

Fig. 4-1 Z-Scan at power reference point (1900 MHz)

WCDMA 850 Right Cheek High

Date: 2016-3-21

Electronics: DAE4 Sn777

Medium: Head 850 MHz

Medium parameters used (interpolated): $f = 846.6$ MHz; $\sigma = 0.911$ mho/m; $\epsilon_r = 41.178$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.9°C Liquid Temperature: 22.5°C

Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN3617 ConvF(9.56, 9.56, 9.56)

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

Maximum value of SAR (interpolated) = 0.327 W/kg

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

Reference Value = 6.449 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.376 W/kg

SAR(1 g) = 0.297 W/kg; SAR(10 g) = 0.227 W/kg

Maximum value of SAR (measured) = 0.321 W/kg

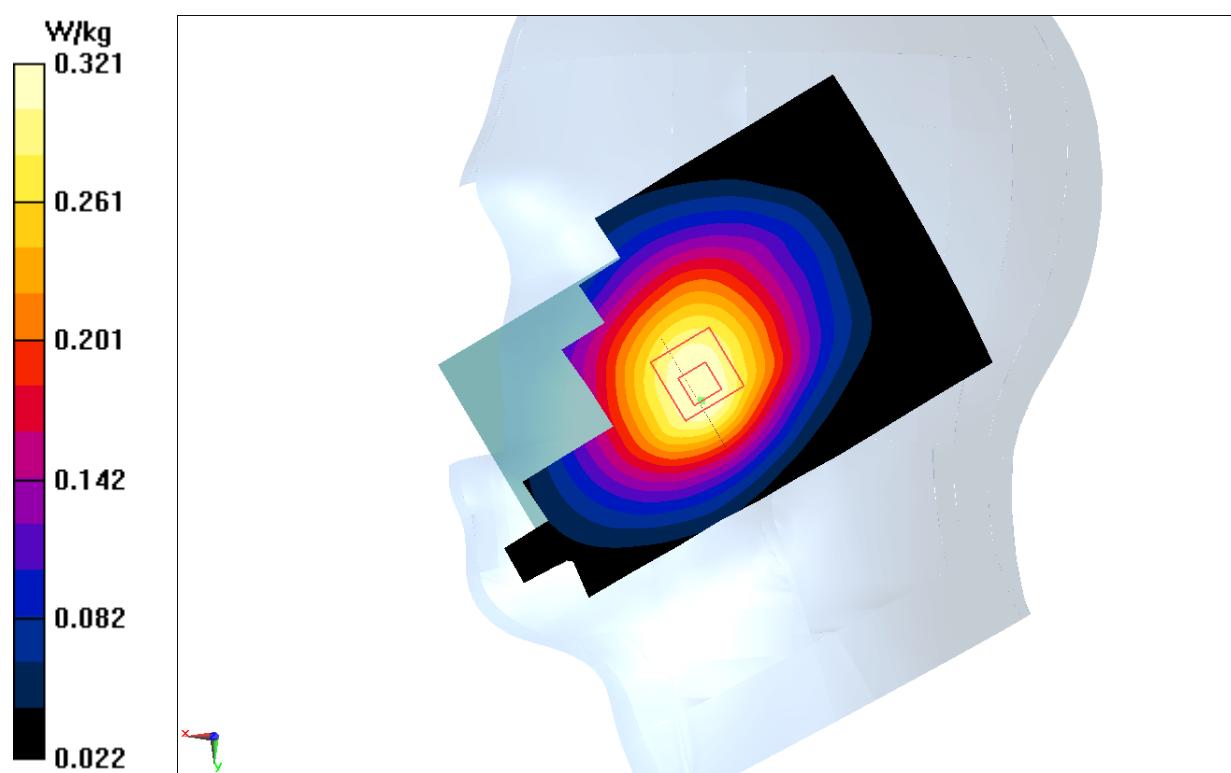


Fig.5 WCDMA 850

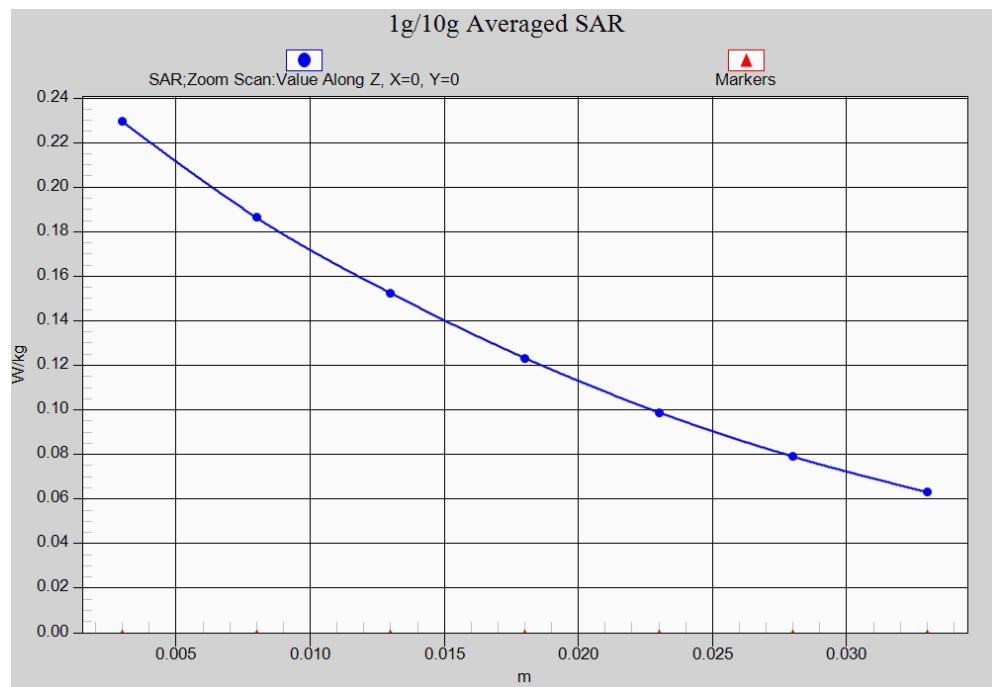


Fig. 5-1 Z-Scan at power reference point (1900 MHz)

WCDMA 850 Body Rear High

Date: 2016-3-21

Electronics: DAE4 Sn777

Medium: Body 850 MHz

Medium parameters used (interpolated): $f = 846.6$ MHz; $\sigma = 0.984$ mho/m; $\epsilon_r = 56.252$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.9°C Liquid Temperature: 22.5°C

Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN3617 ConvF(9.71, 9.71, 9.71)

Area Scan (121x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.575 W/kg

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

Reference Value = 23.73 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.685 W/kg

