2510 MHz; σ = 2.01 mho/m; εr = 52.1; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2510 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 3/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.101 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.04 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 0.182 W/kg
SAR(1 g) = 0.098 mW/g; SAR(10 g) = 0.051 mW/g
Maximum value of SAR (measured) = 0.108 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.04 V/m; Power Drift = 0.007 dB
Peak SAR (extrapolated) = 0.155 W/kg
SAR(1 g) = 0.079 mW/g; SAR(10 g) = 0.043 mW/g
Maximum value of SAR (measured) = 0.089 mW/g

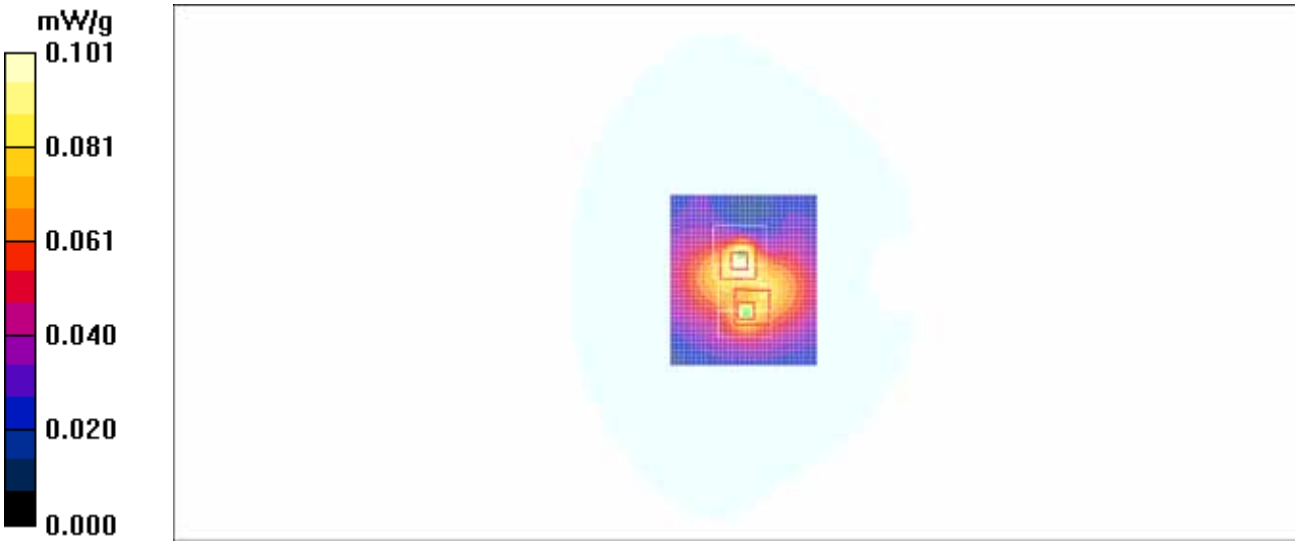


Fig.48 LTE BAND 7 Low

LTE BAND 7, Position 3 Middle Frequency QPSK_20MHz_1RB_Low
Date/Time: 2011-12-27 18:54:58
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 3/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.152 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.86 V/m; Power Drift = -0.165 dB
Peak SAR (extrapolated) = 0.229 W/kg
SAR(1 g) = 0.125 mW/g; SAR(10 g) = 0.067 mW/g
Maximum value of SAR (measured) = 0.143 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.86 V/m; Power Drift = -0.165 dB
Peak SAR (extrapolated) = 0.227 W/kg
SAR(1 g) = 0.118 mW/g; SAR(10 g) = 0.064 mW/g
Maximum value of SAR (measured) = 0.128 mW/g

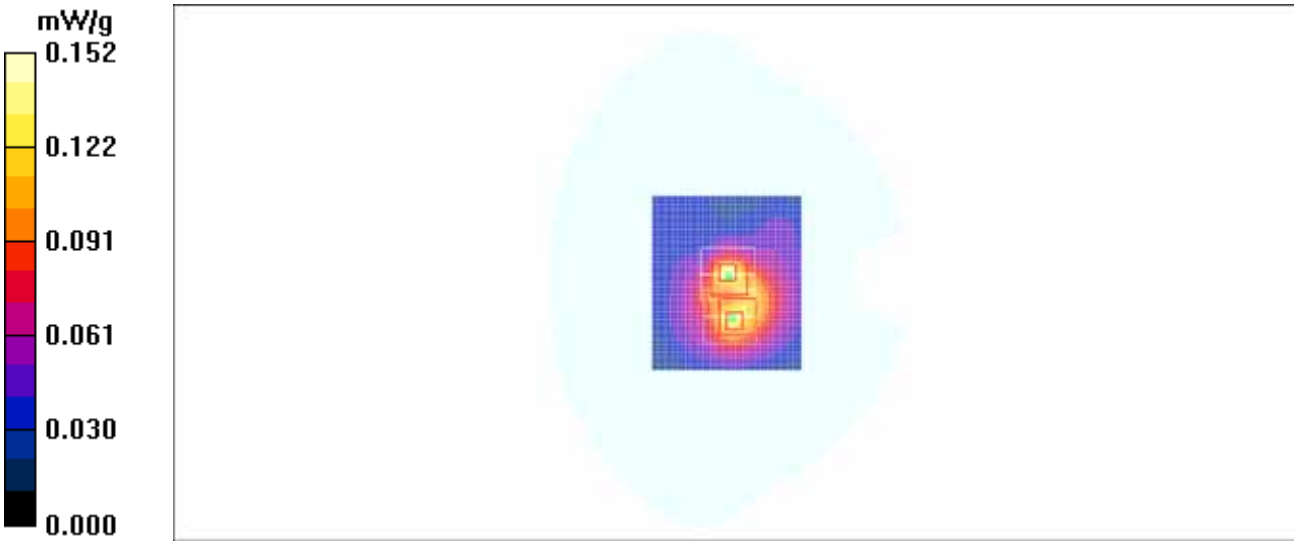


Fig.49 LTE BAND 7 Middle

LTE BAND 7, Position 3 Middle Frequency 16QAM_20MHz_50RB
Date/Time: 2011-12-27 19:10:22
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 3/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.097 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.59 V/m; Power Drift = 0.052 dB
Peak SAR (extrapolated) = 0.143 W/kg
SAR(1 g) = 0.078 mW/g; SAR(10 g) = 0.042 mW/g
Maximum value of SAR (measured) = 0.090 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.59 V/m; Power Drift = 0.052 dB
Peak SAR (extrapolated) = 0.147 W/kg
SAR(1 g) = 0.077 mW/g; SAR(10 g) = 0.041 mW/g
Maximum value of SAR (measured) = 0.083 mW/g

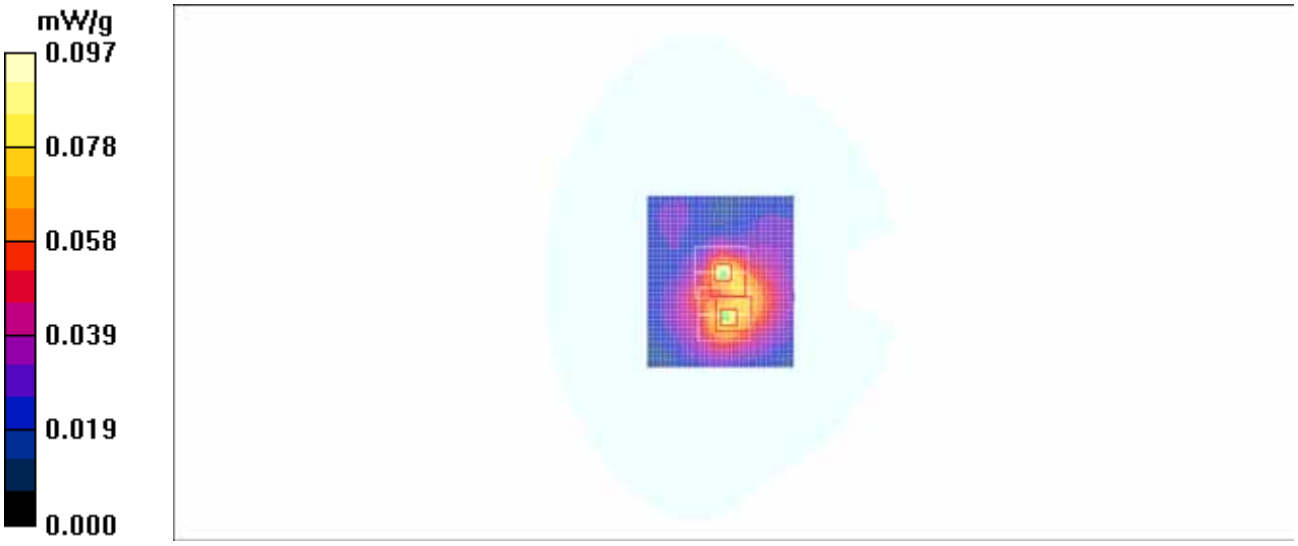


Fig.50 LTE BAND 7 Middle

LTE BAND 7, Position 3 Middle Frequency 16QAM_20MHz_1RB_High
Date/Time: 2011-12-27 19:25:53
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 3/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.138 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.20 V/m; Power Drift = 0.154 dB
Peak SAR (extrapolated) = 0.238 W/kg
SAR(1 g) = 0.120 mW/g; SAR(10 g) = 0.064 mW/g
Maximum value of SAR (measured) = 0.135 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.20 V/m; Power Drift = 0.154 dB
Peak SAR (extrapolated) = 0.174 W/kg
SAR(1 g) = 0.098 mW/g; SAR(10 g) = 0.053 mW/g
Maximum value of SAR (measured) = 0.113 mW/g

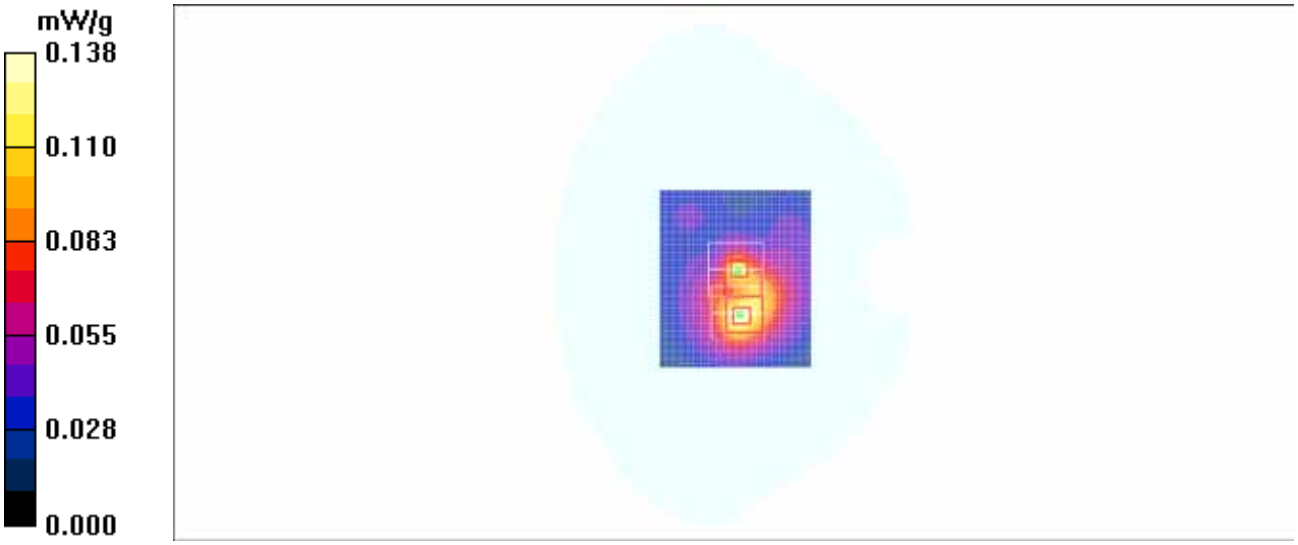


Fig.51 LTE BAND 7 Middle

LTE BAND 7, Position 3 Middle Frequency 16QAM_20MHz_1RB_Low
Date/Time: 2011-12-27 19:41:29
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 3/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.123 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.44 V/m; Power Drift = 0.129 dB
Peak SAR (extrapolated) = 0.191 W/kg
SAR(1 g) = 0.103 mW/g; SAR(10 g) = 0.055 mW/g
Maximum value of SAR (measured) = 0.118 mW/g

Test Position 3/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.44 V/m; Power Drift = 0.129 dB
Peak SAR (extrapolated) = 0.186 W/kg
SAR(1 g) = 0.097 mW/g; SAR(10 g) = 0.053 mW/g
Maximum value of SAR (measured) = 0.106 mW/g

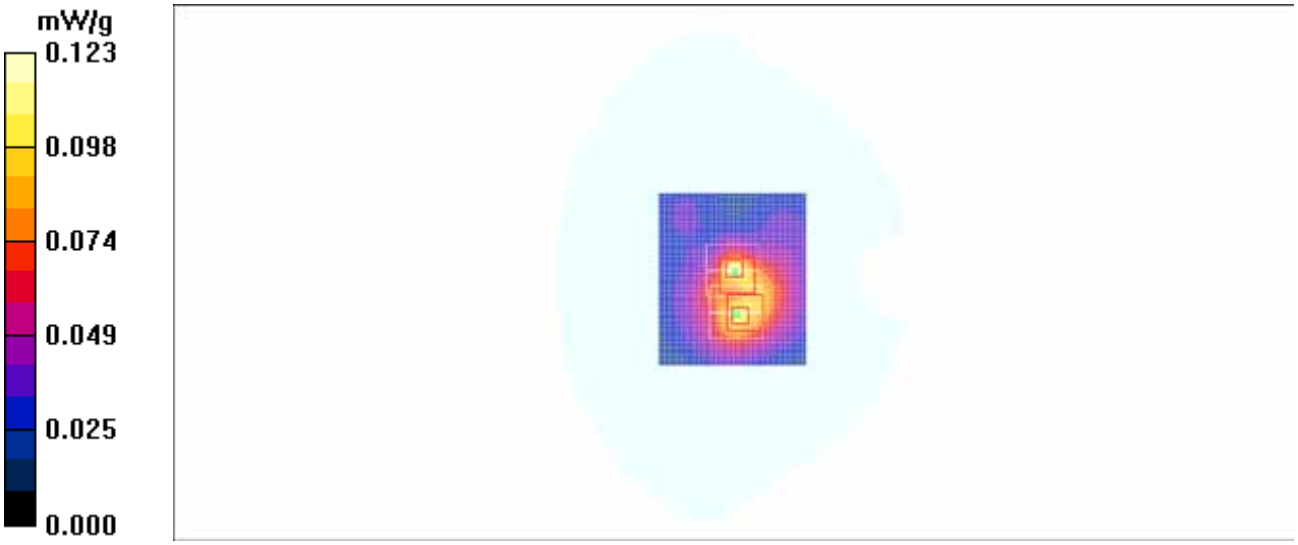


Fig.52 LTE BAND 7 Middle

LTE BAND 7, Position 4 Middle Frequency QPSK_20MHz_50RB
Date/Time: 2011-10-18 9:37:40
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.05 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 4/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.554 mW/g

Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.9 V/m; Power Drift = -0.021 dB
Peak SAR (extrapolated) = 1.14 W/kg
SAR(1 g) = 0.562 mW/g; SAR(10 g) = 0.264 mW/g
Maximum value of SAR (measured) = 0.587 mW/g

Test Position 4/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.9 V/m; Power Drift = -0.021 dB
Peak SAR (extrapolated) = 1.01 W/kg
SAR(1 g) = 0.386 mW/g; SAR(10 g) = 0.198 mW/g
Maximum value of SAR (measured) = 0.545 mW/g

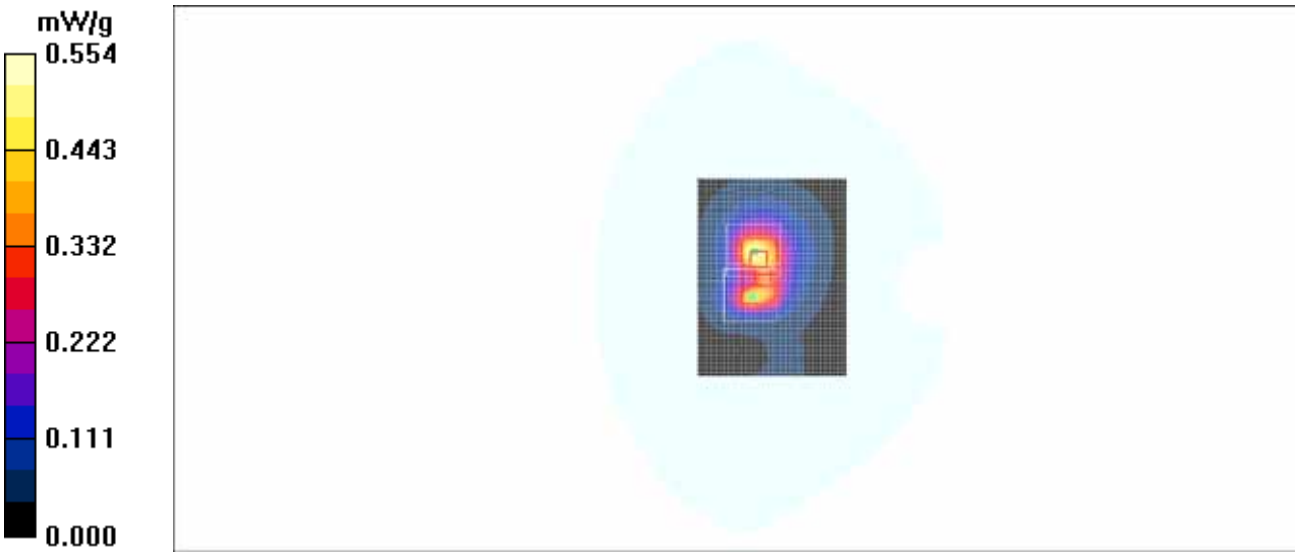


Fig.53 LTE BAND 7 Middle

LTE BAND 7, Position 4 Low Frequency QPSK_20MHz_1RB_High
Date/Time: 2011-12-27 19:57:50
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2510 MHz; σ = 2.01 mho/m; εr = 52.1; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2510 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 4/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.659 mW/g

Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.4 V/m; Power Drift = -0.099 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.578 mW/g; SAR(10 g) = 0.283 mW/g
Maximum value of SAR (measured) = 0.639 mW/g

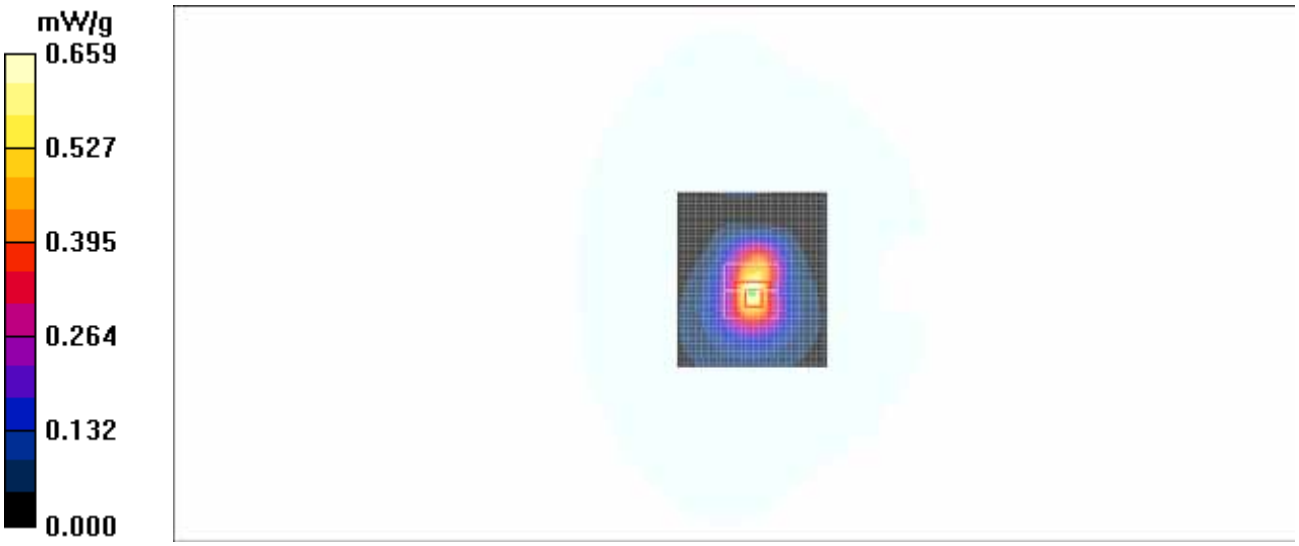


Fig.54 LTE BAND 7 Low

LTE BAND 7, Position 4 Middle Frequency QPSK_20MHz_1RB_Low
Date/Time: 2011-12-27 20:13:24
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 4/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.754 mW/g

Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.8 V/m; Power Drift = -0.170 dB
Peak SAR (extrapolated) = 1.32 W/kg
SAR(1 g) = 0.650 mW/g; SAR(10 g) = 0.305 mW/g
Maximum value of SAR (measured) = 0.757 mW/g

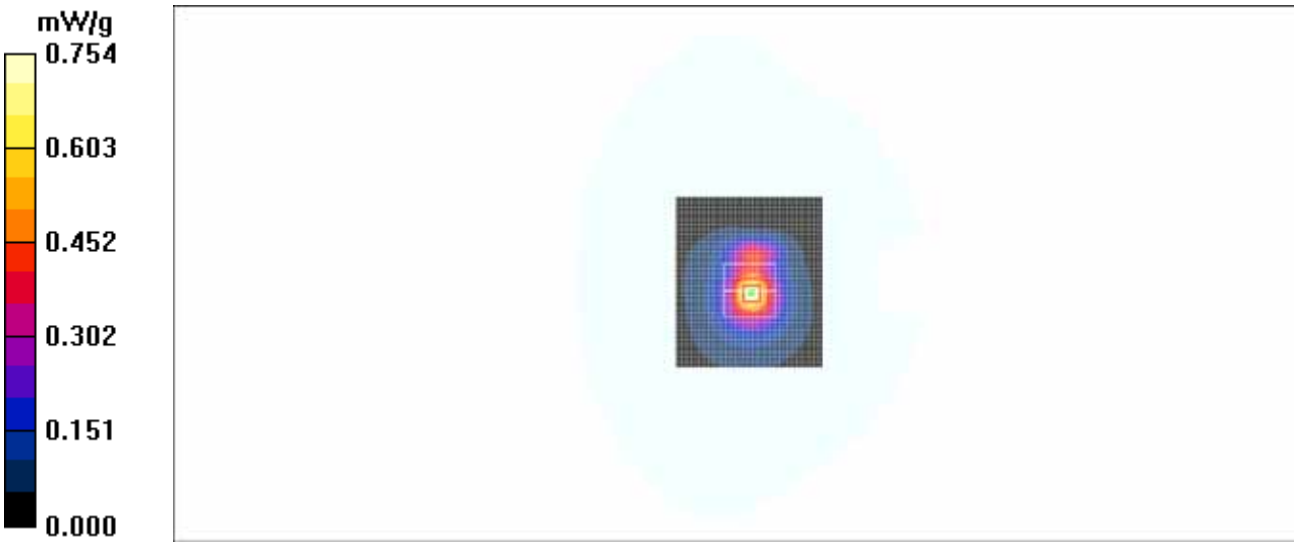


Fig.55 LTE BAND 7 Middle

LTE BAND 7, Position 4 Middle Frequency 16QAM_20MHz_50RB
Date/Time: 2011-12-27 20:29:48
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 4/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.513 mW/g

Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.1 V/m; Power Drift = -0.079 dB
Peak SAR (extrapolated) = 0.866 W/kg
SAR(1 g) = 0.428 mW/g; SAR(10 g) = 0.200 mW/g
Maximum value of SAR (measured) = 0.499 mW/g

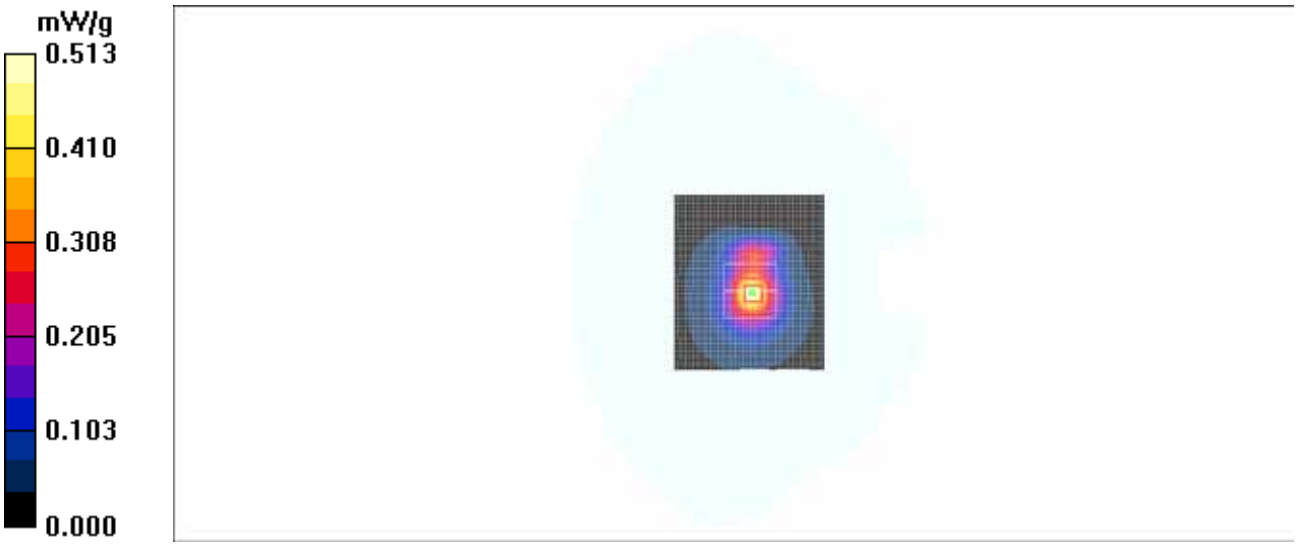


Fig.56 LTE BAND 7 Middle

LTE BAND 7, Position 4 Middle Frequency 16QAM_20MHz_1RB_High
Date/Time: 2011-12-27 20:46:10
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 4 /Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.589 mW/g

Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.9 V/m; Power Drift = -0.109 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.503 mW/g; SAR(10 g) = 0.237 mW/g
Maximum value of SAR (measured) = 0.587 mW/g

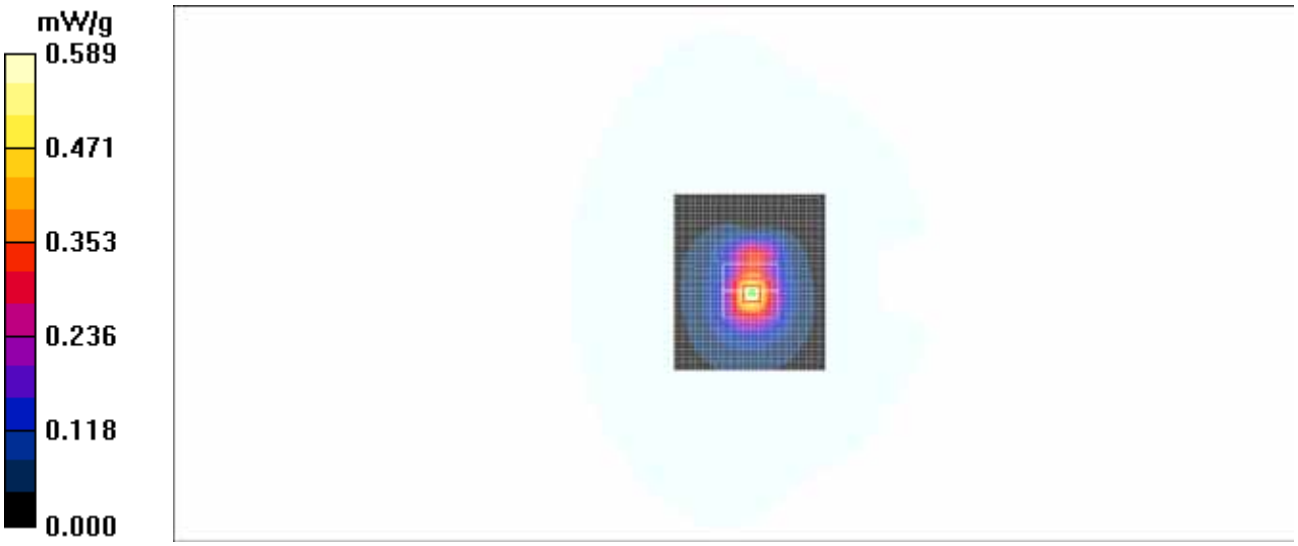


Fig.57 LTE BAND 7 Middle

LTE BAND 7, Position 4 Middle Frequency 16QAM_20MHz_1RB_Low
Date/Time: 2011-12-27 21:01:57
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 4/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.634 mW/g

Test Position 4/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.7 V/m; Power Drift = -0.084 dB
Peak SAR (extrapolated) = 1.13 W/kg
SAR(1 g) = 0.556 mW/g; SAR(10 g) = 0.260 mW/g
Maximum value of SAR (measured) = 0.654 mW/g

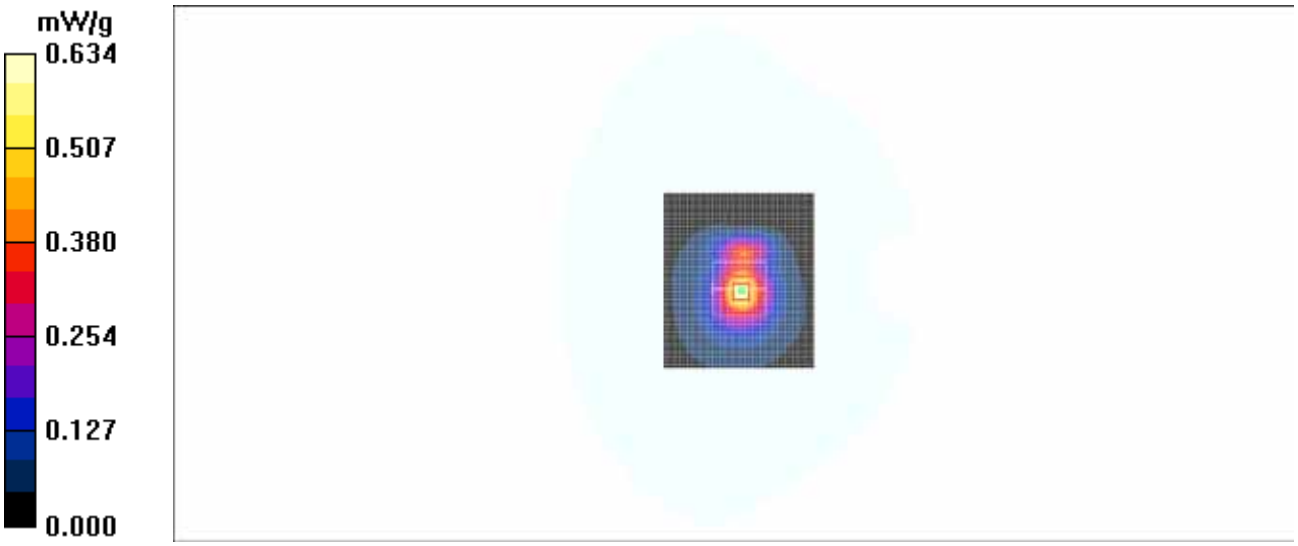


Fig.58 LTE BAND 7 Middle

LTE BAND 7, Position 5 Middle Frequency QPSK_20MHz_50RB
Date/Time: 2011-10-18 9:54:19
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.05 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 5/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.369 mW/g

Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.6 V/m; Power Drift = -0.183 dB
Peak SAR (extrapolated) = 0.620 W/kg
SAR(1 g) = 0.328 mW/g; SAR(10 g) = 0.168 mW/g
Maximum value of SAR (measured) = 0.367 mW/g

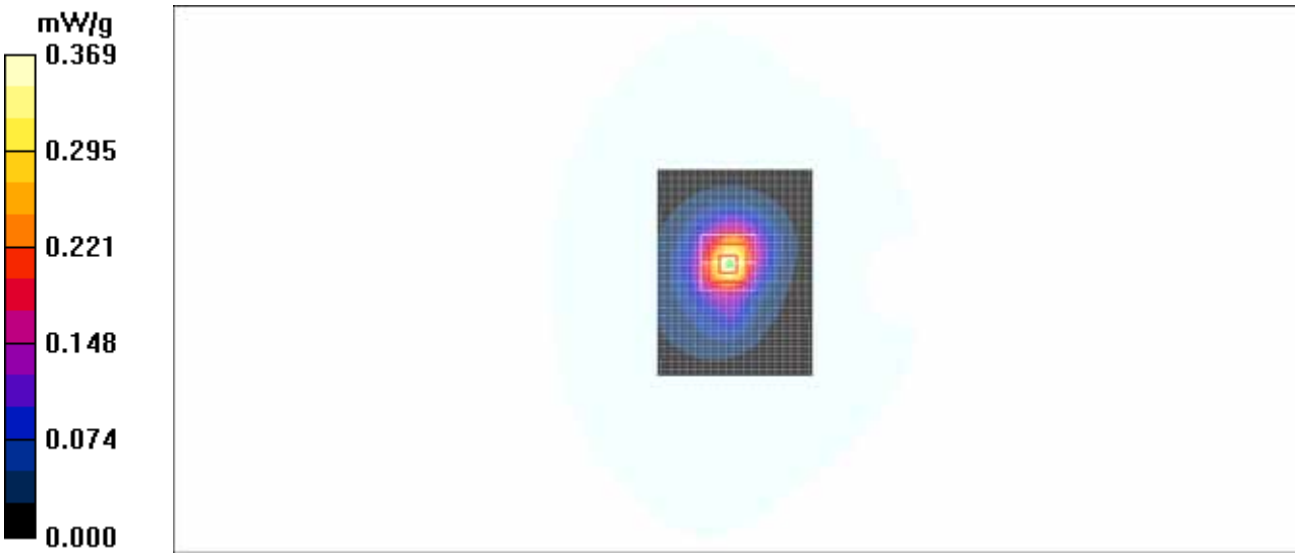


Fig.59 LTE BAND 7 Middle

LTE BAND 7, Position 5 Low Frequency QPSK_20MHz_1RB_High
Date/Time: 2011-12-27 21:17:31
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2510 MHz; σ = 2.01 mho/m; εr = 52.1; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2510 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 5/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.264 mW/g

Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.76 V/m; Power Drift = -0.047 dB
Peak SAR (extrapolated) = 0.440 W/kg
SAR(1 g) = 0.241 mW/g; SAR(10 g) = 0.126 mW/g
Maximum value of SAR (measured) = 0.269 mW/g

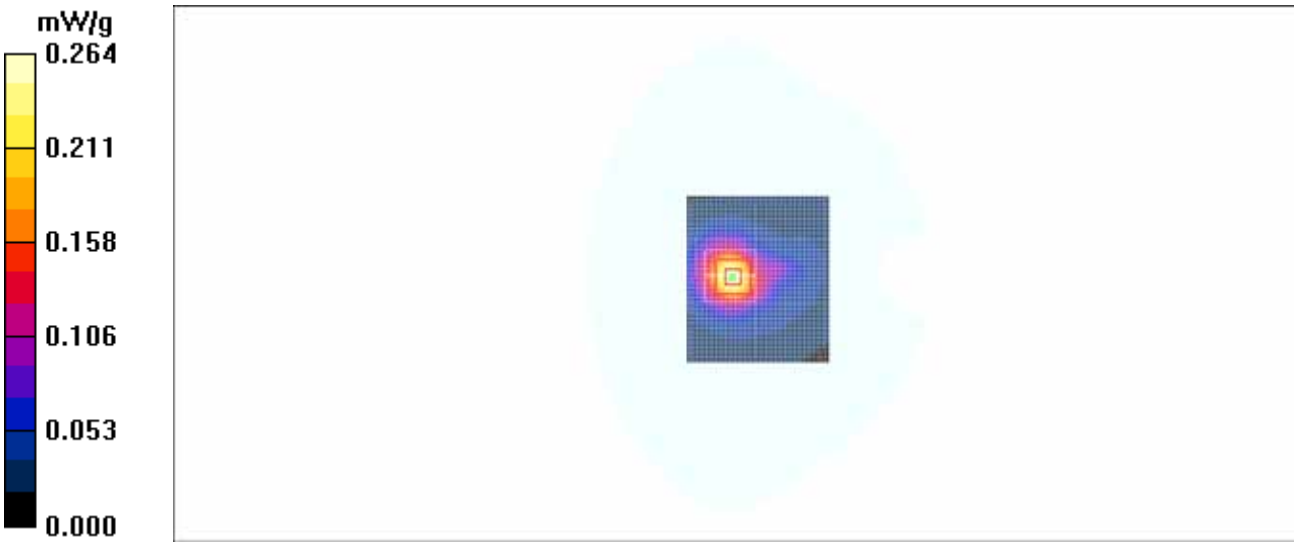


Fig.60 LTE BAND 7 Low

LTE BAND 7, Position 5 Middle Frequency QPSK_20MHz_1RB_Low
Date/Time: 2011-12-27 21:33:45
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 5/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.391 mW/g

Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.9 V/m; Power Drift = -0.078 dB
Peak SAR (extrapolated) = 0.721 W/kg
SAR(1 g) = 0.372 mW/g; SAR(10 g) = 0.193 mW/g
Maximum value of SAR (measured) = 0.406 mW/g

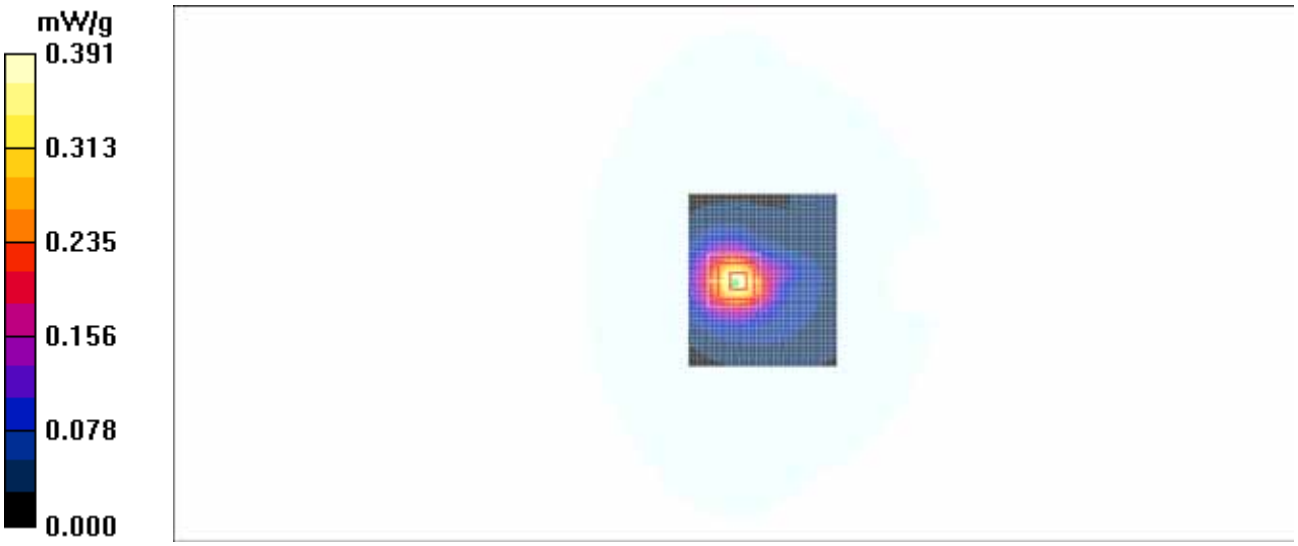


Fig.61 LTE BAND 7 Middle

LTE BAND 7, Position 5 Middle Frequency 16QAM_20MHz_50RB
Date/Time: 2011-12-27 21:50:06
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 5/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.262 mW/g

Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.84 V/m; Power Drift = 0.016 dB
Peak SAR (extrapolated) = 0.462 W/kg
SAR(1 g) = 0.245 mW/g; SAR(10 g) = 0.127 mW/g
Maximum value of SAR (measured) = 0.265 mW/g

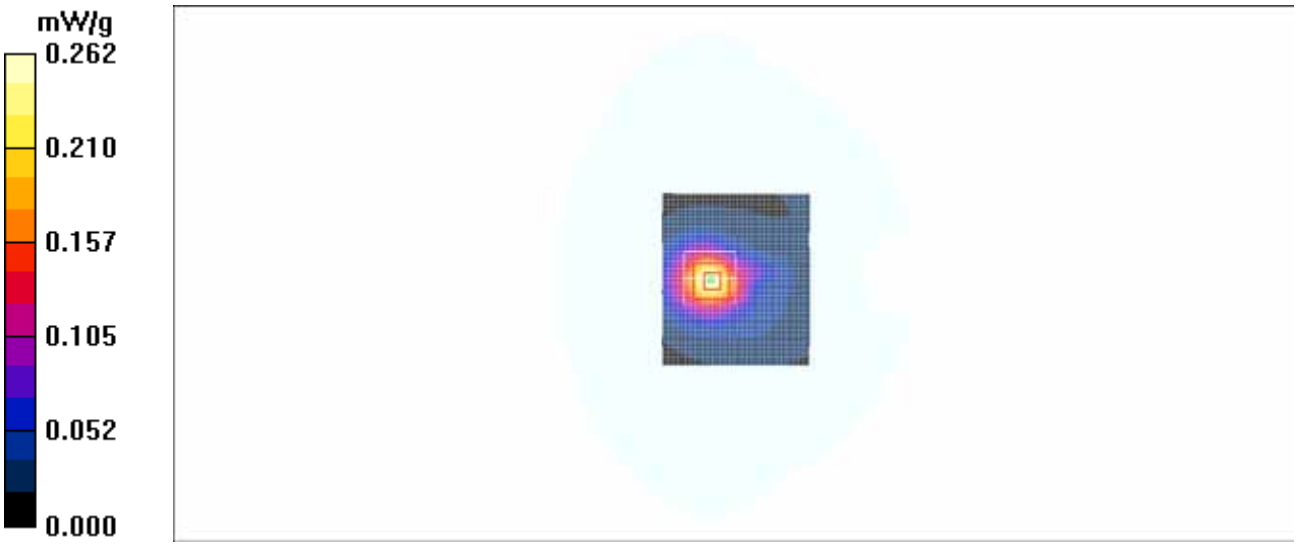


Fig.62 LTE BAND 7 Middle

LTE BAND 7, Position 5 Middle Frequency 16QAM_20MHz_1RB_High
Date/Time: 2011-12-27 22:05:49
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 5/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.342 mW/g

Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.2 V/m; Power Drift = 0.029 dB
Peak SAR (extrapolated) = 0.598 W/kg
SAR(1 g) = 0.314 mW/g; SAR(10 g) = 0.162 mW/g
Maximum value of SAR (measured) = 0.343 mW/g

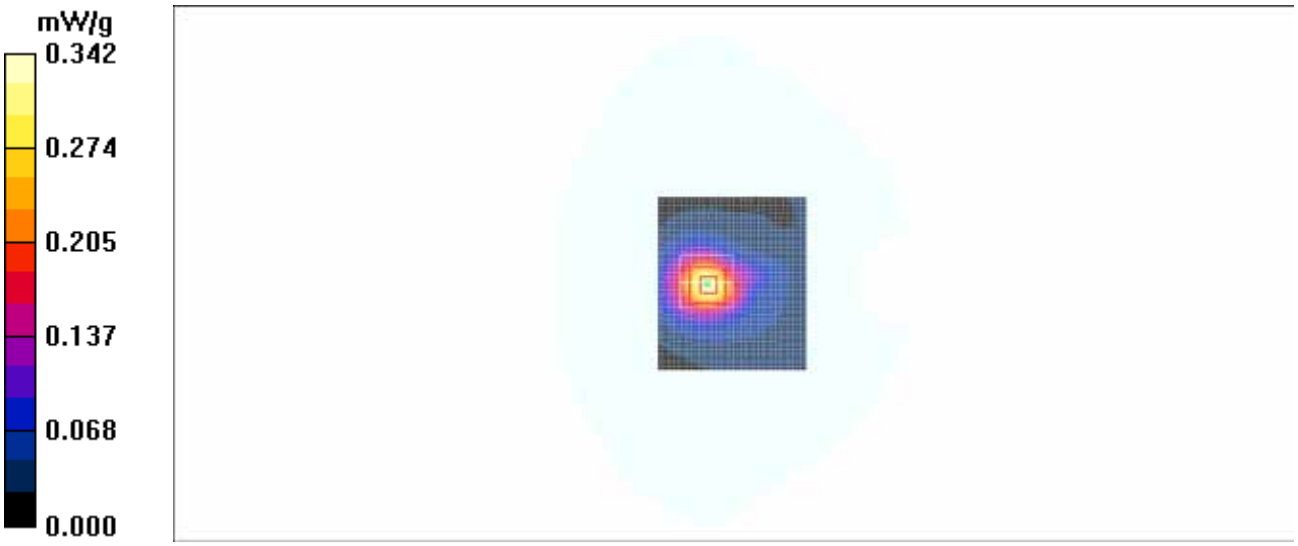


Fig.63 LTE BAND 7 Middle

LTE BAND 7, Position 5 Middle Frequency 16QAM_20MHz_1RB_Low
Date/Time: 2011-12-27 22:21:25
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2535 MHz; σ = 2.04 mho/m; εr = 52.0; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

Test Position 5/Area Scan (61x71x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.328 mW/g

Test Position 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.87 V/m; Power Drift = 0.019 dB
Peak SAR (extrapolated) = 0.565 W/kg
SAR(1 g) = 0.303 mW/g; SAR(10 g) = 0.158 mW/g
Maximum value of SAR (measured) = 0.328 mW/g

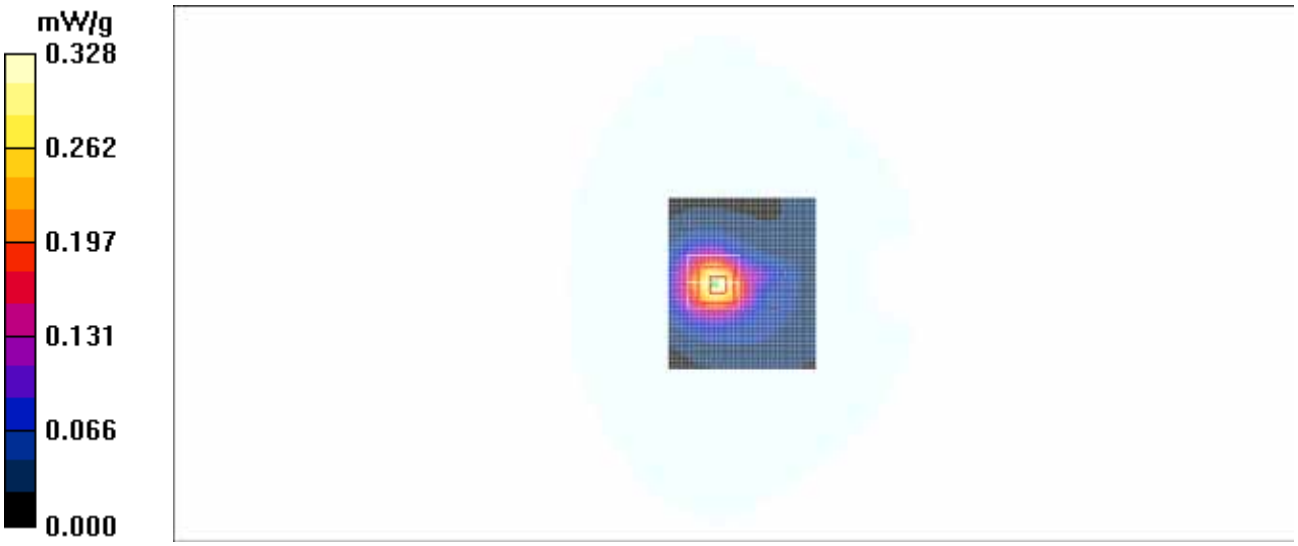


Fig.64 LTE BAND 7 Middle

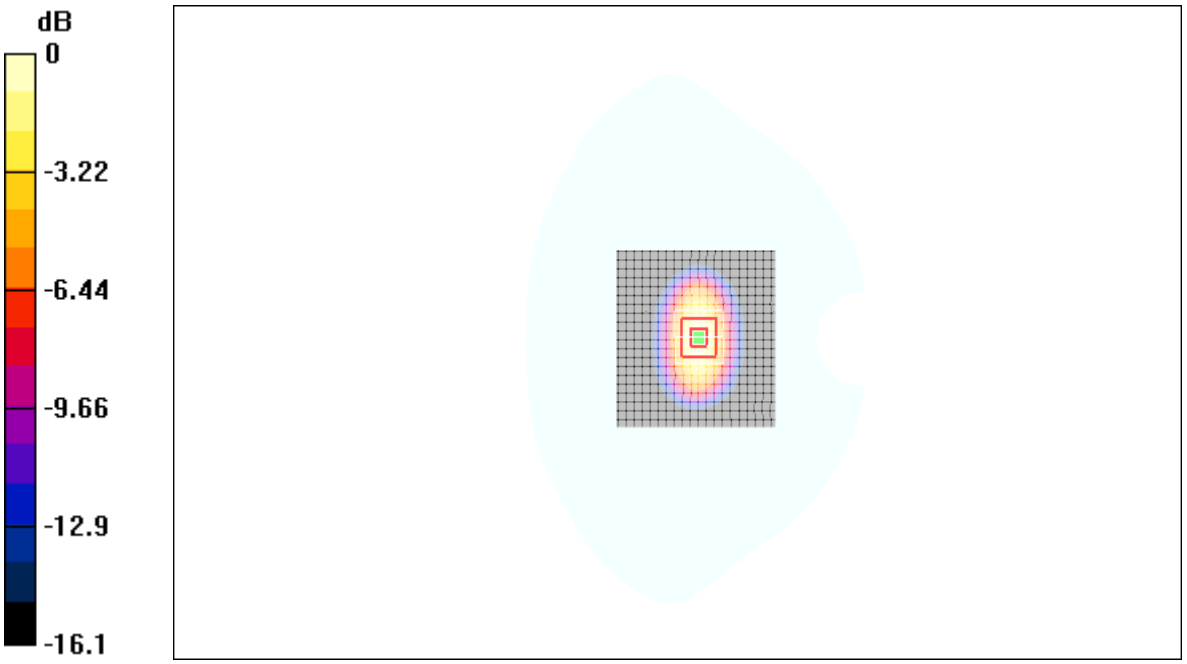
ANNEX D SYSTEM VALIDATION RESULTS

1750MHz

Date/Time: 2012-1-29 07:39:22
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f=1750 MHz; σ = 1.48 mho/m; ε_r = 52. 8; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: CW Frequency: 1750 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

System Validation/Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 13.8 mW/g

System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.4 V/m; Power Drift = -0.065 dB
Peak SAR (extrapolated) = 15.9 W/kg
SAR(1 g) = 9.62 mW/g; SAR(10 g) = 5.04 mW/g
Maximum value of SAR (measured) = 12.2 mW/g



0 dB = 12.2mW/g

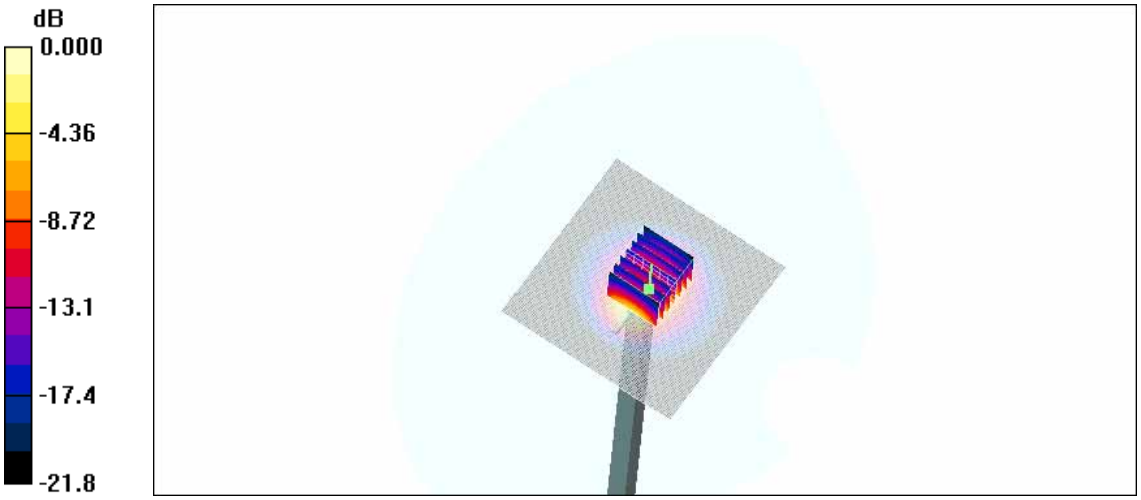
Fig.65 validation 1750MHz 250mW

2550MHz

Date/Time: 2011-10-18 7:37:12
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2550 MHz; σ = 2.07 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: CW Frequency: 2550 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

System Validation/Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 22.1 mW/g

System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.8 V/m; Power Drift = 0.051 dB
Peak SAR (extrapolated) = 26.4 W/kg
SAR(1 g) = 14.0 mW/g; SAR(10 g) = 6.37 mW/g
Maximum value of SAR (measured) = 18.3 mW/g



0 dB = 18.3mW/g

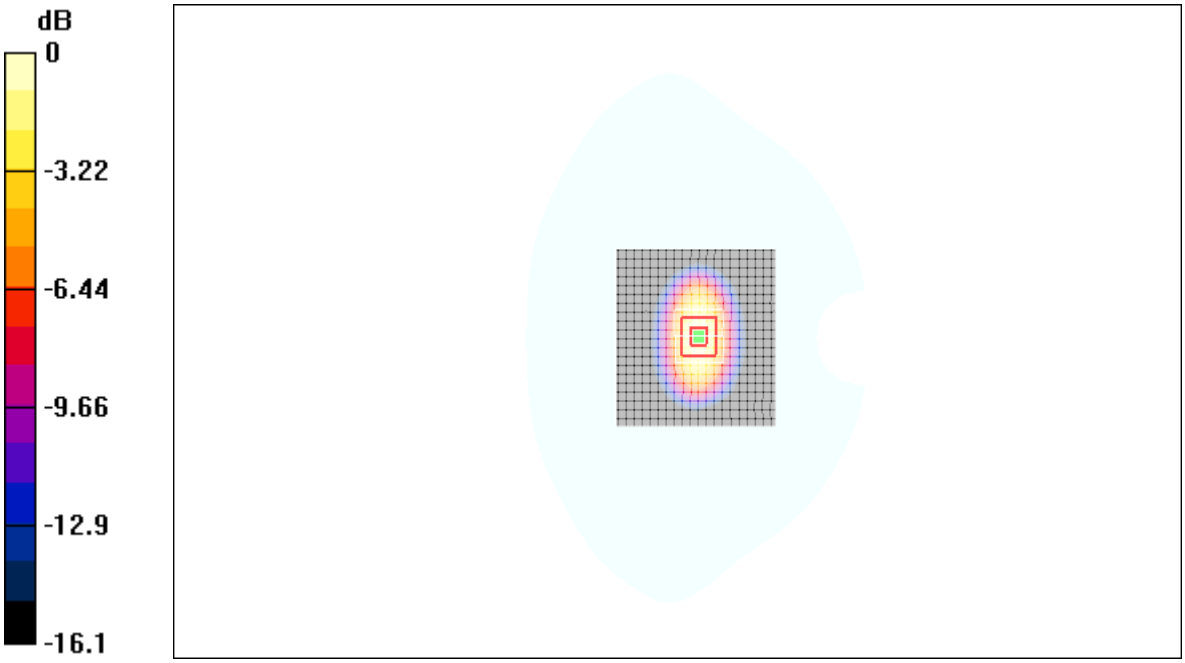
Fig.66 validation 2550MHz 250mW

1750MHz

Date/Time: 2011-12-26 16:41:37
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f=1750 MHz; σ = 1.47 mho/m; ε_r = 52. 9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: CW Frequency: 1750 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3149 ConvF(4.97, 4.97, 4.97)

System Validation/Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 13.9 mW/g

System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.1 V/m; Power Drift = 0.070 dB
Peak SAR (extrapolated) = 16.0 W/kg
SAR(1 g) = 9.67 mW/g; SAR(10 g) = 5.10 mW/g
Maximum value of SAR (measured) = 12.2 mW/g



0 dB = 12.2mW/g

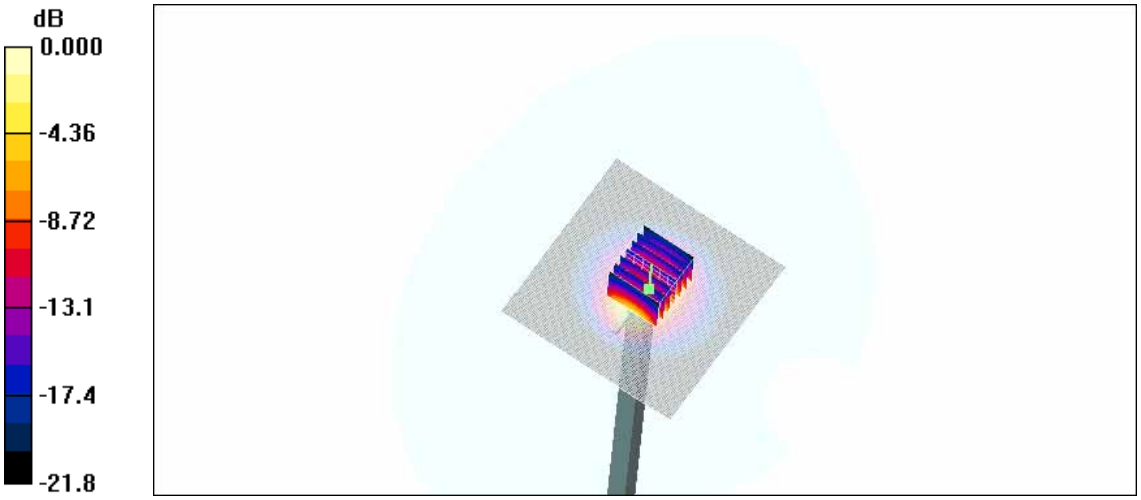
Fig.67 validation 1750MHz 250mW

2550MHz

Date/Time: 2011-12-27 7:32:04
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2550 MHz; σ = 2.06 mho/m; ε_r = 51.9; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: CW Frequency: 2550 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

System Validation/Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 22.0 mW/g

System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.5 V/m; Power Drift = 0.065 dB
Peak SAR (extrapolated) = 26.3 W/kg
SAR(1 g) = 13.9 mW/g; SAR(10 g) = 6.28 mW/g
Maximum value of SAR (measured) = 18.2 mW/g



0 dB = 18.2mW/g

Fig.68 validation 2550MHz 250mW

ANNEX E PROBE CALIBRATION CERTIFICATE

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

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

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

Accreditation No.: SCS 108

Client TMC China Certificate No: ES3DV3-3149_Sep11

CALIBRATION CERTIFICATE

Object	ES3DV3-SN: 3149
Calibration procedure(s)	QA CAL-01.v6 Calibration procedure for dosimetric E-field probes
Calibration date:	September 24, 2011
Condition of the calibrated item	In Tolerance

This calibration certify 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 at an environment temperature (22±3)°C and humidity<70%

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID#	Cal Data (Calibrated by, Certification NO.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-May-11 (METAS, NO. 251-00388)	May-12
Power sensor E4412A	MY41495277	5-May-11 (METAS, NO. 251-00388)	May-12
Reference 3 dB Attenuator	SN:S5054 (3c)	11-Aug-11 (METAS, NO. 251-00403)	Aug-12
Reference 20 dB Attenuator	SN:S5086 (20b)	3-May-11 (METAS, NO. 251-00389)	May-12
Reference 30 dB Attenuator	SN:S5129 (30b)	11-Aug-11 (METAS, NO. 251-00404)	Aug-12
DAE4	SN:617	10-Jun-11 (SPEAG, NO.DAE4-907_Jun11)	Jun-12
Reference Probe ES3DV2	SN: 3013	12-Jan-11 (SPEAG, NO. ES3-3013_Jan11)	Jan-12

Secondary Standards	ID#	Check Data (in house)	Scheduled Calibration
RF generator HP8648C	US3642U01700	4-Aug-99(SPEAG, in house check Oct-10)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01(SPEAG, in house check Nov-10)	In house check: Nov-11

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: September 24, 2011

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

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

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

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

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

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:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN: 3149

Manufactured: June 12, 2007

Calibrated: September 24, 2011

Calibrated for DASY/EASY System

(Note: non-compatible with DASY2 system!)