SAR(1 g) = 0.554 W/kg; SAR(10 g) = 0.428 W/kg

Maximum value of SAR (measured) = 0.581 W/kg

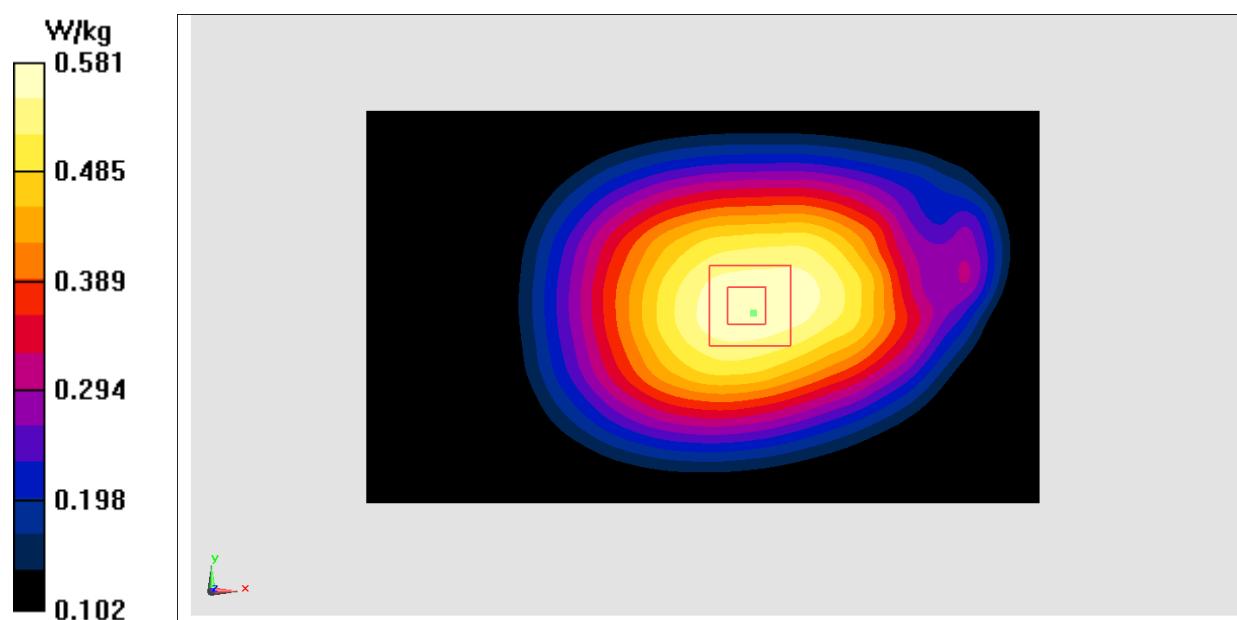


Fig.6 WCDMA 850

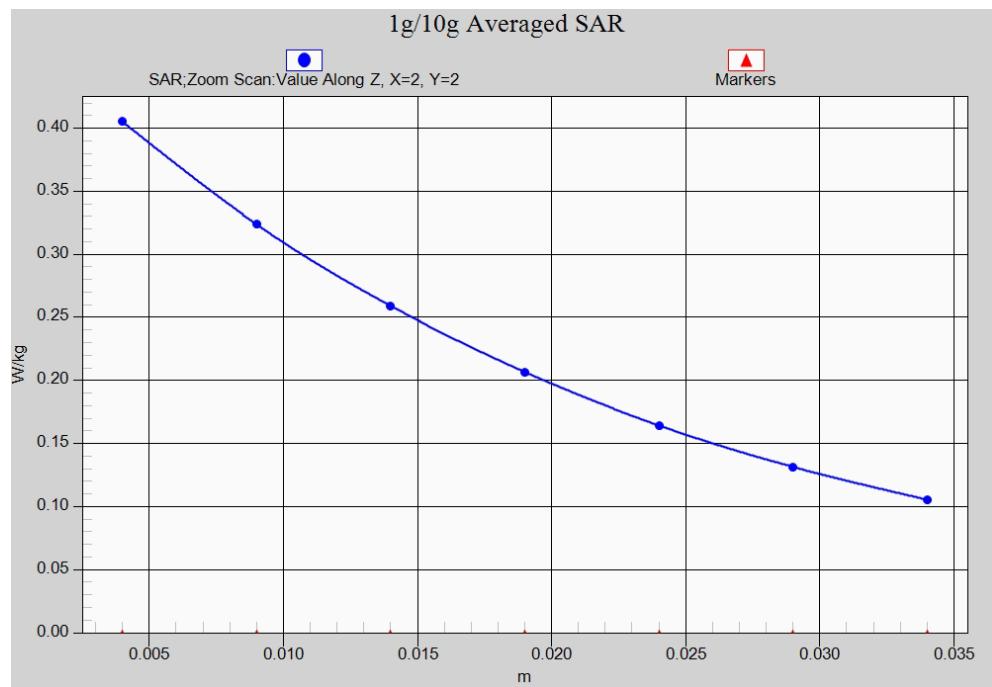


Fig. 6-1 Z-Scan at power reference point (WCDMA850)

WCDMA 1900 Left Cheek Middle

Date: 2016-3-22

Electronics: DAE4 Sn777

Medium: Head 1900 MHz

Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.389$ mho/m; $\epsilon_r = 40.332$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.9°C Liquid Temperature: 22.5°C

Communication System: WCDMA 1900 Frequency: 1880 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN3617 ConvF(8.07, 8.07, 8.07)

Area Scan (71x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.313 W/kg

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

Reference Value = 5.868 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.447 W/kg

SAR(1 g) = 0.295 W/kg; SAR(10 g) = 0.185 W/kg

Maximum value of SAR (measured) = 0.323 W/kg

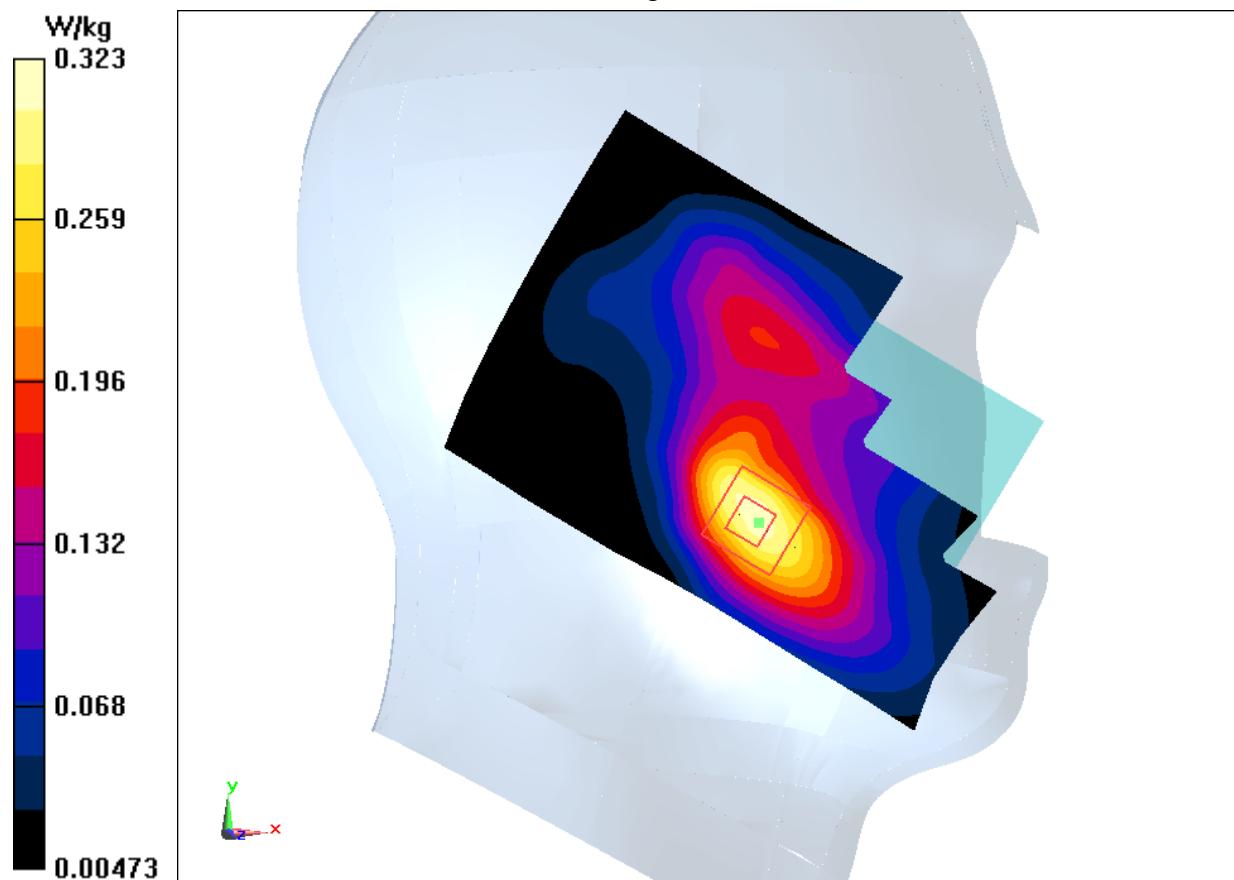


Fig.7 WCDMA1900

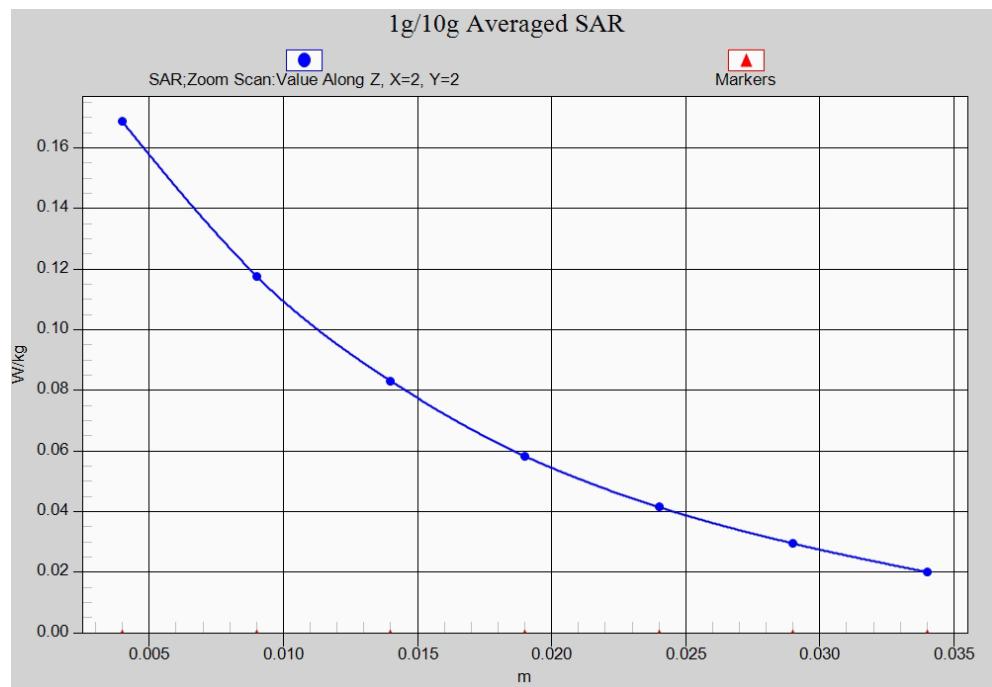


Fig. 7-1 Z-Scan at power reference point (WCDMA850)

WCDMA 1900 Body Bottom Middle

Date: 2016-3-22

Electronics: DAE4 Sn777

Medium: Body 1900 MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.567$ mho/m; $\epsilon_r = 54.235$; $\rho = 1000$ kg/m 3

Ambient Temperature: 22.9°C Liquid Temperature: 22.5°C

Communication System: WCDMA 1900 Frequency: 1880 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN3617 ConvF(7.74, 7.74, 7.74)