DASY/EASY – Parameters of Probe: ES3DV3 - SN:3149

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (μ V/(V/m)^2)^A	1.14	1.23	1.29	±10.1%
DCP (mV)^B	94	95	91	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300.0	±1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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 Page 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

DASY/EASY – Parameters of Probe: ES3DV3 - SN:3149

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)
850	41.5	0.90	6.56	6.56	6.56	0.91	1.13	±12.0%
900	41.5	0.97	6.34	6.34	6.34	0.83	1.26	±12.0%
1800	40.0	1.40	5.18	5.18	5.18	0.69	1.47	±12.0%
1900	40.0	1.40	5.03	5.03	5.03	0.72	1.38	±12.0%
2100	39.8	1.49	4.58	4.58	4.58	0.66	1.34	±12.0%
2450	39.2	1.80	4.35	4.35	4.35	0.67	1.36	±12.0%

[C] Frequency validity of ±100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY – Parameters of Probe: ES3DV3 - SN:3149

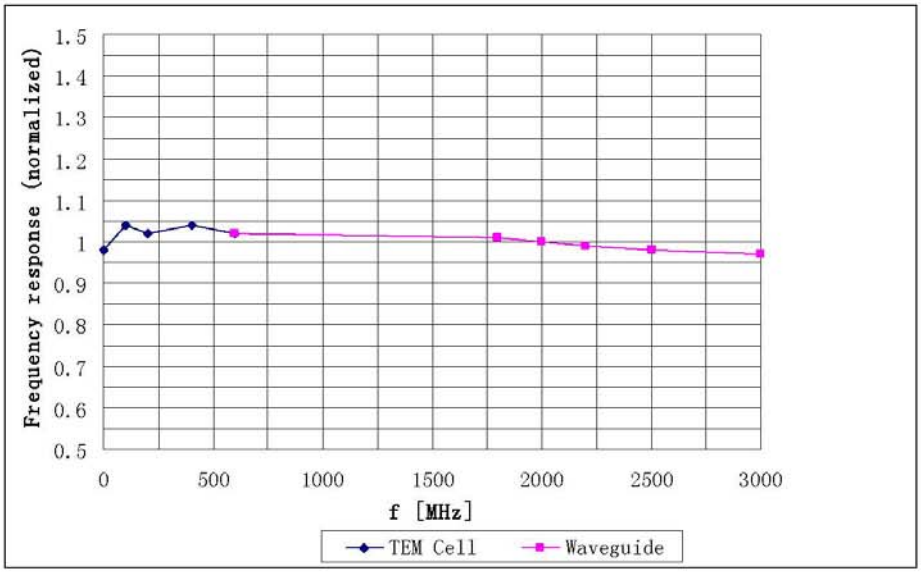
Calibration Parameter Determined in Body Tissue Simulating Media

f[MHz] [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
850	55.2	0.97	6.22	6.22	6.22	0.76	1.26	±12.0%
900	55.0	1.05	6.02	6.02	6.02	0.99	1.06	±12.0%
1800	53.3	1.52	4.97	4.97	4.97	0.75	1.34	±12.0%
1900	53.3	1.52	4.68	4.68	4.68	0.62	1.33	±12.0%
2100	53.5	1.57	4.35	4.35	4.35	0.68	1.34	±12.0%
2450	52.7	1.95	4.13	4.13	4.13	0.71	1.35	±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.

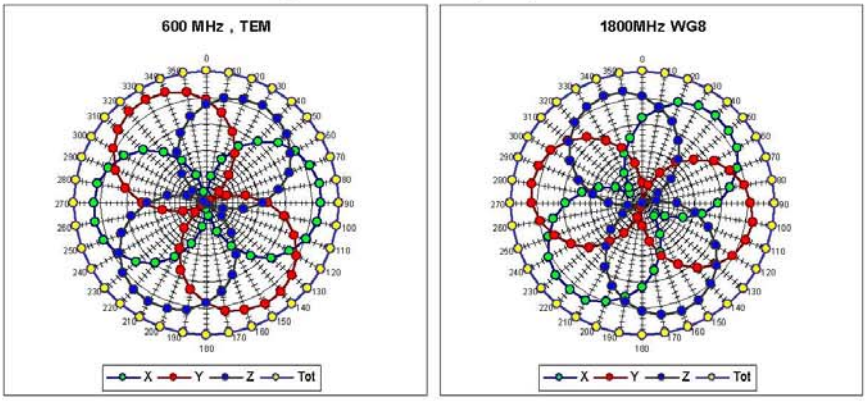
Frequency Response of E-Field

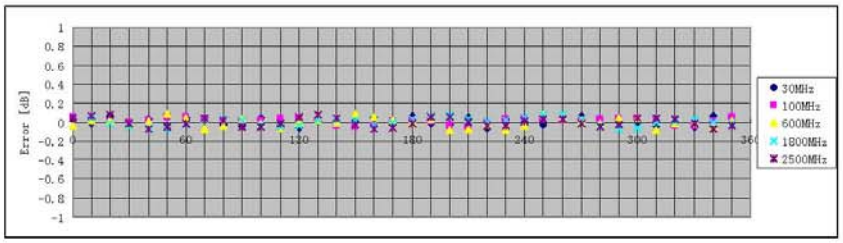
(TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ±5.0% (k=2)

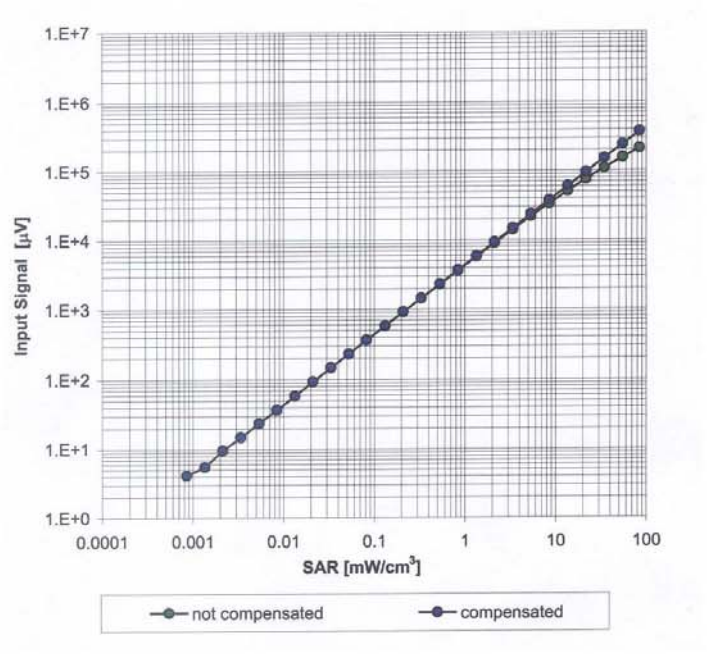
Receiving Pattern (ϕ), θ =0°

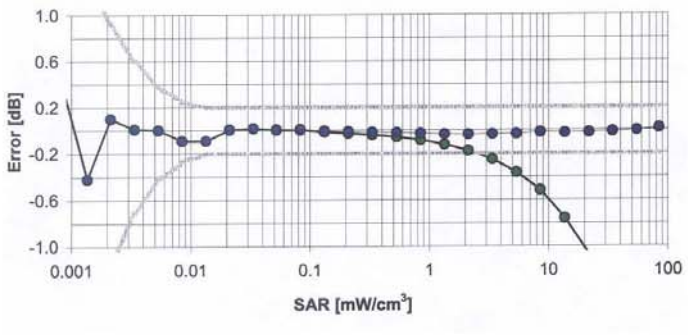




Uncertainty of Axial Isotropy Assessment: ±0.5% (k=2)

Dynamic Range f(SAR_{head})
(Waveguide: WG8, f = 1800 MHz)

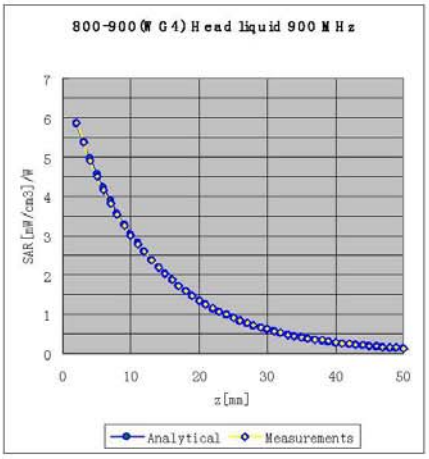


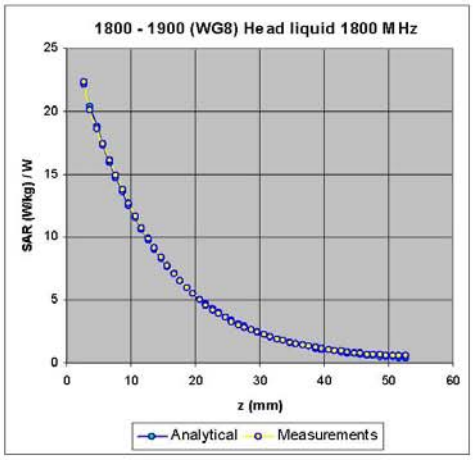


Uncertainty of Linearity Assessment: ±0.5% (k=2)

ES3DV3 SN: 3149 **September 24, 2011**

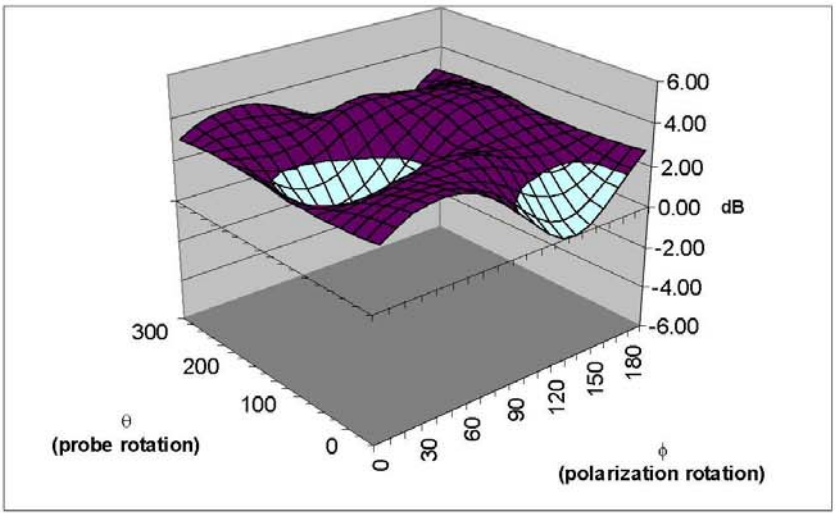
Conversion Factor Assessment





Deviation from Isotropy

Error (Φ , θ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ±2.5% (k=2)

DASY/EASY – Parameters of Probe: ES3DV3 - SN:3149

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	2 mm

Calibration Laboratory of
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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 108

Client TMC China Certificate No: EX3DV4-3617_Jul11

CALIBRATION CERTIFICATE

Object	EX3DV4-SN: 3617
Calibration procedure(s)	QA CAL-01.v6 Calibration procedure for dosimetric E-field probes
Calibration date:	July 8, 2011
Condition of the calibrated item	In Tolerance

This calibration certify 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 at an environment temperature (22±3)°C and humidity<70%

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID#	Cal Data (Calibrated by, Certification NO.)	Scheduled Calibration
Power meter E4419B	GB41293874	5-May-11 (METAS, NO. 251-00388)	May-12
Power sensor E4412A	MY41495277	5-May-11 (METAS, NO. 251-00388)	May-12
Reference 3 dB Attenuator	SN:S5054 (3c)	11-Aug-10 (METAS, NO. 251-00403)	Aug-11
Reference 20 dB Attenuator	SN:S5086 (20b)	3-May-11 (METAS, NO. 251-00389)	May-12
Reference 30 dB Attenuator	SN:S5129 (30b)	11-Aug-10 (METAS, NO. 251-00404)	Aug-11
DAE4	SN:617	10-Jun-11 (SPEAG, NO.DAE4-907_Jun11)	Jun-12
Reference Probe ES3DV2	SN: 3013	12-Jan-11 (SPEAG, NO. ES3-3013_Jan11)	Jan-12

Secondary Standards	ID#	Check Data (in house)	Scheduled Calibration
RF generator HP8648C	US3642U01700	4-Aug-99(SPEAG, in house check Oct-10)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01(SPEAG, in house check Nov-10)	In house check: Nov-11

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Niels Kuster	Quality Manager	

Issued: July 8, 2011

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

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

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis

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:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN: 3617

Manufactured: May 3, 2007

Calibrated: July 8, 2011

Calibrated for DASY/EASY System

(Note: non-compatible with DASY2 system!)

DASY/EASY – Parameters of Probe: EX3DV4 - SN:3617

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (μ V/(V/m)^2)^A	0.42	0.44	0.31	±10.1%
DCP (mV)^B	89	88	91	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dBuV	C	VR mV	Unc^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	300.0	±1.5%
			Y	0.00	0.00	1.00	300.0	
			Z	0.00	0.00	1.00	300.0	

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 Page 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the maximum deviation from linear response applying recatangular distribution and is expressed for the square of the field value.

DASY/EASY – Parameters of Probe: EX3DV4 - SN:3617

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)
2300	39.5	1.67	7.23	7.23	7.23	0.33	1.02	±12.0%
2450	39.2	1.80	7.19	7.19	7.19	0.33	1.00	±12.0%
2600	39.0	1.96	7.16	7.16	7.16	0.36	1.21	±12.0%
3500	37.9	2.91	6.48	6.48	6.48	0.34	1.35	±12.0%
5200	36.0	4.66	5.33	5.33	5.33	0.35	1.60	±12.0%
5800	35.3	5.27	4.69	4.69	4.69	0.35	1.60	±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.

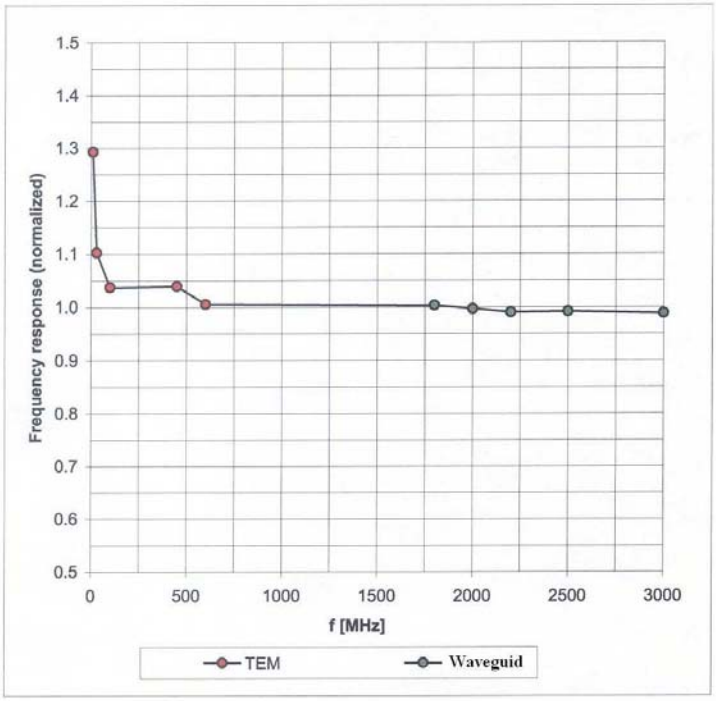
DASY/EASY – Parameters of Probe: EX3DV4 - SN:3617

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)
2300	52.8	1.85	6.95	6.95	6.95	0.30	1.01	±12.0%
2450	52.7	1.95	6.88	6.88	6.88	0.36	1.00	±12.0%
2600	52.5	2.16	6.84	6.84	6.84	0.36	1.05	±12.0%
3500	51.3	3.30	5.02	5.02	5.02	0.33	1.40	±12.0%
5200	49.0	5.30	4.64	4.64	4.64	0.35	1.70	±12.0%
5800	48.2	6.00	4.53	4.53	4.53	0.30	1.70	±12.0%

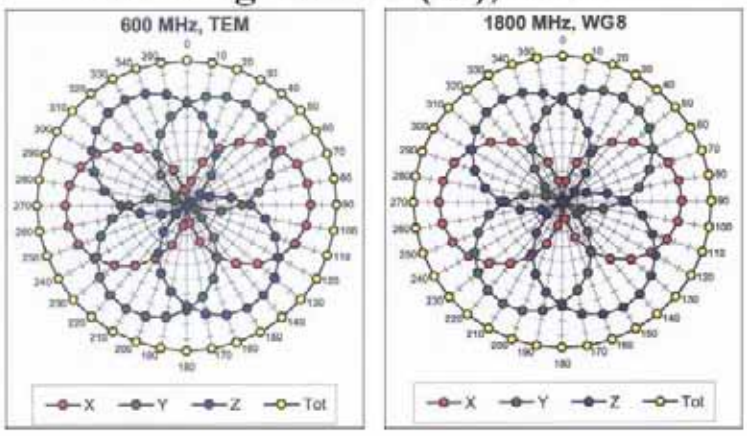
[C] Frequency validity of ±100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue 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.

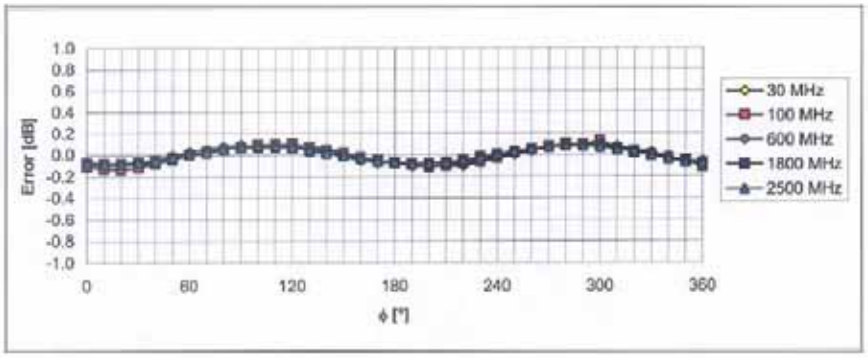
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ±6.3% (k=2)

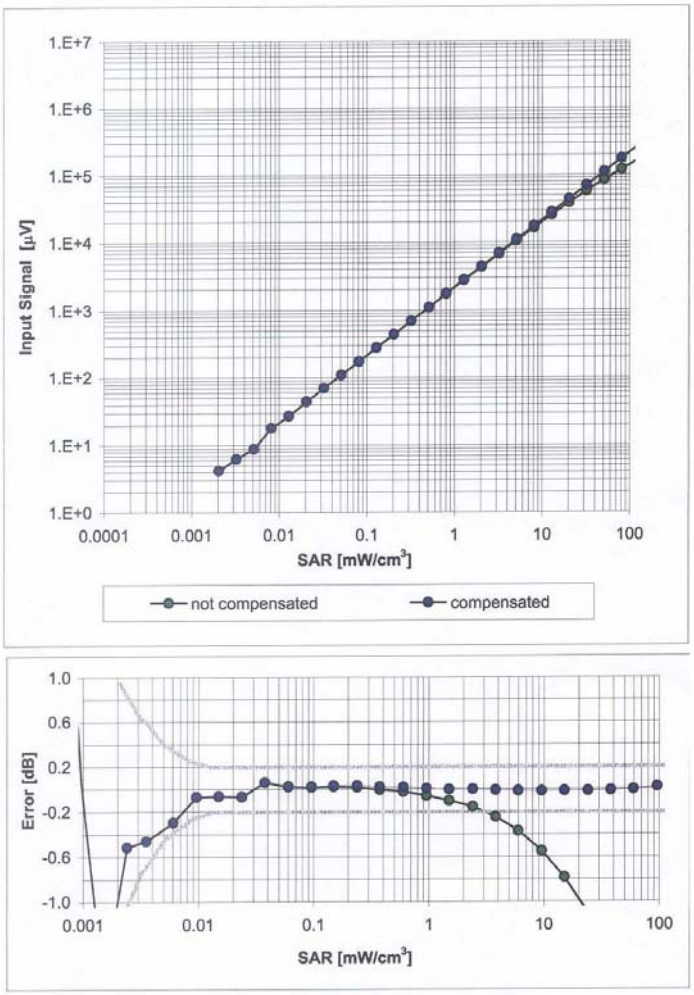
Receiving Pattern (ϕ), $\theta = 0°$





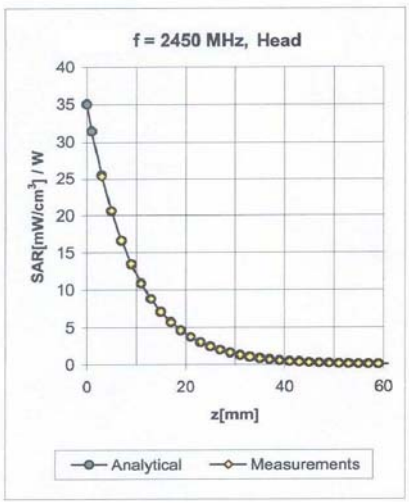
Uncertainty of Axial Isotropy Assessment: ±0.5% (k=2)

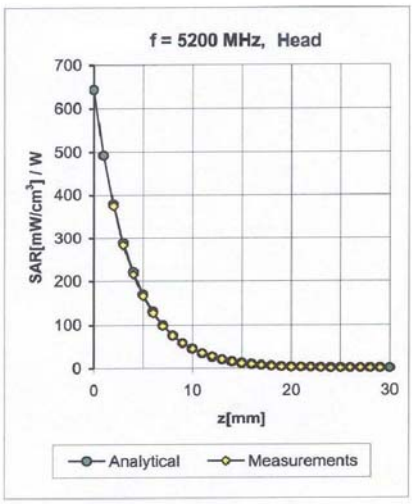
Dynamic Range f(SAR_{head})
(Waveguide: WG8, f = 1800 MHz)



Uncertainty of Linearity Assessment: ±0.6% (k=2)

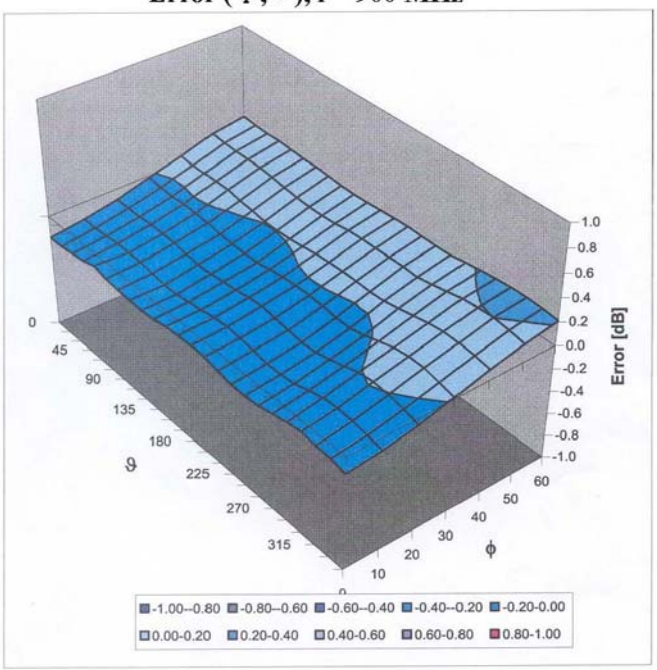
Conversion Factor Assessment





Deviation from Isotropy

Error (φ , θ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ±2.6% (k=2)

DASY/EASY – Parameters of Probe: EX3DV4 - SN:3617

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	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

ANNEX F DIPOLE CALIBRATION CERTIFICATE

1750 MHz Dipole Calibration Certificate

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

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Accreditation No.: SCS 108

Client TMC (Auden)

Certificate No: D1750V2-1003_Sep11

CALIBRATION CERTIFICATE

Object D1750V2 - SN: 1003

Calibration procedure(s) QA CAL-05.v6
Calibration procedure for dipole validation kits

Calibration date: September 29, 2011

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	06-Oct-10 (No. 217-01086)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01086)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-11 (No. 217-01158)	Mar-12
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-11 (No. 217-01162)	Mar-12
Reference Probe ES3DV3	SN: 3205	30-Apr-11 (No. ES3-3205_Apr10)	Apr-12
DAE4	SN: 601	02-Mar-11 (No. DAE4-601_Mar10)	Mar-12

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: October 1, 2011

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

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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	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.7 ± 6 %	1.34 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.07 mW / g
SAR normalized	normalized to 1W	36.3 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**36.7 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.82 mW / g
SAR normalized	normalized to 1W	19.3 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**19.4 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	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.1 ± 6 %	1.45 mho/m ± 6 %
Body TSL temperature during test	(21.4 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	condition	
SAR measured	250 mW input power	9.38 mW / g
SAR normalized	normalized to 1W	37.5 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**38.0 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.05 mW / g
SAR normalized	normalized to 1W	20.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.3 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.3 Ω + 0.9 jΩ
Return Loss	- 36.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.9 Ω + 1.4 jΩ
Return Loss	- 29.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.211 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 30, 2008

DASY5 Validation Report for Head TSL

Date/Time: 28.09.2011 14:40:48

Test Laboratory: SPEAG, Zurich, Switzerland

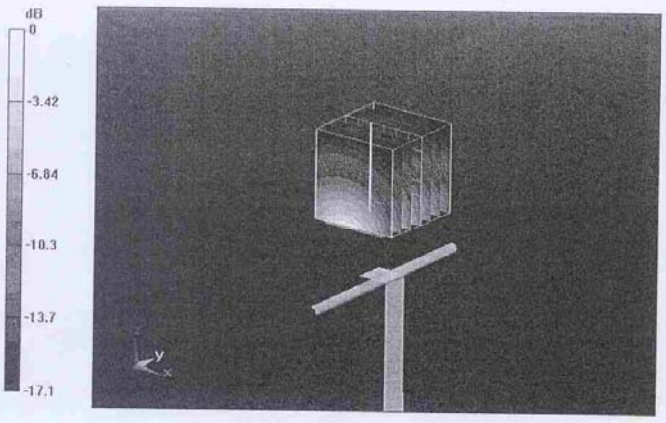
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1003

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: HSL U12 BB
Medium parameters used: f = 1750 MHz; σ = 1.34 mho/m; ε_r = 39.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

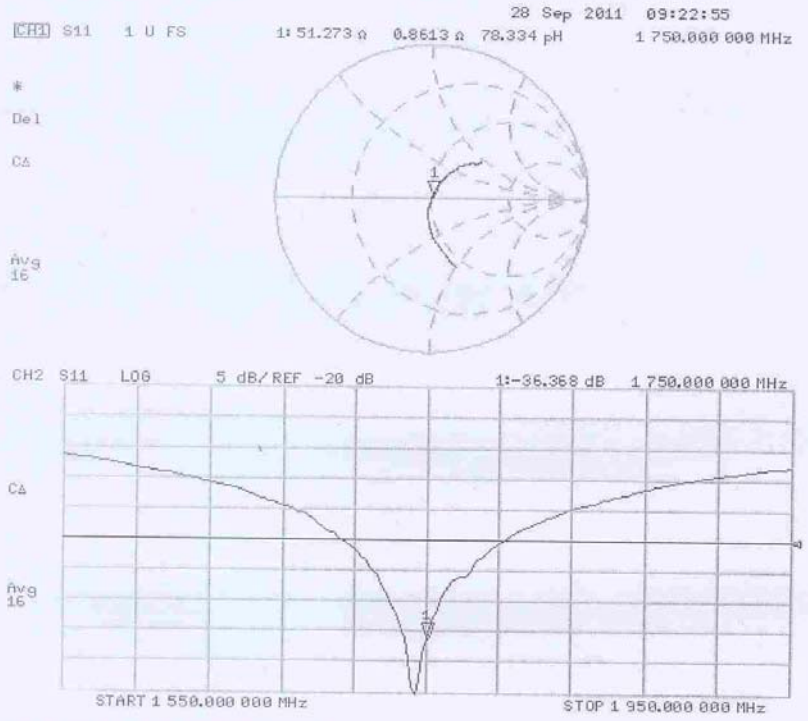
- Probe: ES3DV3 - SN3205; ConvF(5.25, 5.25, 5.25); Calibrated: 30.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.03.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 92.2 V/m; Power Drift = 0.077 dB
Peak SAR (extrapolated) = 16.2 W/kg
SAR(1 g) = 9.07 mW/g; SAR(10 g) = 4.82 mW/g
Maximum value of SAR (measured) = 11.3 mW/g



0 dB = 11.3mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date/Time: 29.09.2011 14:14:51

Test Laboratory: SPEAG, Zurich, Switzerland

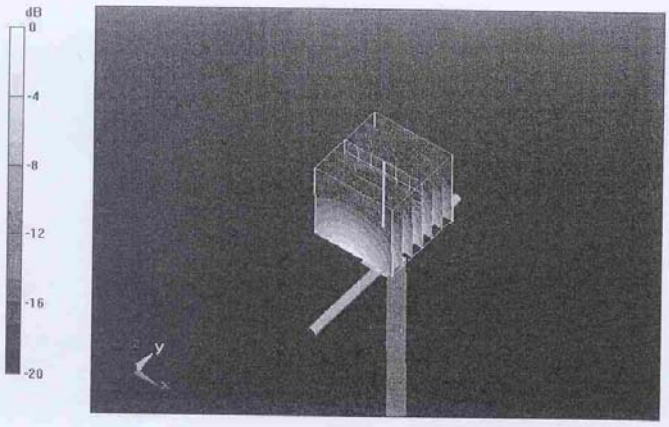
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1003

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium: MSL U12 BB
Medium parameters used: f = 1750 MHz; σ = 1.45 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

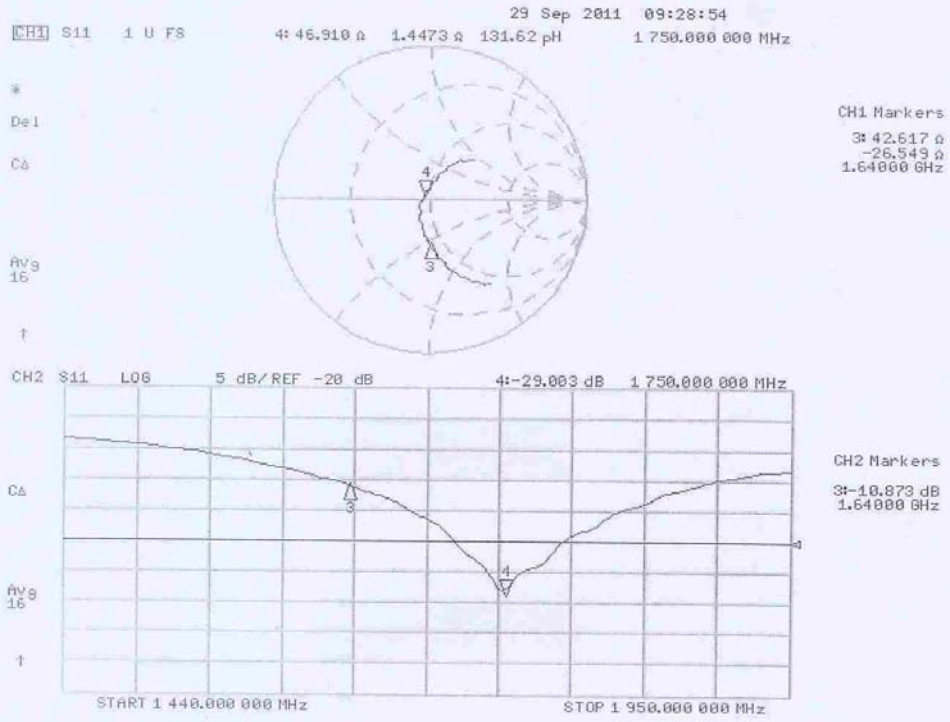
- Probe: ES3DV3 - SN3205; ConvF(5.25, 5.25, 5.25); Calibrated: 30.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.03.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.5 V/m; Power Drift = -0.00829 dB
Peak SAR (extrapolated) = 16.2 W/kg
SAR(1 g) = 9.38 mW/g; SAR(10 g) = 5.05 mW/g
Maximum value of SAR (measured) = 11.7 mW/g



0 dB = 11.7mW/g

Impedance Measurement Plot for Body TSL



2550 MHz Dipole Calibration Certificate

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

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

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

Accreditation No.: SCS 108

Client TMC (Auden)

Certificate No: D2550V2-1002_Sep10

CALIBRATION CERTIFICATE

Object D2550V2 - SN: 1002

Calibration procedure(s) QA CAL-05.v7
Calibration procedure for dipole validation kits

Calibration date: September 27, 2010

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	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

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

Issued: October 5, 2010

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

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

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

Accreditation No.: SCS 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	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2550 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.1	1.91 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.1 ± 6 %	1.99 mho/m ± 6 %
Head TSL temperature during test	(21.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.3 mW / g
SAR normalized	normalized to 1W	57.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**56.3 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.43 mW / g
SAR normalized	normalized to 1W	25.7 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**25.6 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	52.6	2.09 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.3 ± 6 %	2.04 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.7 mW / g
SAR normalized	normalized to 1W	54.8 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**55.3 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.18 mW / g
SAR normalized	normalized to 1W	24.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**24.8 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.3 Ω - 0.3 jΩ
Return Loss	- 35.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.0 Ω + 0.6 jΩ
Return Loss	- 27.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.156 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.
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	April 01, 2010

DASY5 Validation Report for Head TSL

Date/Time: 24.09.2010 15:28:28

Test Laboratory: SPEAG, Zurich, Switzerland

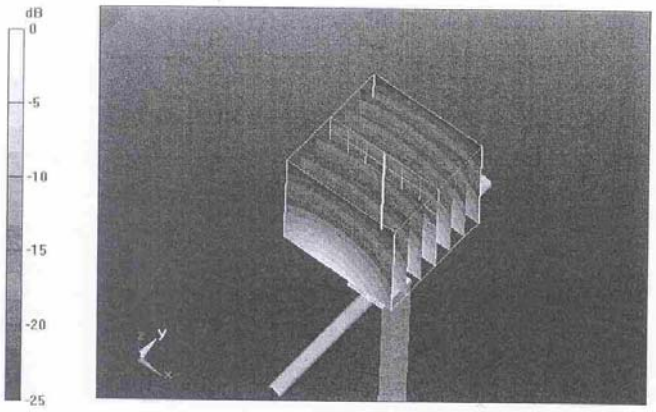
DUT: Dipole 2550 MHz; Type: D2550V2; Serial: D2550V2 - SN:1002

Communication System: CW; Frequency: 2550 MHz; Duty Cycle: 1:1
Medium: HSL BB1.9
Medium parameters used: f = 2550 MHz; σ = 1.99 mho/m; ε_r = 39.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

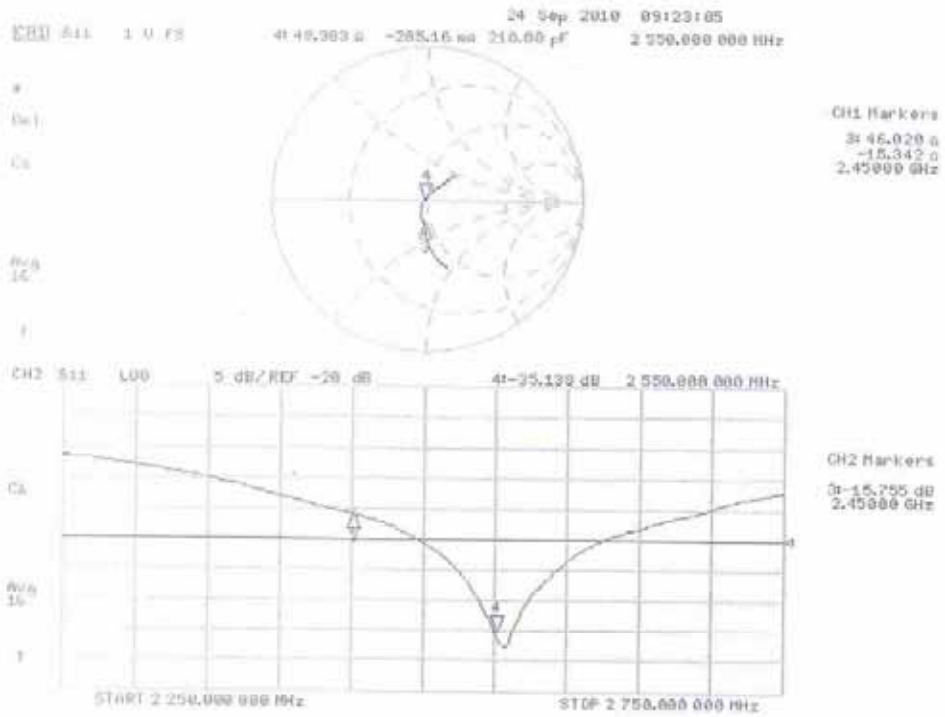
- Probe: ES3DV3 - SN3205; ConvF(4.69, 4.69, 4.69); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250 mW/d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.4 V/m; Power Drift = 0.054 dB
Peak SAR (extrapolated) = 30.2 W/kg
SAR(1 g) = 14.3 mW/g; SAR(10 g) = 6.43 mW/g
Maximum value of SAR (measured) = 18.5 mW/g