Area Scan (121x71x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.501 W/kg

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

Reference Value = 12.28 V/m; Power Drift = -0.-0.02 dB

Peak SAR (extrapolated) = 0.705 W/kg

SAR(1 g) = 0.407 W/kg; SAR(10 g) = 0.213 W/kg

Maximum value of SAR (measured) = 0.490 W/kg

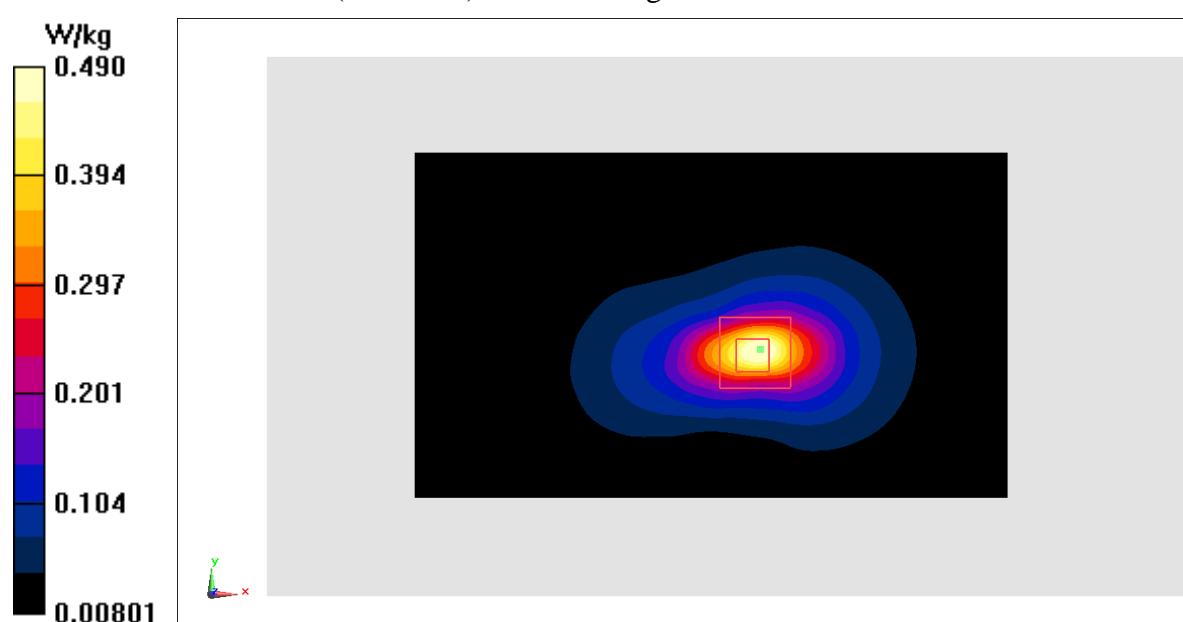


Fig.8 WCDMA1900

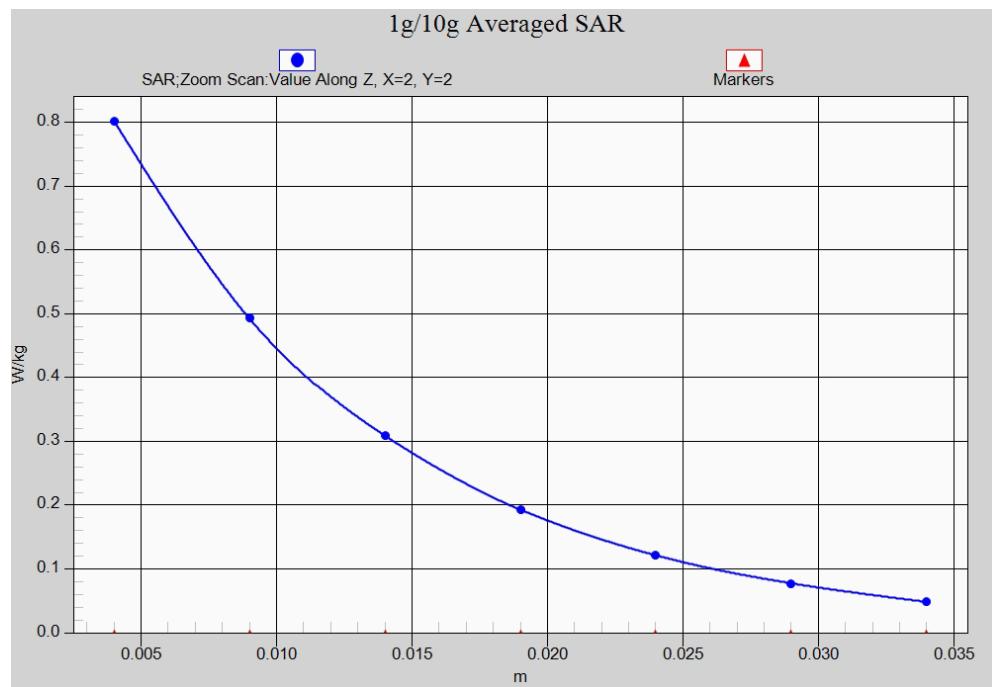


Fig. 8-1 Z-Scan at power reference point (WCDMA1900)

WCDMA 1700 Left Cheek High

Date: 2016-4-14

Electronics: DAE4 Sn777

Medium: Head 1750 MHz

Medium parameters used (interpolated): $f = 1752.6$ MHz; $\sigma = 1.364$ mho/m; $\epsilon_r = 39.573$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.0°C Liquid Temperature: 22.5°C

Communication System: WCDMA 1700 Frequency: 1752.6 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN3617 ConvF(8.34, 8.34, 8.34)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.5\000 mm

Maximum value of SAR (interpolated) = 0.370 W/kg

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

Reference Value = 6.272 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.474 W/kg

SAR(1 g) = 0.320 W/kg; SAR(10 g) = 0.206 W/kg

Maximum value of SAR (measured) = 0.363 W/kg

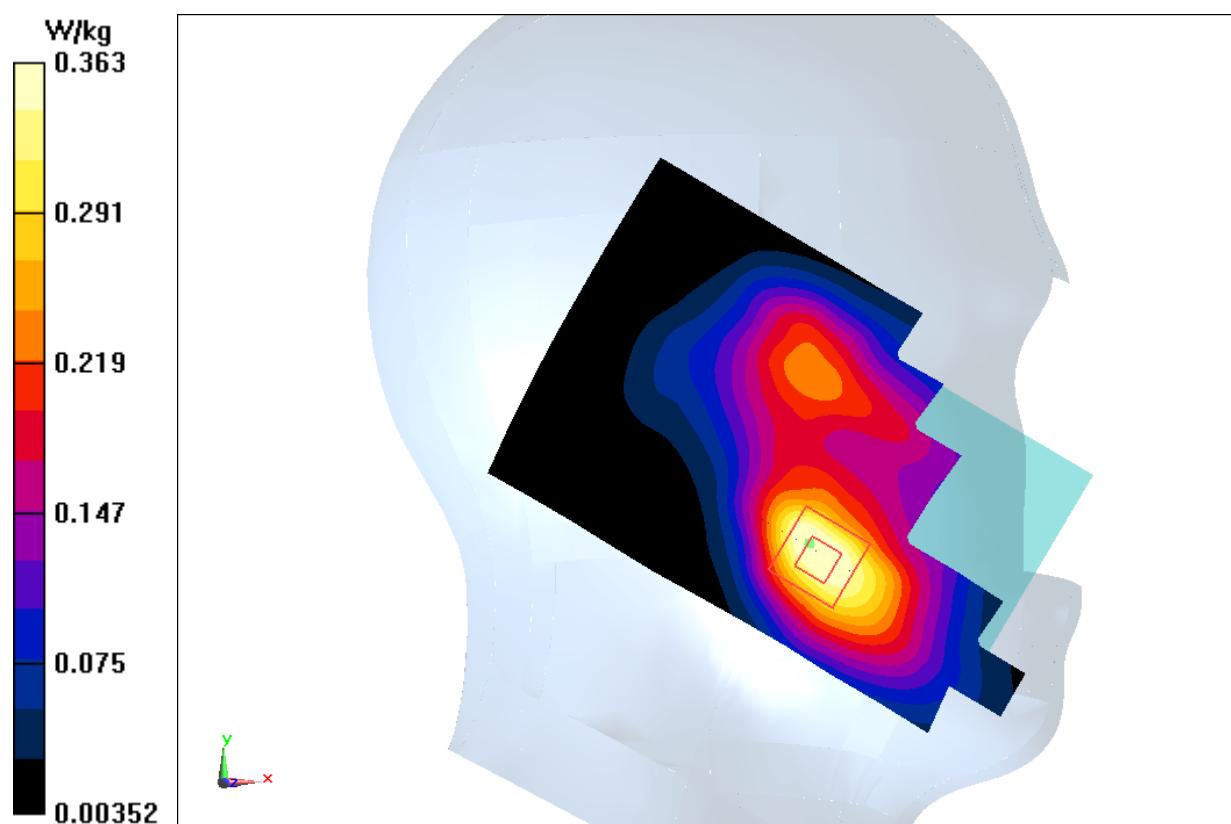


Fig.9 1700MHz

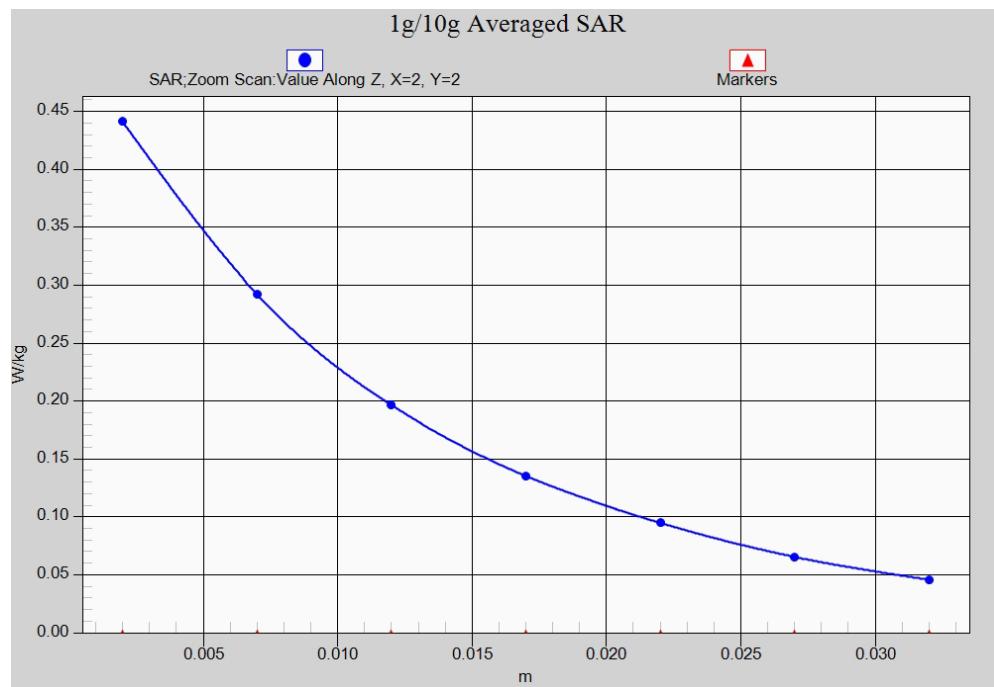


Fig. 9-1 Z-Scan at power reference point (WCDMA 1700 MHz)