0 dB = 18.5mW/g

Impedance Measurement Plot for Head TSL



Validation Report for Body

Date/Time: 27.09.2010 15:24:00

Test Laboratory: SPEAG, Zurich, Switzerland

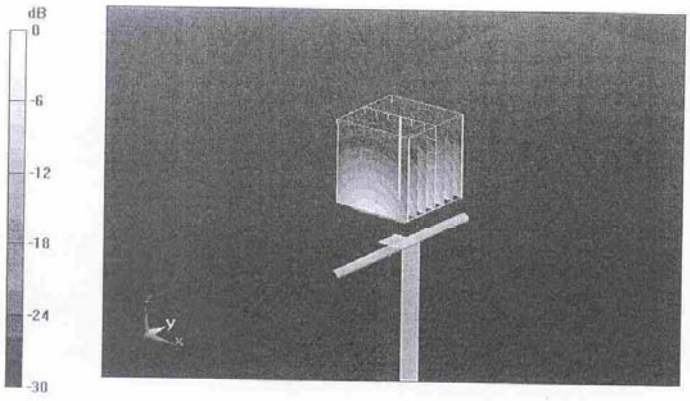
DUT: Dipole 2550 MHz; Type: D2550V2; Serial: D2550V2 - SN:1002

Communication System: CW; Frequency: 2550 MHz; Duty Cycle: 1:1
Medium: MSL U12 BB
Medium parameters used: f = 2550 MHz; σ = 2.04 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.18, 4.18, 4.18); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.4 V/m; Power Drift = -0.019 dB
Peak SAR (extrapolated) = 29.6 W/kg
SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.18 mW/g
Maximum value of SAR (measured) = 18.1 mW/g



0 dB = 18.1mW/g

Validation Report for Body

Date/Time: 27.09.2010 15:24:00

Test Laboratory: SPEAG, Zurich, Switzerland

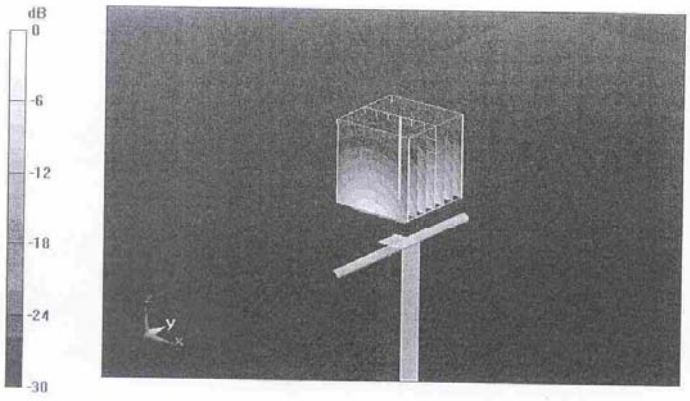
DUT: Dipole 2550 MHz; Type: D2550V2; Serial: D2550V2 - SN:1002

Communication System: CW; Frequency: 2550 MHz; Duty Cycle: 1:1
Medium: MSL U12 BB
Medium parameters used: f = 2550 MHz; σ = 2.04 mho/m; ε_r = 52.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

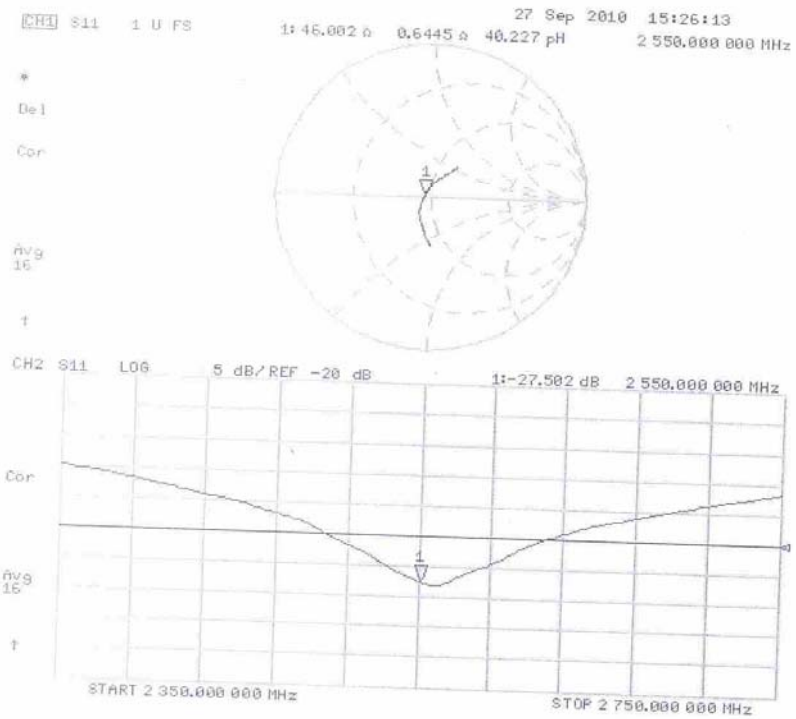
- Probe: ES3DV3 - SN3205; ConvF(4.18, 4.18, 4.18); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250 mW /d=10mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.4 V/m; Power Drift = -0.019 dB
Peak SAR (extrapolated) = 29.6 W/kg
SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.18 mW/g
Maximum value of SAR (measured) = 18.1 mW/g



0 dB = 18.1mW/g

Impedance Measurement Plot for Body TSL



ANNEX G DIPOLE QUALIFICATION FOR THE EXTENDED 3-YEAR CALIBRATION INTERVAL

G1 Dipole2550

The information and documentation below are provided to qualify the extended 3-year calibaration interval of dipole.

G1.1 List of Equipment

No.	Name	Type	Serial Number
01	Network analyzer	E5071C	MY46110673
02	Power meter	NRVD	102083
03	Power sensor	NRV-Z5	100595
04	Signal Generator	E4438C	MY49070393
05	Amplifier	VTL5400	0505
06	E-field Probe	SPEAG EX3DV4	3617
07	DAE	SPEAG DAE4	771
08	Dipole Validation Kit	SPEAG D2550V2	1002

G1.2 Results of Impedance, Return-loss and System validation

Dipole 2550 - Head

		Year		Deviation	Limit
		2010	2011		
Impedance	Real (Ω)	48.3	47.2	1.1Ω	Deviation＜ 5Ω
	Imaginary (Ω)	-0.3	-0.9	0.6Ω	Deviation＜ 5Ω
Return-loss (dB)		-25.7	-35.1	0.1dB	Deviate ＜ 0.2dB
System validation	10g	6.43	6.20	3.58%	Deviation＜ 10%
	1g	14.3	14.1	1.40%	Deviation＜ 10%

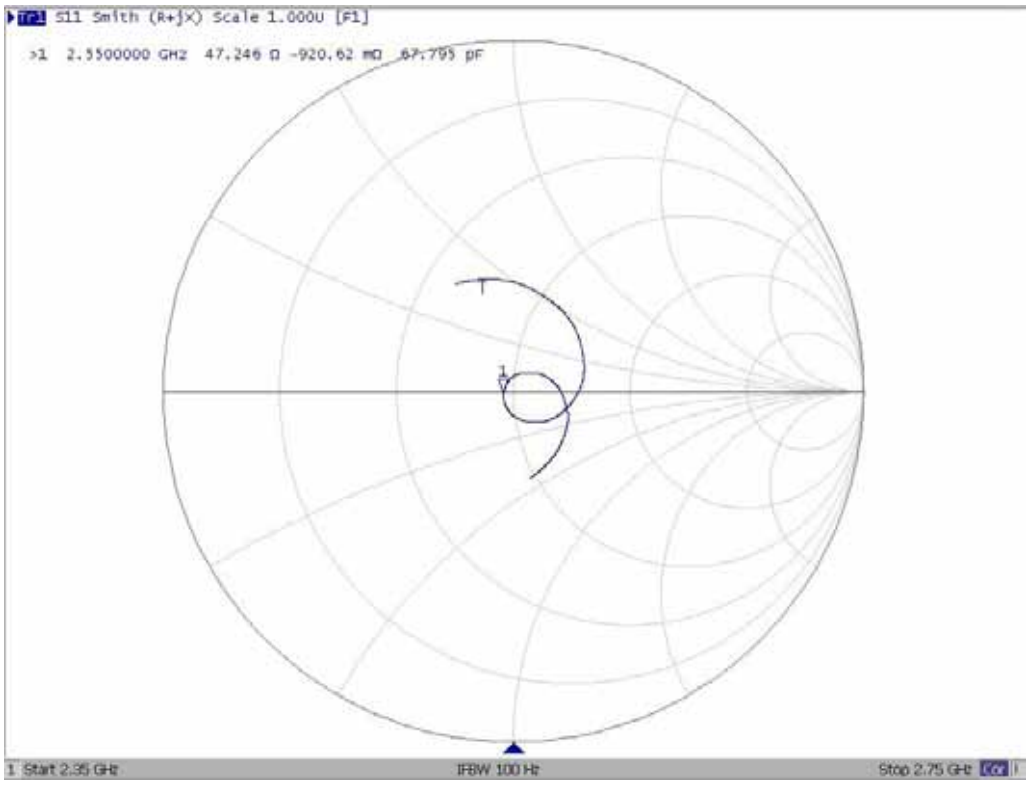
Dipole 2550 - Body

		Year		Deviation	Limit
		2010	2011		
Impedance	Real (Ω)	46.0	46.1	0.1Ω	Deviation＜ 5Ω
	Imaginary (Ω)	0.6	-1.4	2.0Ω	Deviation＜ 5Ω
Return-loss (dB)		-22.6	-27.5	0.1dB	Deviate ＜ 0.2dB
System validation	10g	6.18	6.05	2.10%	Deviation＜ 10%
	1g	13.7	13.7	0.00%	Deviation＜ 10%

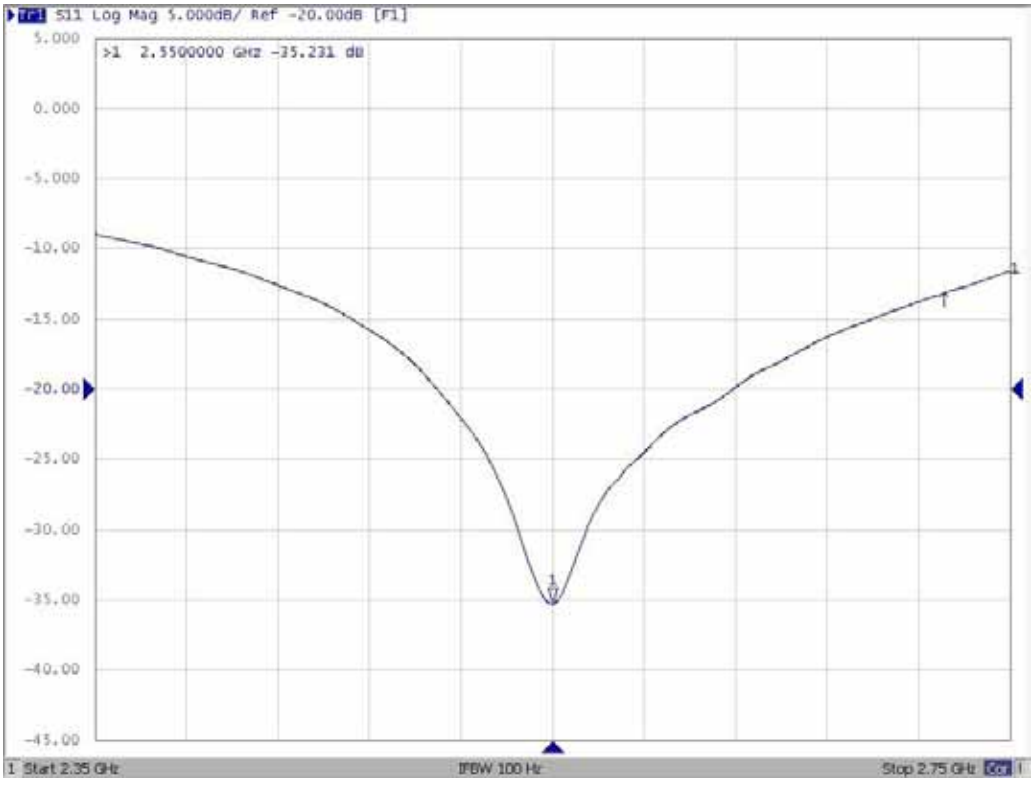
According to the above tables, it is not necessary to recalibration the dipoles in 2011. Please see below for the detail information.

G1.3 Detail Information

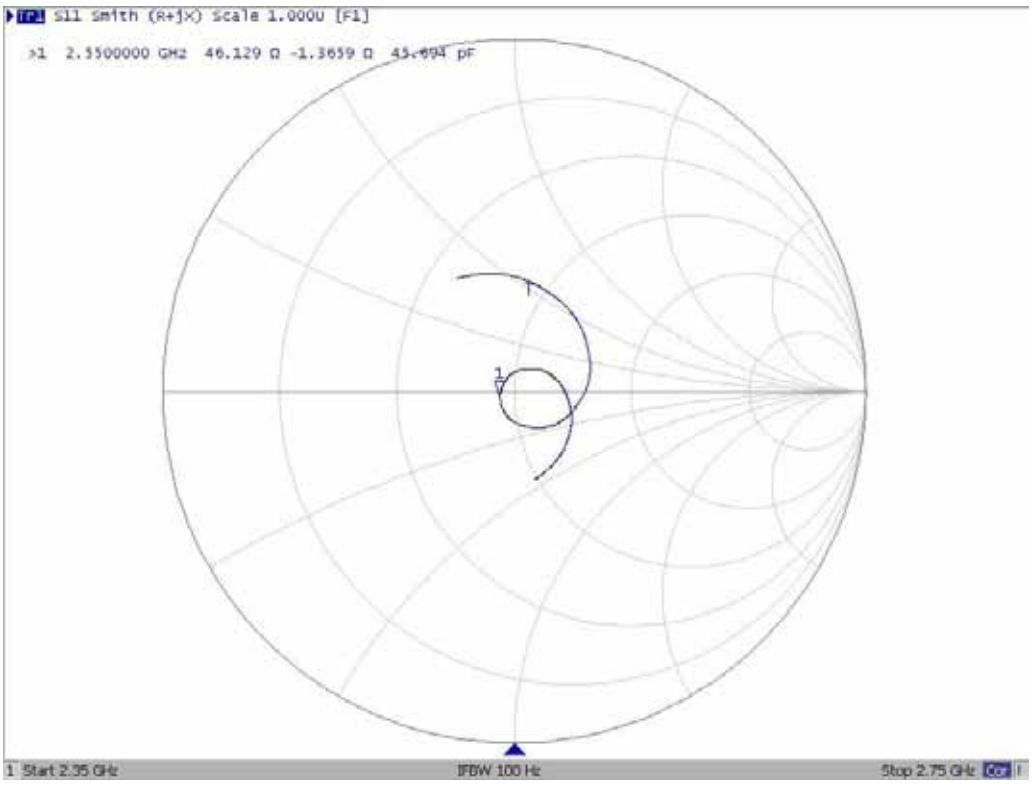
G1.3.1 Impedance Measurement Plot



Picture G1: Dipole 2550 Head_Smith



Picture G2: Dipole 2550 Head_Log



Picture G3: Dipole 2550 Body_Smith

Picture G4: Dipole 2550 Body_Log

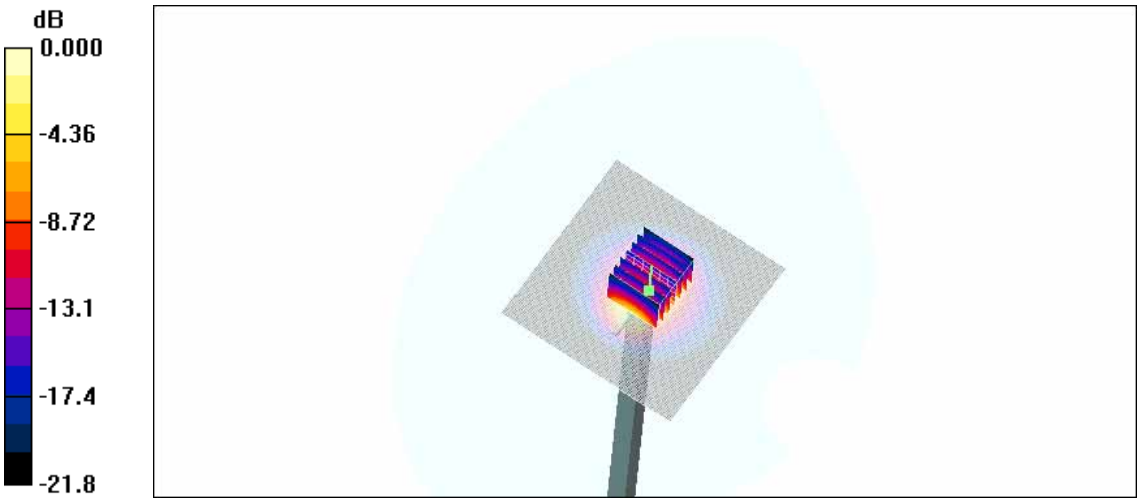
G1.3.2 System Validation Results

2550MHz

Date/Time: 2011-9-26 9:33:02
Electronics: DAE4 Sn771
Medium: Head 2550 MHz
Medium parameters used: f = 2550 MHz; σ = 1.89 mho/m; ε_r = 38.6; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: CW Frequency: 2550 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(7.16, 7.16, 7.16)

System Validation/Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 21.9 mW/g

System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.6 V/m; Power Drift = -0.062 dB
Peak SAR (extrapolated) = 26.1 W/kg
SAR(1 g) = 14.1 mW/g; SAR(10 g) = 6.20 mW/g
Maximum value of SAR (measured) = 18.1 mW/g



0 dB = 18.1mW/g

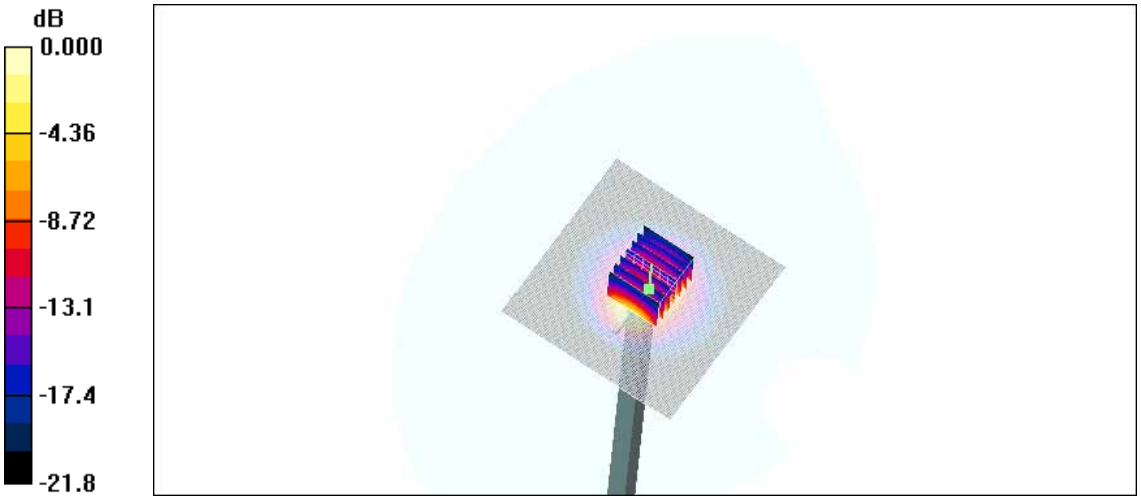
Fig.G1 validation 2550MHz 250mW

2550MHz

Date/Time: 2011-9-26 13:28:46
Electronics: DAE4 Sn771
Medium: Body 2550 MHz
Medium parameters used: f = 2550 MHz; σ = 2.06 mho/m; ε_r = 51.3; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature: 22.5°C
Communication System: CW Frequency: 2550 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(6.84, 6.84, 6.84)

System Validation/Area Scan (101x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 21.7 mW/g

System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.3 V/m; Power Drift = 0.058 dB
Peak SAR (extrapolated) = 26.0 W/kg
SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.05 mW/g
Maximum value of SAR (measured) = 18.0 mW/g



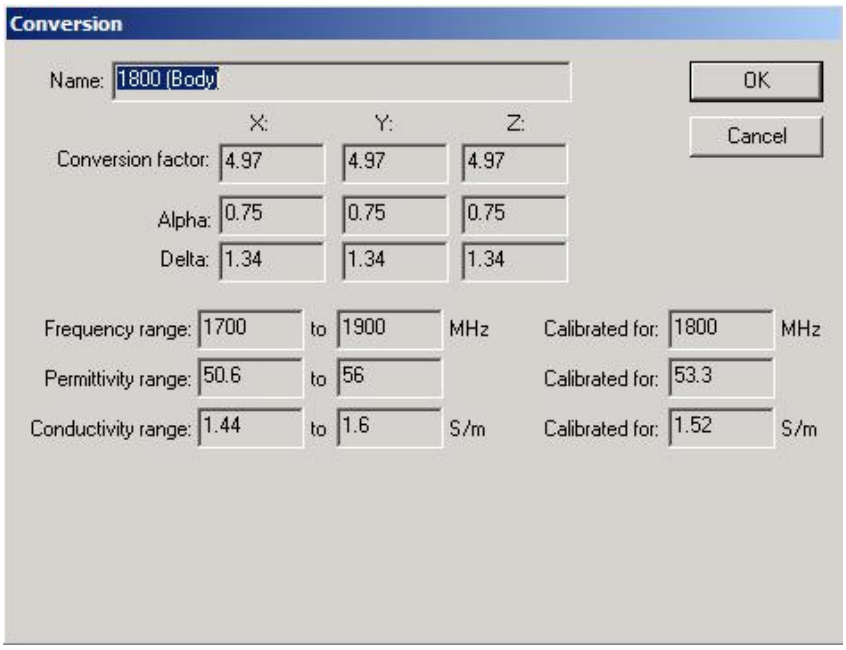
0 dB = 18.0mW/g

Fig.G2 validation 2550MHz 250mW

ANNEX H Analysis of Effective Frequency Interval of Probe

ANNEX H.1 1800 MHz_01/29/2012

The test frequencies are properly matched as this is a LTE band4. The probe calibration for permittivity and conductivity is within ±5%, were the probe calibrated centre frequency at 1800 MHz has permittivity and conductivity of 53.3 and 1.52 respectively. At the probe extreme frequencies the following are true: at 1700 MHz the permittivity and conductivity are 50.6 and 1.44 respectively. At 1900 MHz the permittivity and conductivity are 56 and 1.6 respectively. The probe was calibrated at these parameters in order to cover the frequency range 1700 MHz to 1900 MHz.



The target permittivity and conductivity at 1750 MHz is 53.4 and 1.49 respectively which is within the calibrated range of the probe parameter.

The following parameters are declared in the probe calibration certificate on page 6 :

DASY/EASY – Parameters of Probe: ES3DV3 - SN:3149

Calibration Parameter Determined in Body Tissue Simulating Media

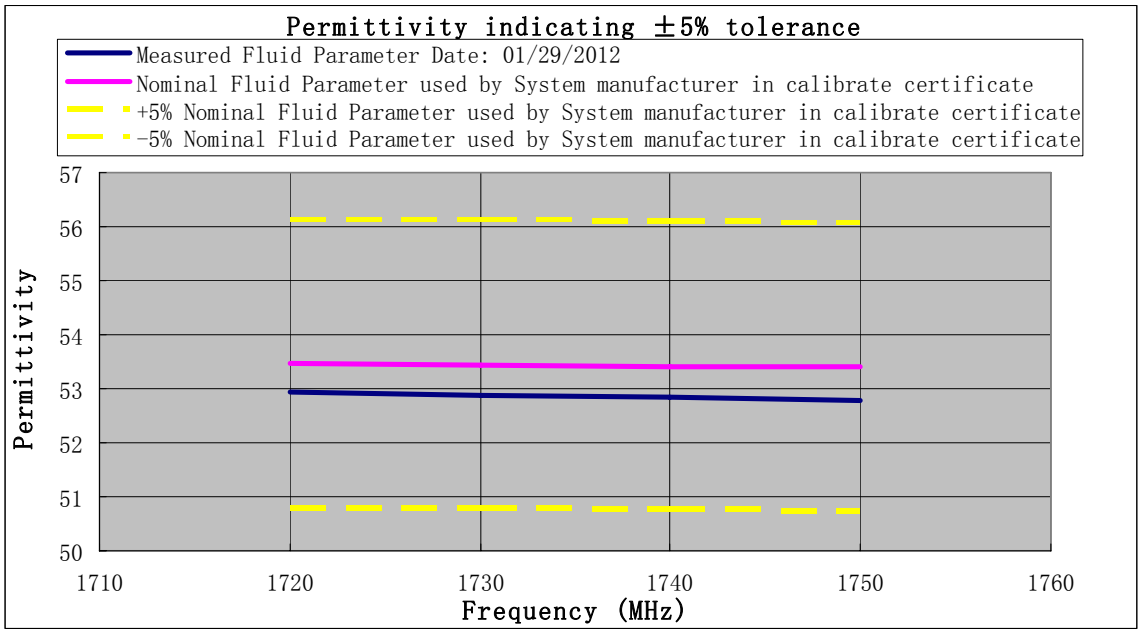
f[MHz]^{C}	Relative Permittivity^{F}	Conductivity (S/m)^{F}	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
850	55.2	0.97	6.22	6.22	6.22	0.76	1.26	±12.0%
900	55.0	1.05	6.02	6.02	6.02	0.99	1.06	±12.0%
1800	53.3	1.52	4.97	4.97	4.97	0.75	1.34	±12.0%
1900	53.3	1.52	4.68	4.68	4.68	0.62	1.33	±12.0%
2100	53.5	1.57	4.35	4.35	4.35	0.68	1.34	±12.0%
2450	52.7	1.95	4.13	4.13	4.13	0.71	1.35	±12.0%

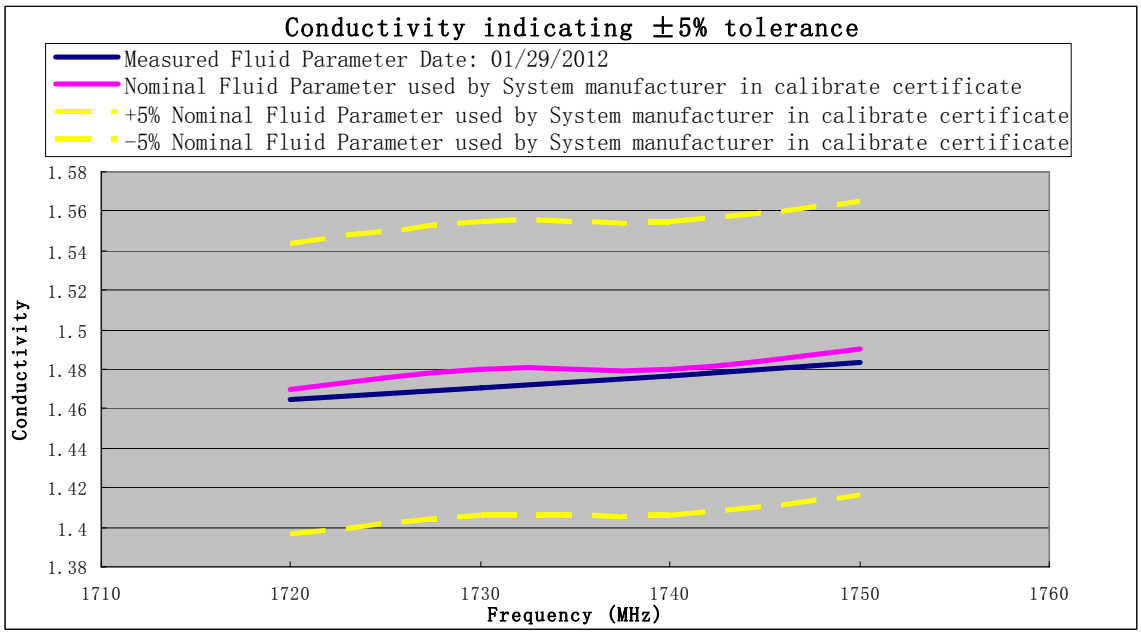
The system manufacturer has carried out addition steps as detailed on page 4 of KDB 450824. This is detailed in the calibration certificates. The measured SAR values in the report are all below 10% of the SAR limit.

The measured fluid dielectric parameters for 1750 MHz, performed during test values were all within ±5% of the 1750 MHz target ralue.

At 1800 MHz, the probe was calibrated and validation performed, the tissue dielectric parameter measured for routine measurements at 1800 MHz was less than the target parameter for 1750 MHz ε_r and higher than the target parameter for 1750 MHz σ.

/	Measured Fluid Parameter Date : 01/29/2012		Nominal Fluid Parameter used by System manufacturer in calibrate certificate	
Frequency (MHz)	ε_r	σ	ε_r	σ
1720	52.95	1.465	53.46	1.47
1730	52.89	1.471	53.44	1.48
1740	52.83	1.477	53.42	1.48
1750	52.77	1.483	53.40	1.49
1800	52.47	1.513	53.30	1.52

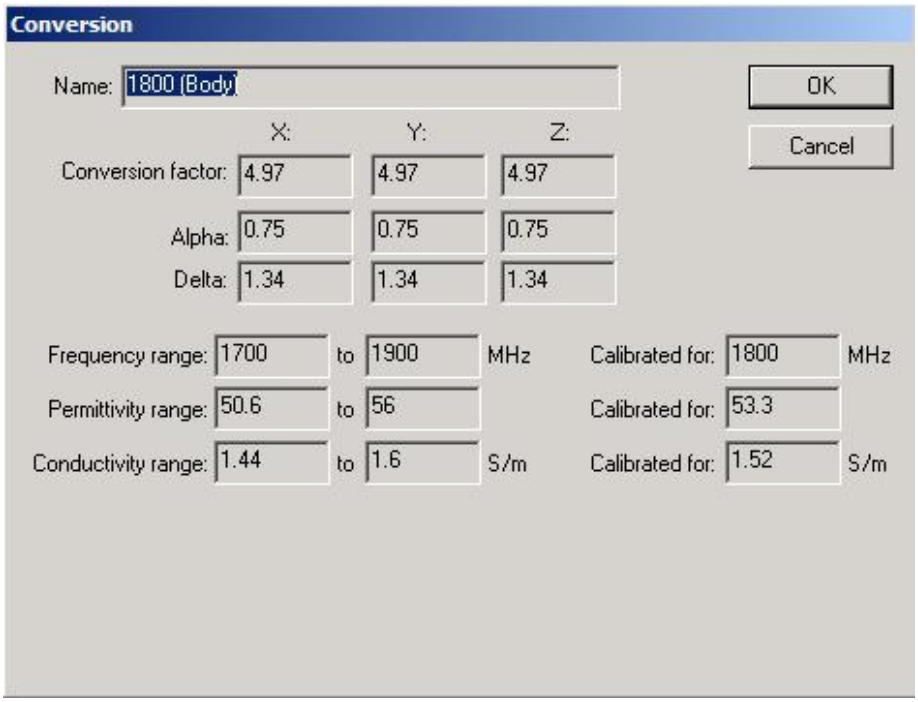




The probe conversion factor and its frequency response, with respect to the tissue dielectric media used during the probe calibration and routine measurements was examined to determine if the effective frequency interval is adequate for the intended measurements to satisfy protocol requirements. The frequency range at which the probe was calibrated for 1800 MHz covered 1700 MHz to 1900 MHz and the dielectric parameters required for 1720 to 1745 MHz were all within the calibrated range of the probe dielectric parameters.

ANNEX H.2 1800 MHz_12/26/2011

The test frequencies are properly matched as this is a LTE band4. The probe calibration for permittivity and conductivity is within ±5%, were the probe calibrated centre frequency at 1800 MHz has permittivity and conductivity of 53.3 and 1.52 respectively. At the probe extreme frequencies the following are true: at 1700 MHz the permittivity and conductivity are 50.6 and 1.44 respectively. At 1900 MHz the permittivity and conductivity are 56 and 1.6 respectively. The probe was calibrated at these parameters in order to cover the frequency range 1700 MHz to 1900 MHz.



The target permittivity and conductivity at 1750 MHz is 53.4 and 1.49 respectively which is within the calibrated range of the probe parameter.

The following parameters are declared in the probe calibration certificate on page 6 :

DASY/EASY – Parameters of Probe: ES3DV3 - SN:3149

Calibration Parameter Determined in Body Tissue Simulating Media

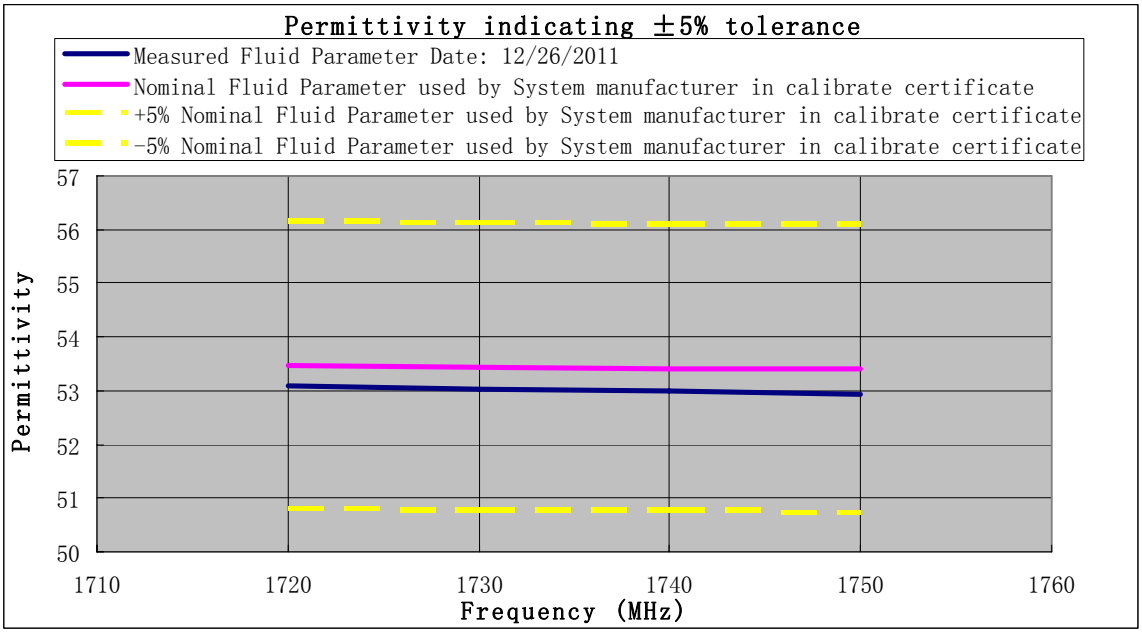
f[MHz] C	Relative Permittivity F	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
850	55.2	0.97	6.22	6.22	6.22	0.76	1.26	±12.0%
900	55.0	1.05	6.02	6.02	6.02	0.99	1.06	±12.0%
1800	53.3	1.52	4.97	4.97	4.97	0.75	1.34	±12.0%
1900	53.3	1.52	4.68	4.68	4.68	0.62	1.33	±12.0%
2100	53.5	1.57	4.35	4.35	4.35	0.68	1.34	±12.0%
2450	52.7	1.95	4.13	4.13	4.13	0.71	1.35	±12.0%

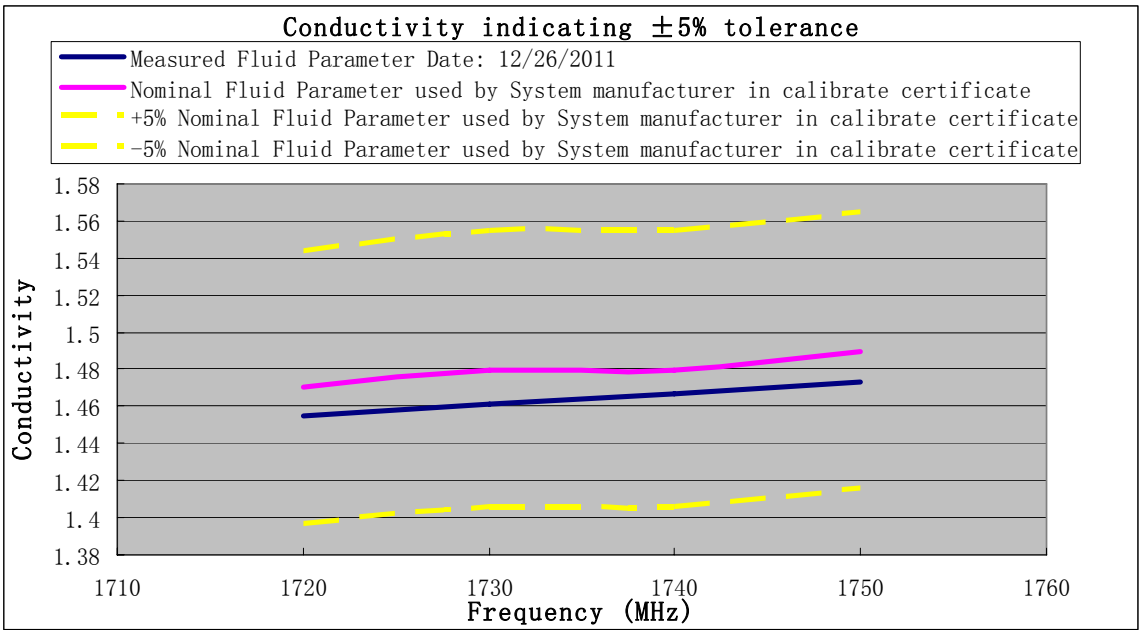
The system manufacturer has carried out addition steps as detailed on page 4 of KDB 450824. This is detailed in the calibration certificates. The measured SAR values in the report are all below 10% of the SAR limit.

The measured fluid dielectric parameters for 1750 MHz, performed during test values were all within ±5% of the 1750 MHz target ralue.

At 1800 MHz, the probe was calibrated and validation performed, the tissue dielectric parameter measured for routine measurements at 1800 MHz was less than the target parameter for 1750 MHz ε_r and higher than the target parameter for 1750 MHz σ.