WCDMA 1700 Body Rear High

Date: 2016-4-14

Electronics: DAE4 Sn777

Medium: Body 1750 MHz

Medium parameters used (interpolated): $f = 1752.6$ MHz; $\sigma = 1.512$ mho/m; $\epsilon_r = 52.638$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.0°C Liquid Temperature: 22.5°C

Communication System: WCDMA 1700 Frequency: 1752.6 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN3617 ConvF(7.96, 7.96, 7.96)

Area Scan (121x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.730 W/kg

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

Reference Value = 13.33 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.885 W/kg

SAR(1 g) = 0.594 W/kg; SAR(10 g) = 0.390 W/kg

Maximum value of SAR (measured) = 0.631 W/kg

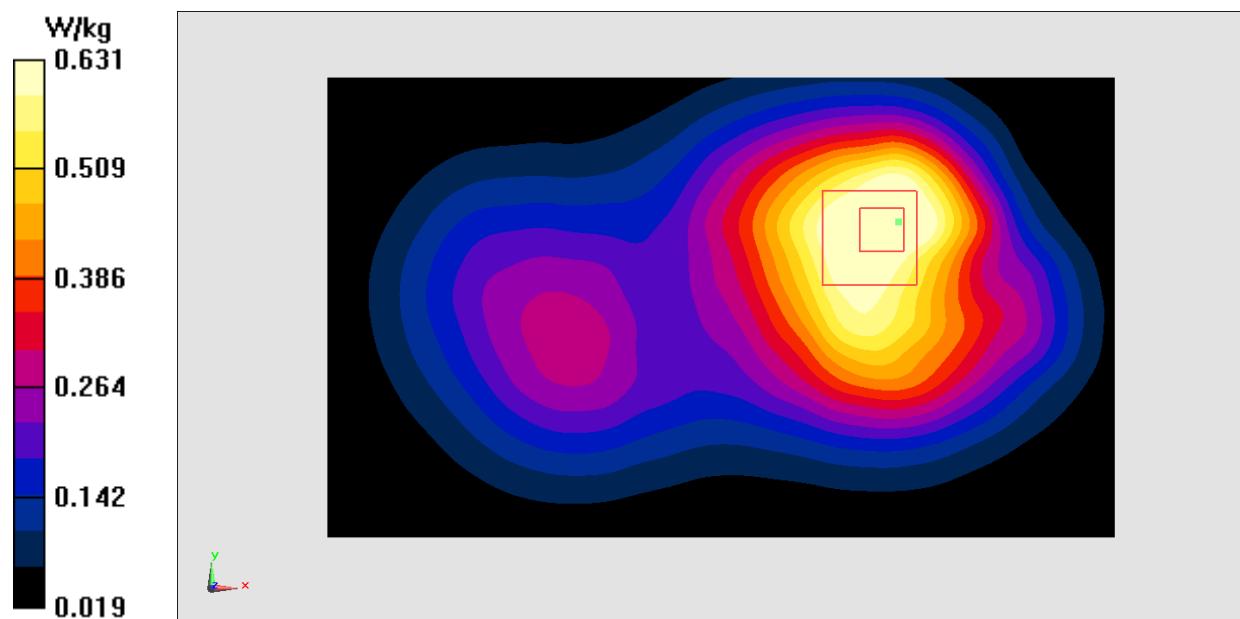


Fig.10 1700 MHz

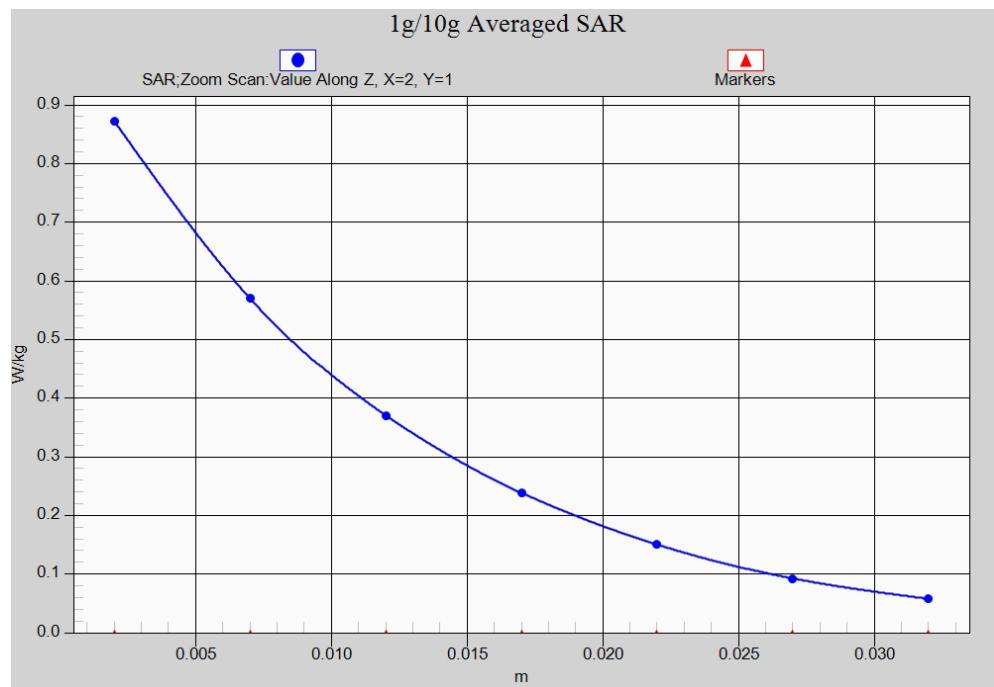


Fig.10-1 Z-Scan at power reference point (WCDMA 1700 MHz)

Wifi 802.11b Left Cheek Channel 11

Date: 2016-3-23

Electronics: DAE4 Sn777

Medium: Head 2450 MHz

Medium parameters used (interpolated): $f = 2462$ MHz; $\sigma = 1.843$ mho/m; $\epsilon_r = 38.357$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C Liquid Temperature: 22.0°C

Communication System: WLan 2450 Frequency: 2462 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN3617 ConvF(7.24, 7.24, 7.24)

Area Scan (71x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

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

Reference Value = 3.567 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.164 W/kg

SAR(1 g) = 0.068 W/kg; SAR(10 g) = 0.028 W/kg

Maximum value of SAR (measured) = 0.0837 W/kg

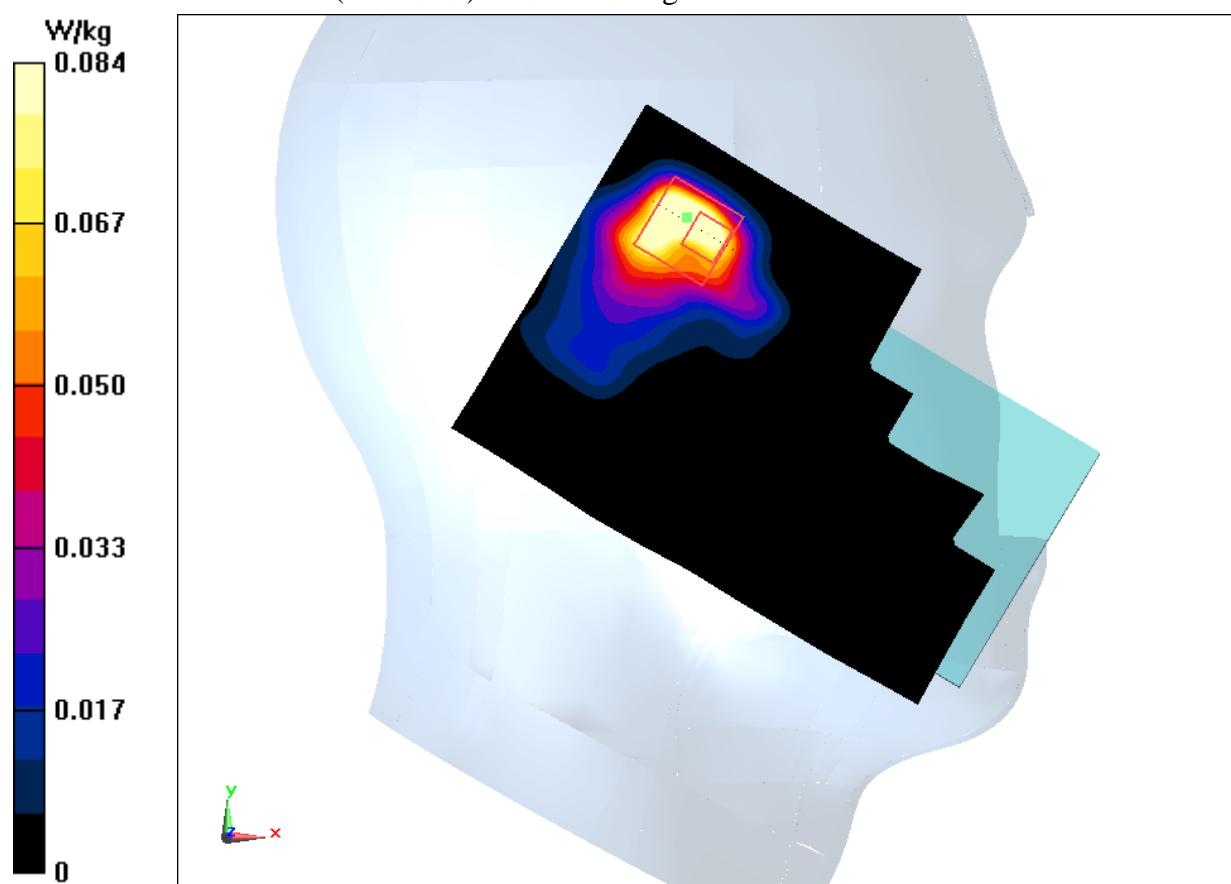


Fig.11 2450 MHz

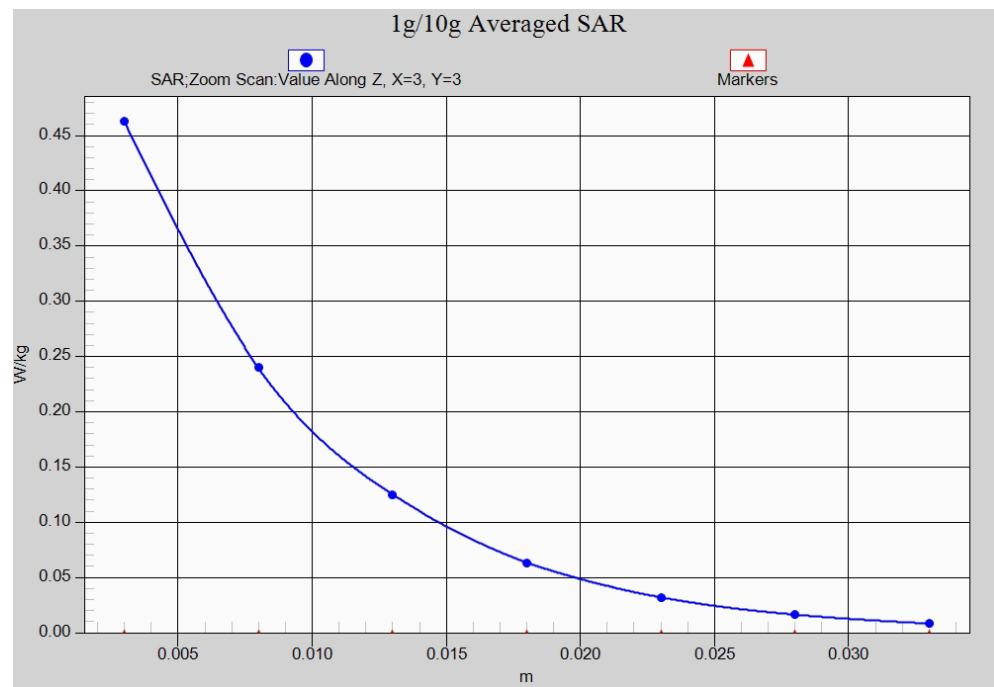


Fig. 11-1 Z-Scan at power reference point (2450 MHz)

Wifi 802.11b Body Rear Channel 11

Date: 2016-3-23

Electronics: DAE4 Sn777

Medium: Body 2450 MHz

Medium parameters used (interpolated): $f = 2462$ MHz; $\sigma = 2.053$ mho/m; $\epsilon_r = 51.245$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C Liquid Temperature: 22.0°C

Communication System: WLan 2450 Frequency: 2462 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN3617 ConvF(7.35, 7.35, 7.35)

Area Scan (141x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.0773 W/kg

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

Reference Value = 0.7620 V/m; Power Drift = 0.18dB

Peak SAR (extrapolated) = 0.109 W/kg

SAR(1 g) = 0.044 W/kg; SAR(10 g) = 0.019 W/kg

Maximum value of SAR (measured) = 0.0727 W/kg

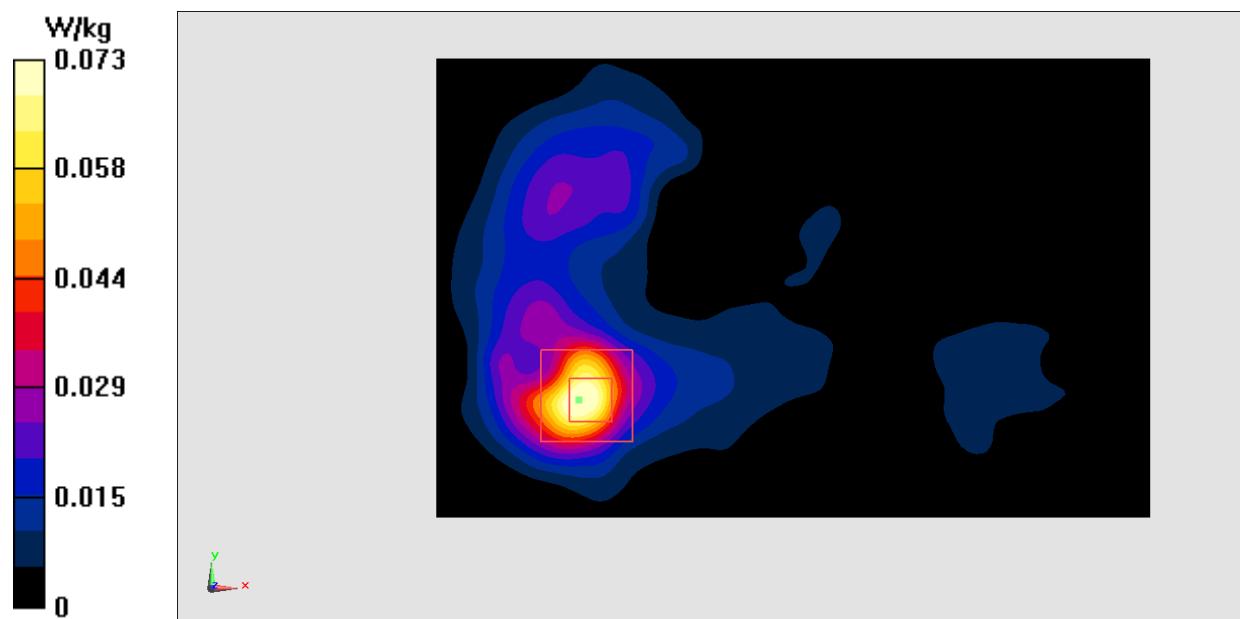


Fig.12 2450 MHz

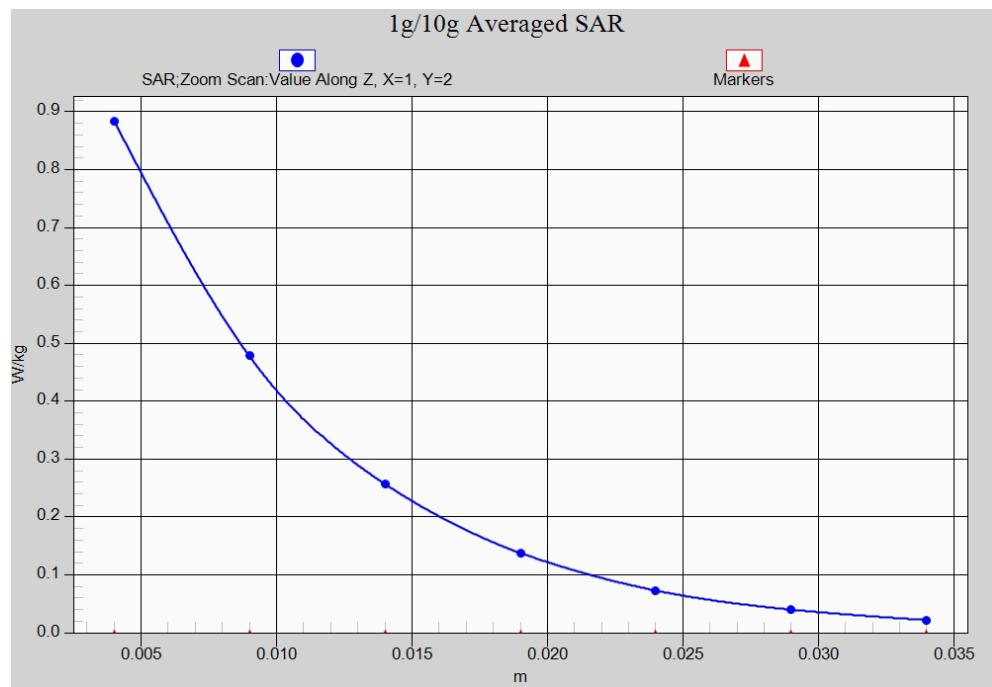


Fig. 12-1 Z-Scan at power reference point (2450 MHz)

ANNEX B System Verification Results

835MHz

Date: 2016-3-21

Electronics: DAE4 Sn777

Medium: Head 850 MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.923 \text{ S/m}$; $\epsilon_r = 41.22$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.5°C Liquid Temperature: 22.0°C

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

Probe: EX3DV4 – SN3617 ConvF(9.56, 9.56, 9.56)

System Validation /Area Scan (81x161x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Reference Value = 51.264 V/m; Power Drift = 0.08 dB

Fast SAR: $\text{SAR}(1 \text{ g}) = 2.26 \text{ W/kg}$; $\text{SAR}(10 \text{ g}) = 1.45 \text{ W/kg}$