/	Measured Fluid Parameter Date : 12/26/2011		Nominal Fluid Parameter used by System manufacturer in calibrate certificate	
Frequency (MHz)	ε_r	σ	ε_r	σ
1720	53.10	1.454	53.46	1.47
1730	53.04	1.460	53.44	1.48
1740	52.98	1.466	53.42	1.48
1750	52.92	1.472	53.40	1.49
1800	52.62	1.502	53.30	1.52

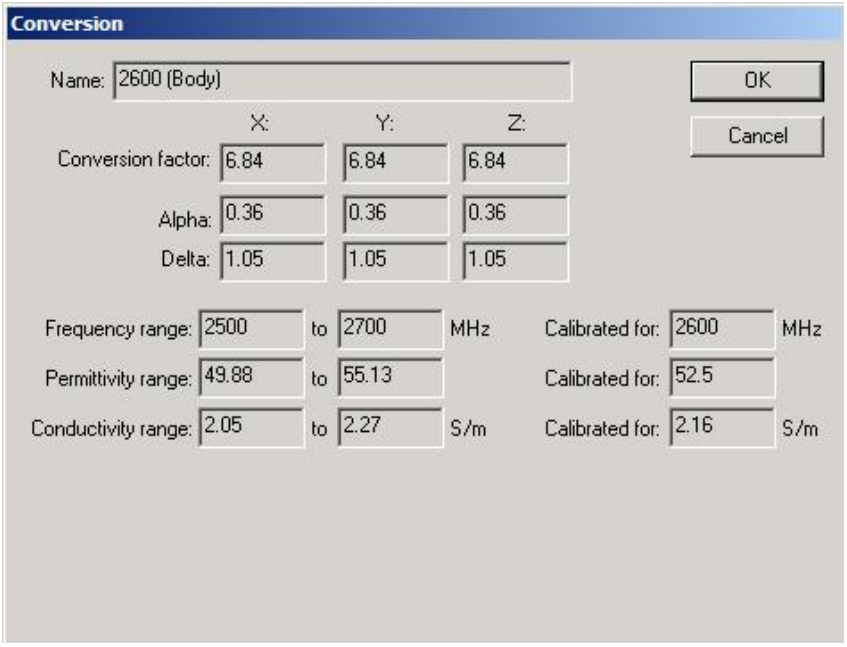




The probe conversion factor and its frequency response, with respect to the tissue dielectric media used during the probe calibration and routine measurements was examined to determine if the effective frequency interval is adequate for the intended measurements to satisfy protocol requirements. The frequency range at which the probe was calibrated for 1800 MHz covered 1700 MHz to 1900 MHz and the dielectric parameters required for 1720 to 1745 MHz were all within the calibrated range of the probe dielectric parameters.

ANNEX H.3 2600 MHz_10/18/2011

The test frequencies are properly matched as this is a LTE band7. The probe calibration for permittivity and conductivity is within ±5%, were the probe calibrated centre frequency at 2600 MHz has permittivity and conductivity of 52.5 and 2.16 respectively. At the probe extreme frequencies the following are true: at 2500 MHz the permittivity and conductivity are 49.88 and 2.05 respectively. At 2700 MHz the permittivity and conductivity are 55.13 and 2.27 respectively. The probe was calibrated at these parameters in order to cover the frequency range 2500 MHz to 2700 MHz.



The target permittivity and conductivity at 2550 MHz is 52.6 and 2.09 respectively which is within the calibrated range of the probe parameter.

The following parameters are declared in the probe calibration certificate on page 6 :

DASY/EASY – Parameters of Probe: EX3DV4 - SN:3617

Calibration Parameter Determined in Body Tissue Simulating Media

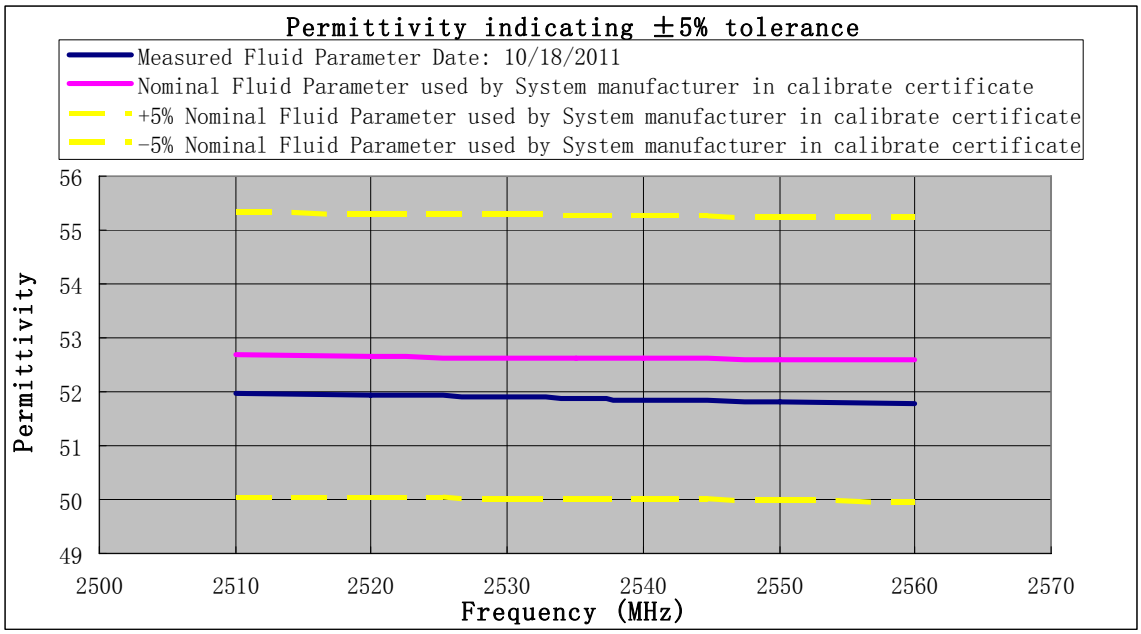
f[MHz]^C	Relative Permittivity^F	Conductivity (S/m)^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
2300	52.8	1.85	6.95	6.95	6.95	0.30	1.01	±12.0%
2450	52.7	1.95	6.88	6.88	6.88	0.36	1.00	±12.0%
2600	52.5	2.16	6.84	6.84	6.84	0.36	1.05	±12.0%
3500	51.3	3.30	5.02	5.02	5.02	0.33	1.40	±12.0%
5200	49.0	5.30	4.64	4.64	4.64	0.35	1.70	±12.0%
5800	48.2	6.00	4.53	4.53	4.53	0.30	1.70	±12.0%

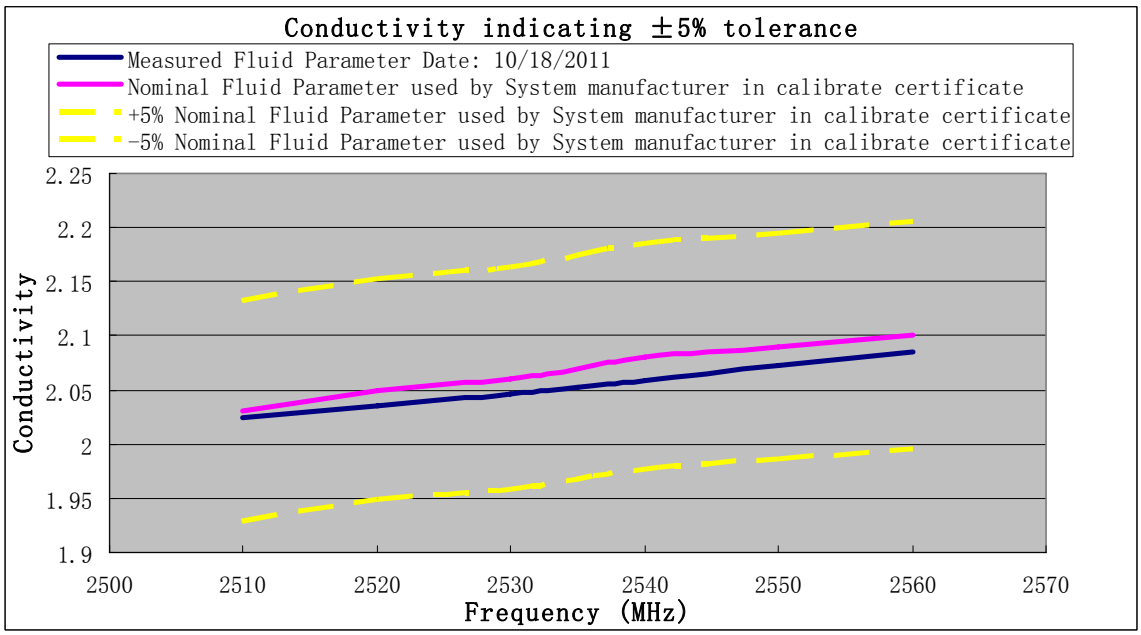
The system manufacturer has carried out addition steps as detailed on page 4 of KDB 450824. This is detailed in the calibration certificates. The measured SAR values in the report are all below 10% of the SAR limit.

The measured fluid dielectric parameters for 2550 MHz, performed during test values were all within ±5% of the 2550 MHz target ralue.

At 2600 MHz, the probe was calibrated and validation performed, the tissue dielectric parameter measured for routine measurements at 2600 MHz was less than the target parameter for 2550 MHz ε_r and higher than the target parameter for 2550 MHz σ.

/	Measured Fluid Parameter Date : 10/18/2011		Nominal Fluid Parameter used by System manufacturer in calibrate certificate	
Frequency (MHz)	ε_r	σ	ε_r	σ
2510	51.96	2.024	52.68	2.03
2520	51.94	2.036	52.66	2.05
2530	51.90	2.046	52.64	2.06
2535	51.87	2.052	52.63	2.07
2540	51.85	2.058	52.62	2.08
2550	51.81	2.072	52.60	2.09
2560	51.78	2.085	52.58	2.10
2600	51.68	2.126	52.50	2.16

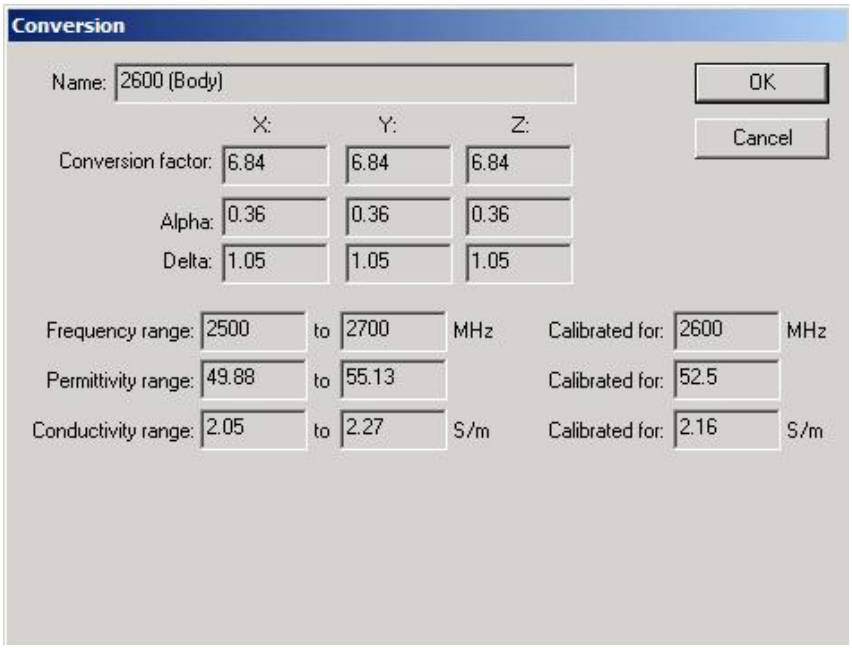




The probe conversion factor and its frequency response, with respect to the tissue dielectric media used during the probe calibration and routine measurements was examined to determine if the effective frequency interval is adequate for the intended measurements to satisfy protocol requirements. The frequency range at which the probe was calibrated for 1800 MHz covered 1700 MHz to 1900 MHz and the dielectric parameters required for 1720 to 1745 MHz were all within the calibrated range of the probe dielectric parameters.

ANNEX H.4 2600 MHz_12/27/2011

The test frequencies are properly matched as this is a LTE band7. The probe calibration for permittivity and conductivity is within ±5%, were the probe calibrated centre frequency at 2600 MHz has permittivity and conductivity of 52.5 and 2.16 respectively. At the probe extreme frequencies the following are true: at 2500 MHz the permittivity and conductivity are 49.88 and 2.05 respectively. At 2700 MHz the permittivity and conductivity are 55.13 and 2.27 respectively. The probe was calibrated at these parameters in order to cover the frequency range 2500 MHz to 2700 MHz.



The target permittivity and conductivity at 2550 MHz is 52.6 and 2.09 respectively which is within the calibrated range of the probe parameter.

The following parameters are declared in the probe calibration certificate on page 6 :

DASY/EASY – Parameters of Probe: EX3DV4 - SN:3617

Calibration Parameter Determined in Body Tissue Simulating Media

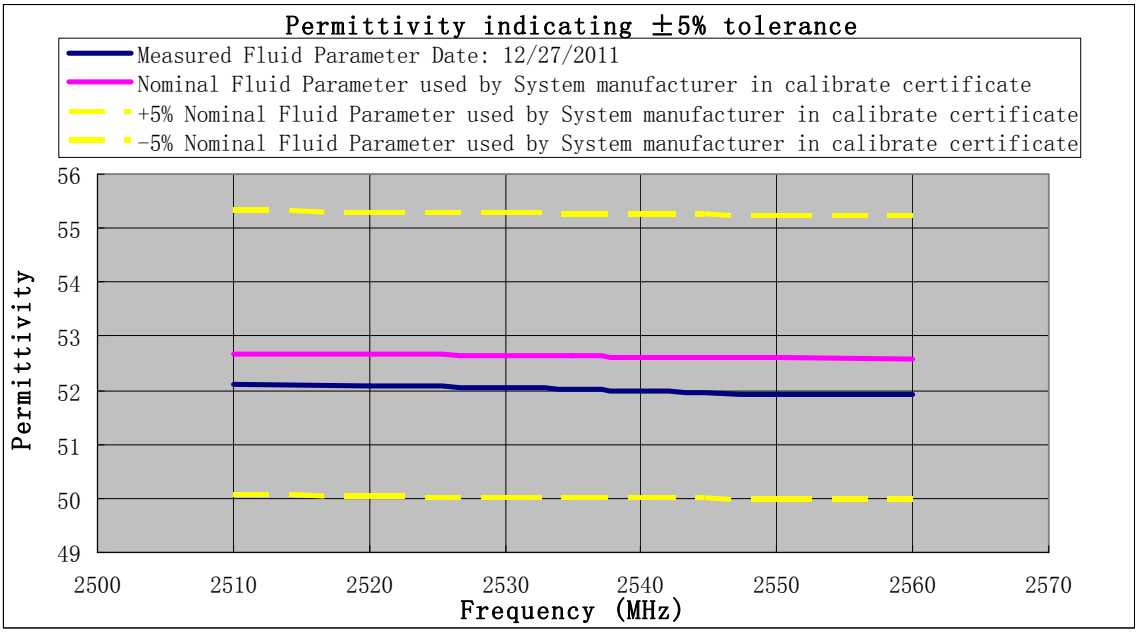
f[MHz][C]	Relative Permittivity[F]	Conductivity (S/m)[F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
2300	52.8	1.85	6.95	6.95	6.95	0.30	1.01	±12.0%
2450	52.7	1.95	6.88	6.88	6.88	0.36	1.00	±12.0%
2600	52.5	2.16	6.84	6.84	6.84	0.36	1.05	±12.0%
3500	51.3	3.30	5.02	5.02	5.02	0.33	1.40	±12.0%
5200	49.0	5.30	4.64	4.64	4.64	0.35	1.70	±12.0%
5800	48.2	6.00	4.53	4.53	4.53	0.30	1.70	±12.0%

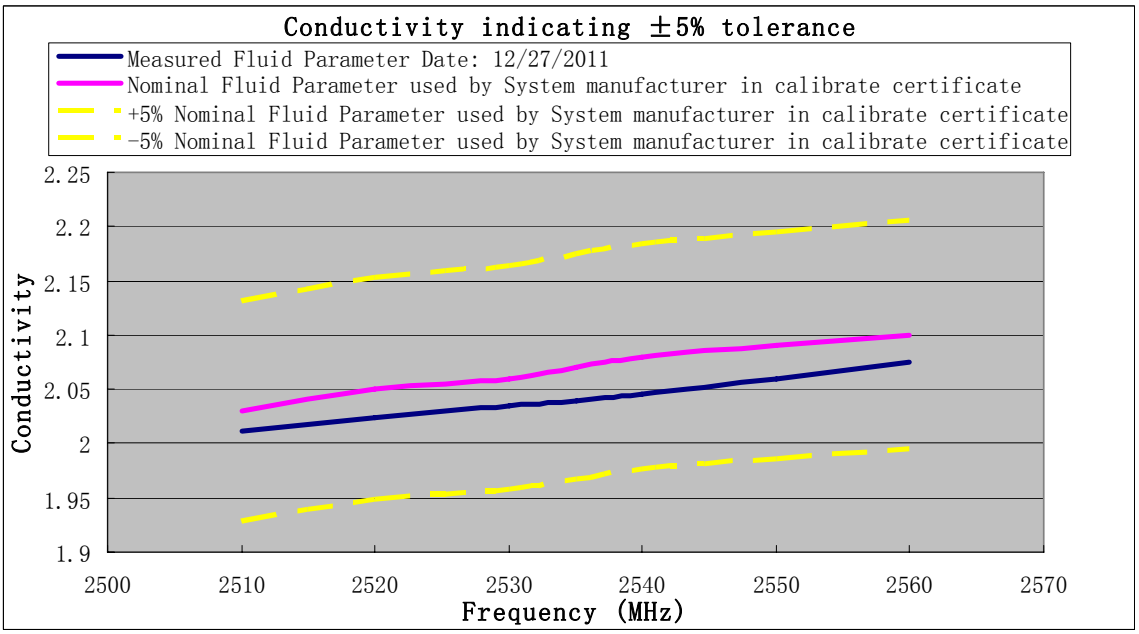
The system manufacturer has carried out addition steps as detailed on page 4 of KDB 450824. This is detailed in the calibration certificates. The measured SAR values in the report are all below 10% of the SAR limit.

The measured fluid dielectric parameters for 2550 MHz, performed during test values were all within ±5% of the 2550 MHz target ralue.

At 2600 MHz, the probe was calibrated and validation performed, the tissue dielectric parameter measured for routine measurements at 2600 MHz was less than the target parameter for 2550 MHz ε_r and higher than the target parameter for 2550 MHz σ.

/	Measured Fluid Parameter Date : 12/27/2011		Nominal Fluid Parameter used by System manufacturer in calibrate certificate	
Frequency (MHz)	ε_r	σ	ε_r	σ
2510	52.11	2.012	52.68	2.03
2520	52.09	2.024	52.66	2.05
2530	52.05	2.034	52.64	2.06
2535	52.02	2.040	52.63	2.07
2540	52.00	2.046	52.62	2.08
2550	51.94	2.060	52.60	2.09
2560	51.91	2.075	52.58	2.10
2600	51.83	2.114	52.50	2.16





The probe conversion factor and its frequency response, with respect to the tissue dielectric media used during the probe calibration and routine measurements was examined to determine if the effective frequency interval is adequate for the intended measurements to satisfy protocol requirements. The frequency range at which the probe was calibrated for 1800 MHz covered 1700 MHz to 1900 MHz and the dielectric parameters required for 1720 to 1745 MHz were all within the calibrated range of the probe dielectric parameters.