Maximum value of SAR (interpolated) = 2.50 W/kg

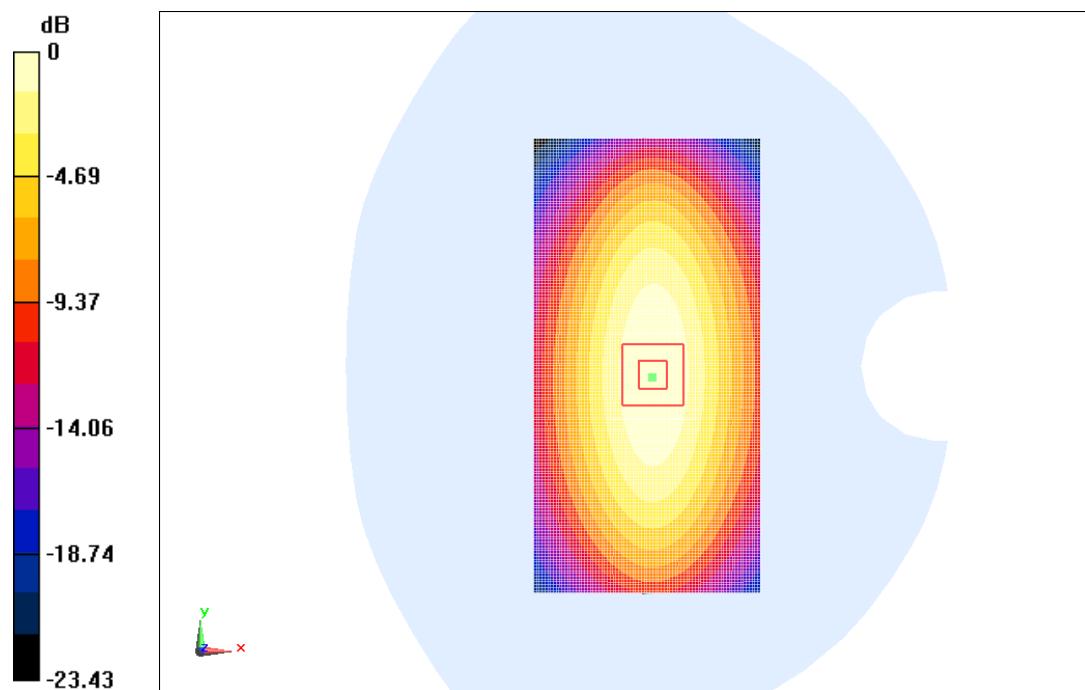
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 51.264 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 3.58 W/kg

SAR(1 g) = 2.3 W/kg; SAR(10 g) = 1.48 W/kg

Maximum value of SAR (measured) = 2.53 W/kg



$$0 \text{ dB} = 2.53 \text{ W/kg} = 4.03 \text{ dBW/kg}$$

Fig.B.1 validation 835MHz 250mW

835MHz

Date: 2016-3-21

Electronics: DAE4 Sn777

Medium: Body 850 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 0.982$ S/m; $\epsilon_r = 56.33$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C Liquid Temperature: 22.0°C

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

Probe: EX3DV4 – SN3617 ConvF(9.71, 9.71, 9.71)

System Validation /Area Scan (81x171x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 51.433 V/m; Power Drift = 0.05 dB

Fast SAR: SAR(1 g) = 2.33 W/kg; SAR(10 g) = 1.52 W/kg

Maximum value of SAR (interpolated) = 2.51 W/kg

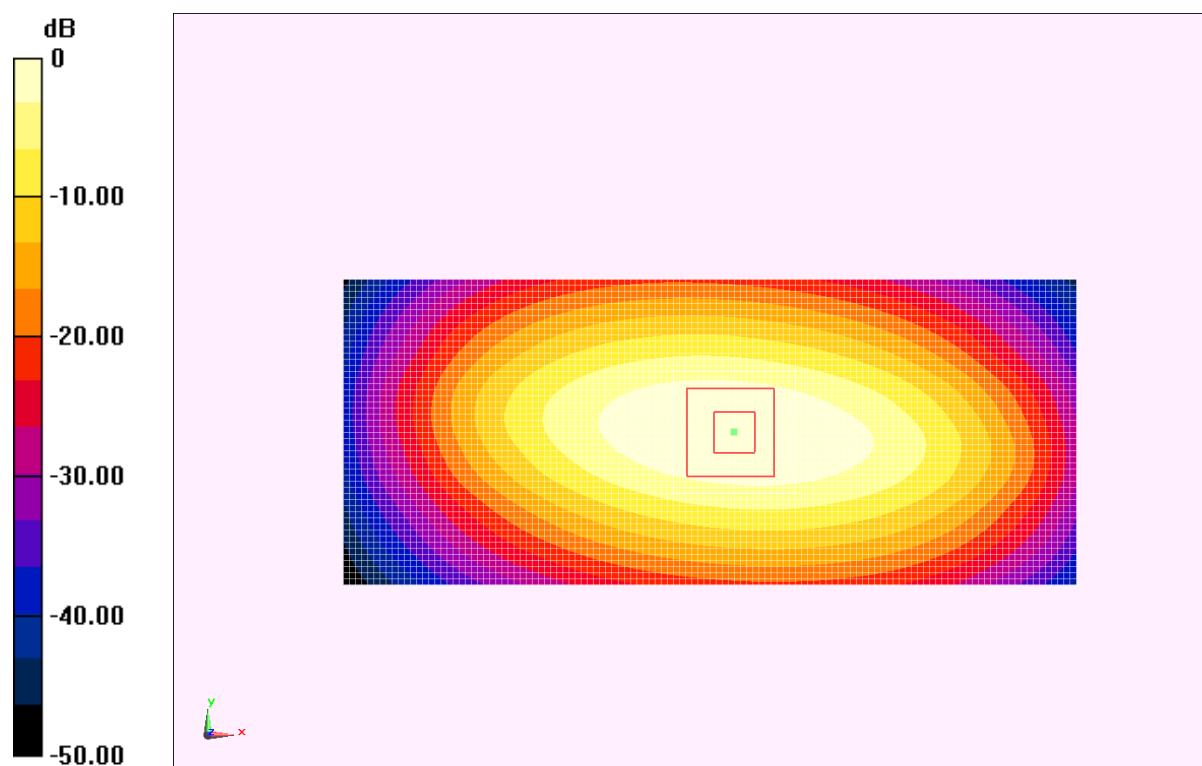
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 51.433 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 3.52 W/kg

SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.54 W/kg

Maximum value of SAR (measured) = 2.54 W/kg



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

Fig.B.2 validation 835MHz 250mW

1900MHz

Date: 2016-3-22

Electronics: DAE4 Sn777

Medium: Head 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.436$ S/m; $\epsilon_r = 39.88$; $\rho = 1000$ kg/m 3

Ambient Temperature: 22.5°C Liquid Temperature: 22.0°C

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

Probe: EX3DV4 - SN3617 ConvF(8.07, 8.07, 8.07)

System Validation /Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 93.622 V/m; Power Drift = 0.05 dB

Fast SAR: SAR(1 g) = 10.6 W/kg; SAR(10 g) = 5.60 W/kg

Maximum value of SAR (interpolated) = 11.96 W/kg

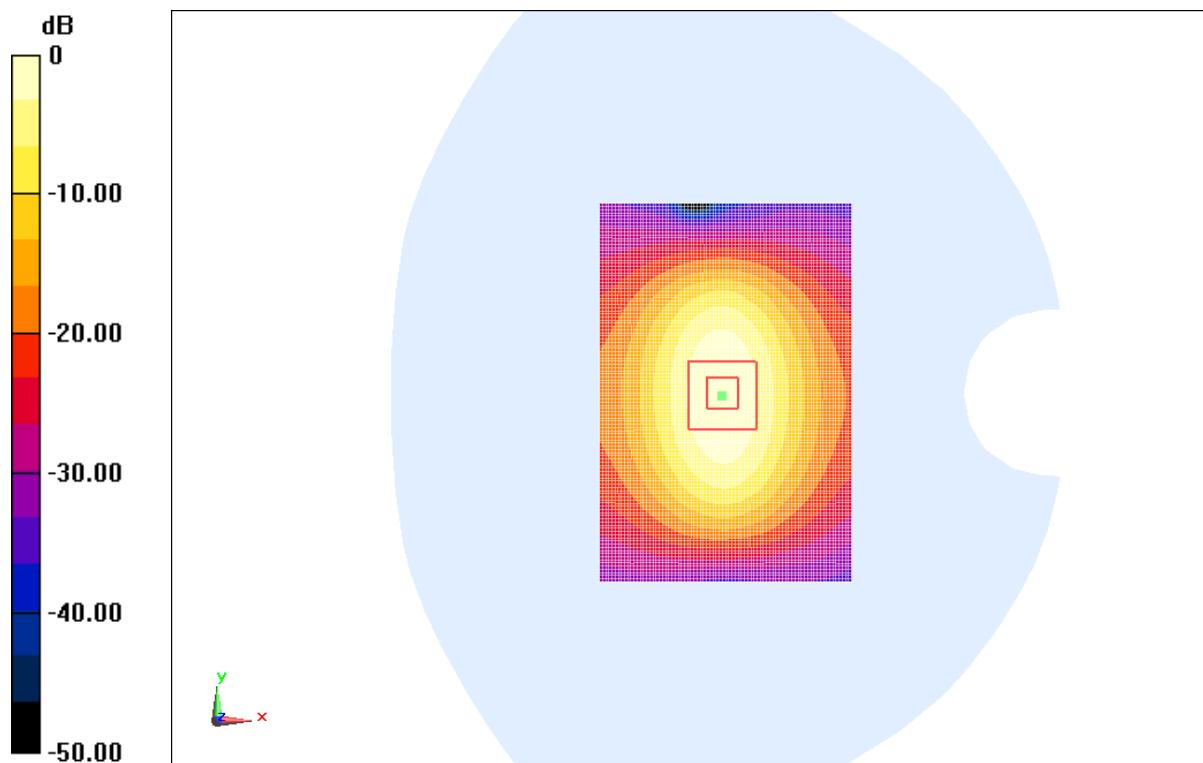
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.622 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 18.89 W/kg

SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.38 W/kg

Maximum value of SAR (measured) = 11.79 W/kg



$$0 \text{ dB} = 11.79 \text{ W/kg} = 10.72 \text{ dBW/kg}$$

Fig.B.3 validation 1900MHz 250mW

1900MHz

Date: 2016-3-22

Electronics: DAE4 Sn777

Medium: Body 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.573$ S/m; $\epsilon_r = 54.15$; $\rho = 1000$ kg/m 3

Ambient Temperature: 22.5°C Liquid Temperature: 22.0°C

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

Probe: EX3DV4 – SN3617 ConvF(7.74, 7.74, 7.74)

System validation /Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 58.758 V/m; Power Drift = -0.02 dB

Fast SAR: SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.46 W/kg

Maximum value of SAR (interpolated) = 12.44 W/kg

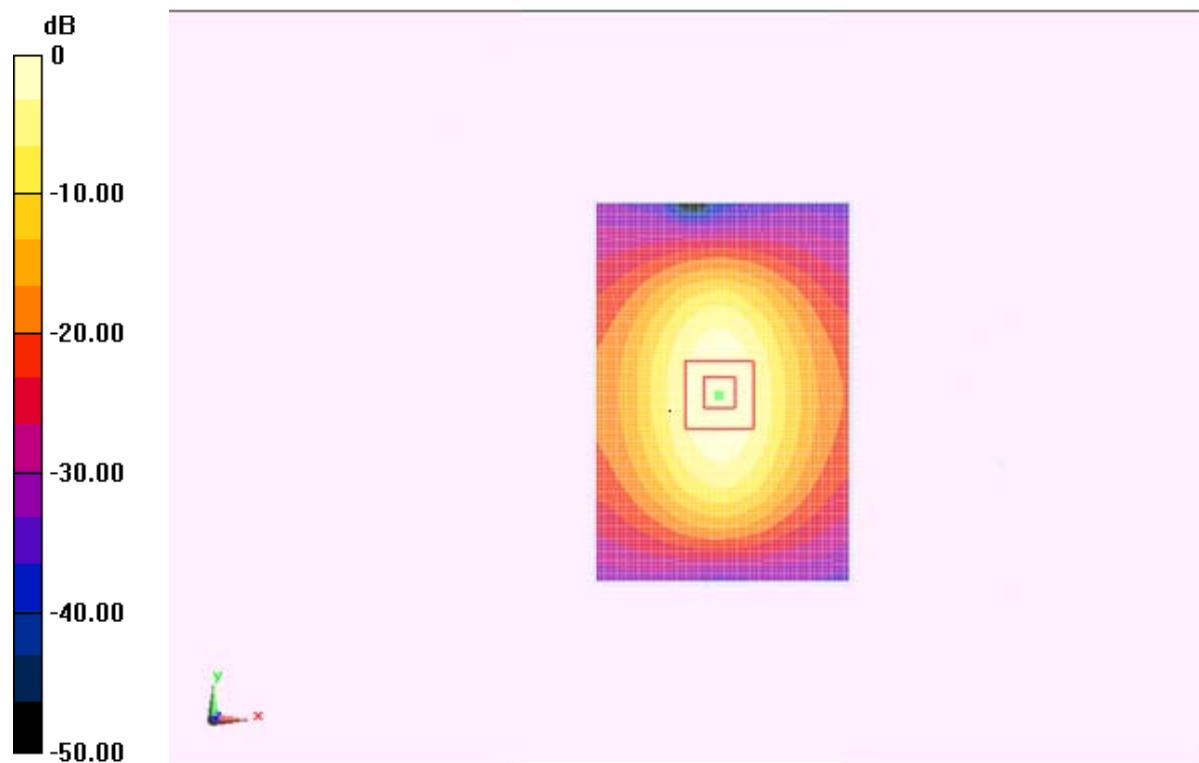
System validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 58.758 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 19.11 W/kg

SAR(1 g) = 10.2 W/kg; SAR(10 g) = 5.3 W/kg

Maximum value of SAR (measured) = 12.28 W/kg



0 dB = 12.28 W/kg = 10.89 dBW/kg

Fig.B.4 validation 1900MHz 250mW

2450MHz

Date: 2016-3-23

Electronics: DAE4 Sn777

Medium: Head 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.834$ mho/m; $\epsilon_r = 38.55$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C Liquid Temperature: 22.0°C

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

Probe: EX3DV4 - SN3617 ConvF(7.24, 7.24, 7.24)

System Validation /Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 90.054 V/m; Power Drift = 0.02 dB

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.21 W/kg

Maximum value of SAR (interpolated) = 16.53 W/kg

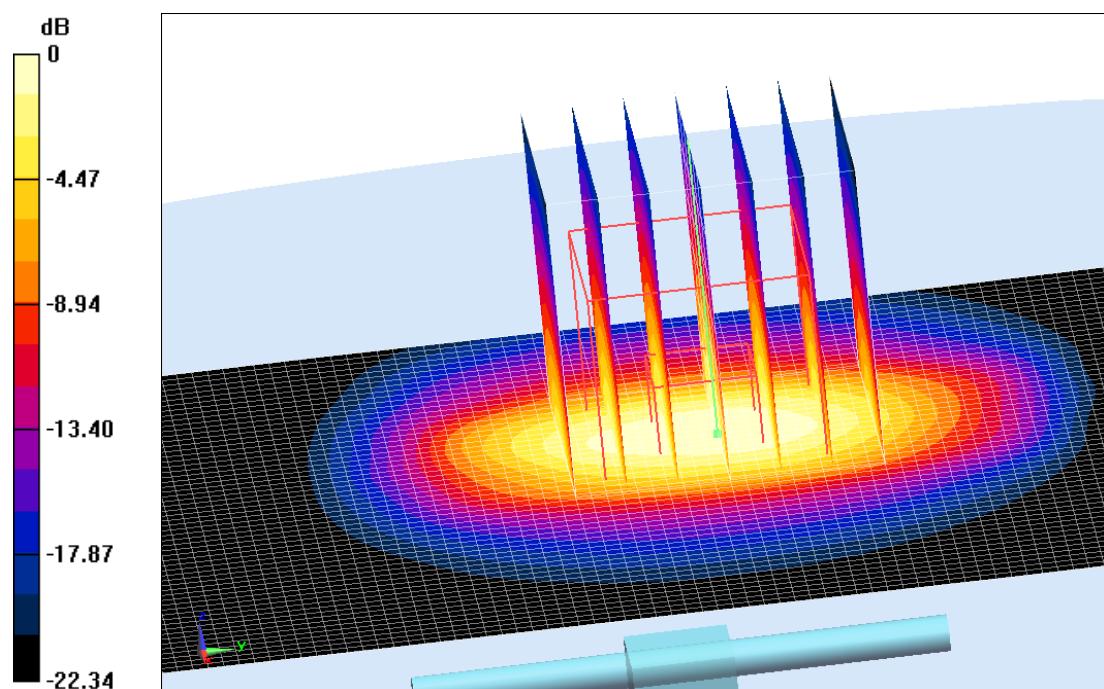
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.054 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 27.17 W/kg

SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.04 W/kg

Maximum value of SAR (measured) = 16.41 W/kg



0 dB = 16.41W/kg = 12.15 dBW/kg

Fig.B.5 validation 2450MHz 250mW

2450MHz

Date: 2016-3-23

Electronics: DAE4 Sn777

Medium: Body 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.982$ S/m; $\epsilon_r = 51.68$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C Liquid Temperature: 22.0°C

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

Probe: EX3DV4 - SN3617 ConvF(7.35, 7.35, 7.35)

System Validation/Area Scan (81x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 88.843 V/m; Power Drift = -0.03 dB

SAR(1 g) = 12.5 W/kg; SAR(10 g) = 5.81 W/kg

Maximum value of SAR (interpolated) = 14.52 W/kg

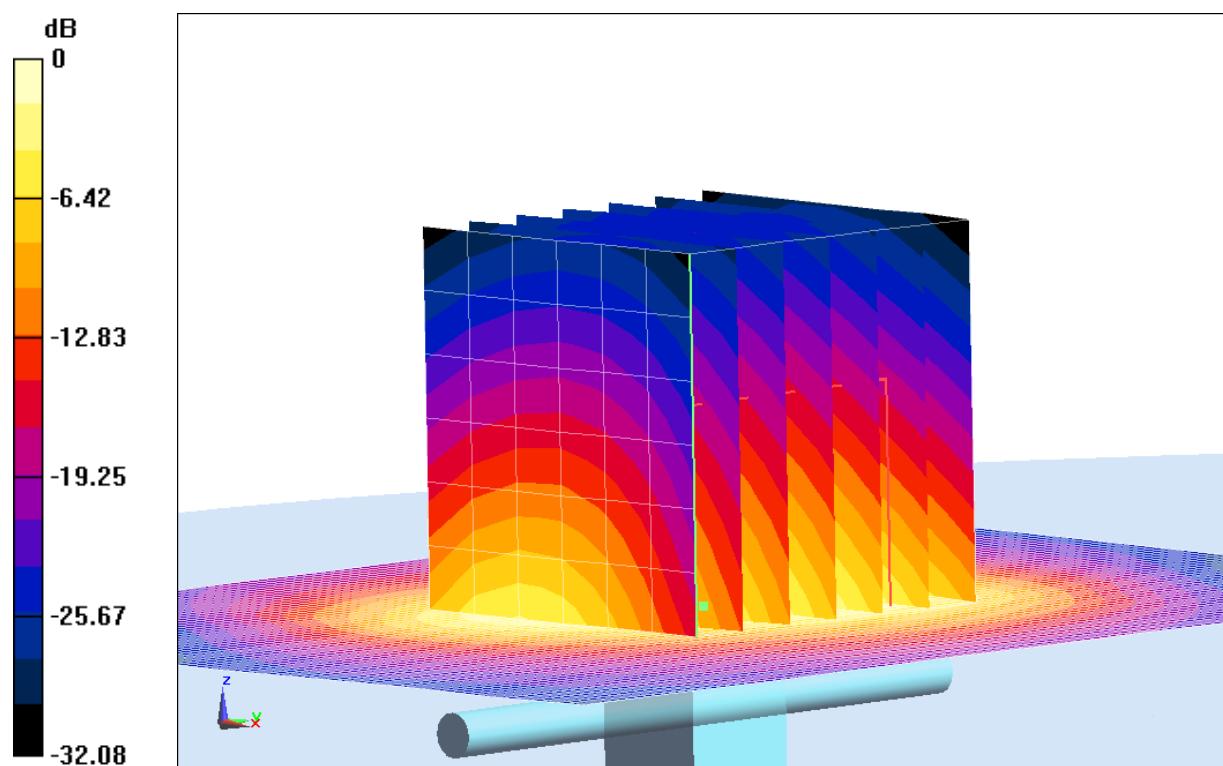
System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.843 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 25.04 W/kg

SAR(1 g) = 12.7 W/kg; SAR(10 g) = 5.94 W/kg

Maximum value of SAR (measured) = 14.79 W/kg



0 dB = 14.79 W/kg = 11.69 dB W/kgz

Fig.B.6 validation 2450MHz 250mW

1750MHz

Date: 2016-4-14

Electronics: DAE4 Sn777

Medium: Head 1750 MHz

Medium parameters used: $f=1750$ MHz; $\sigma = 1.351$ mho/m; $\epsilon_r = 39.65$; $\rho = 1000$ kg/m 3

Ambient Temperature: 23.0°C Liquid Temperature: 22.0°C

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

Probe: EX3DV4 - SN3617 ConvF(8.34, 8.34, 8.34)

System Validation/Area Scan (81x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Reference Value = 92.325 V/m; Power Drift = -0.05 dB

Fast SAR: SAR(1 g) = 8.99 W/kg; SAR(10 g) = 4.80 W/kg

Maximum value of SAR (interpolated) = 10.05 W/kg

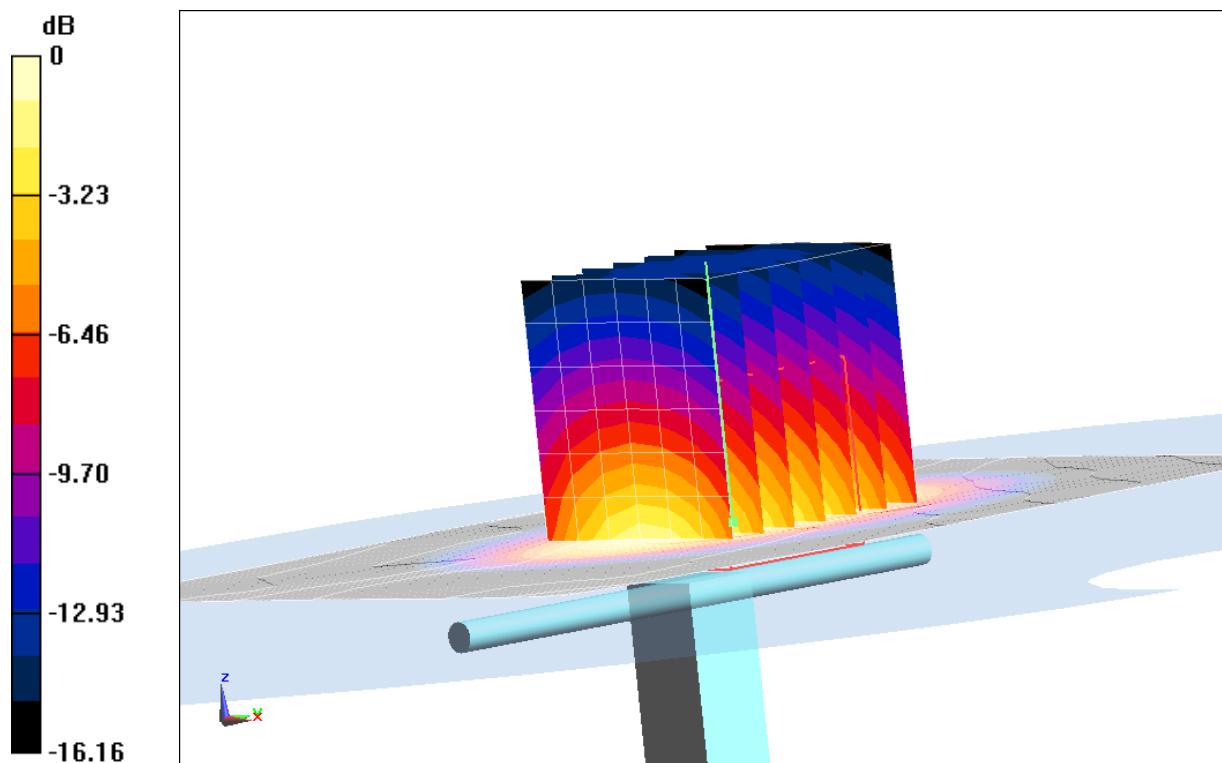
System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 92.325 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 15.64 W/kg

SAR(1 g) = 9.15 W/kg; SAR(10 g) = 4.84 W/kg

Maximum value of SAR (measured) = 10.15 W/kg



0 dB = 10.15 W/kg = 10.06 dB W/kg

Fig.B.7 validation 1750MHz 250mW

1750MHz

Date: 2016-4-14

Electronics: DAE4 Sn777

Medium: Body 1750 MHz

Medium parameters used: $f=1750$ MHz; $\sigma = 1.481$ mho/m; $\epsilon_r = 52.78$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.0°C Liquid Temperature: 22.0°C

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

Probe: EX3DV4 – SN3617 ConvF(7.96, 7.96, 7.96)

System Validation/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 95.223 V/m; Power Drift = -0.03 dB

Fast SAR: SAR(1 g) = 9.35 W/kg; SAR(10 g) = 5.02 W/kg

Maximum value of SAR (interpolated) = 10.14 W/kg

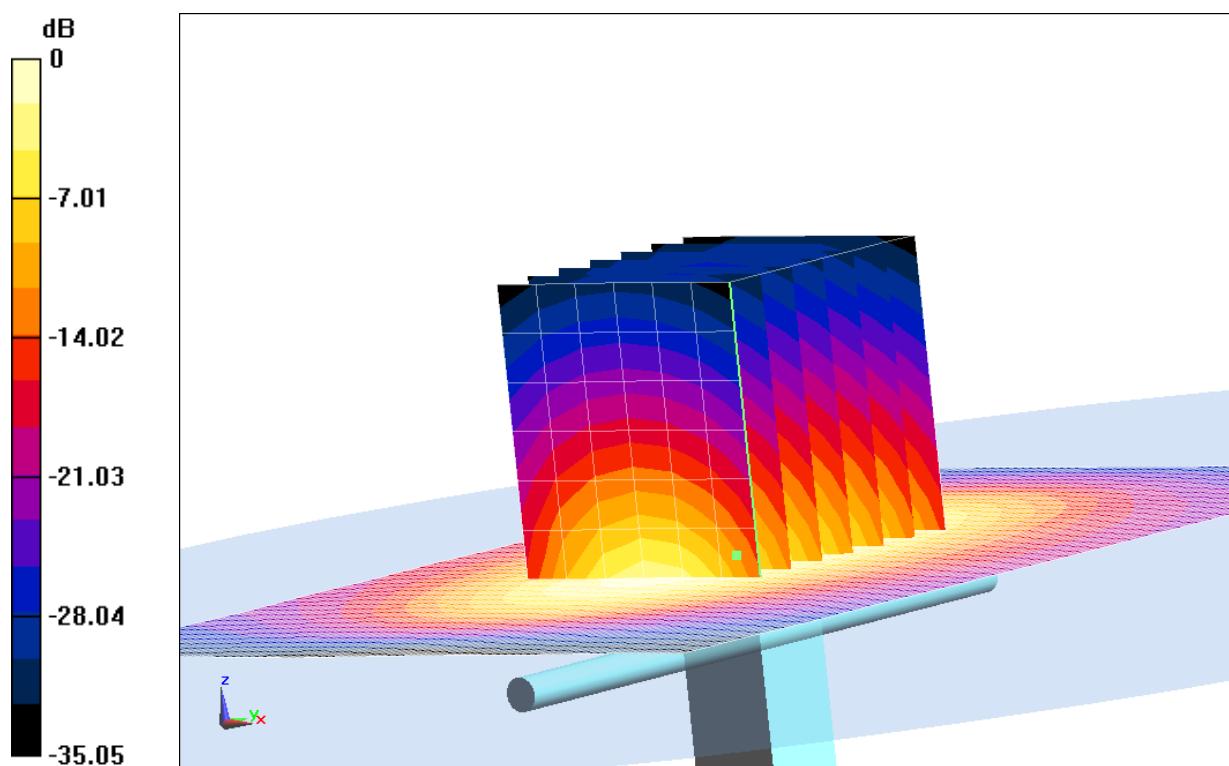
System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.223 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 16.19 W/kg

SAR(1 g) = 9.14 W/kg; SAR(10 g) = 4.99 W/kg

Maximum value of SAR (measured) = 10.11 W/kg



0 dB = 10.11 W/kg = 10.05 dB W/kg

Fig.B.8 validation 1750MHz 250mW

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

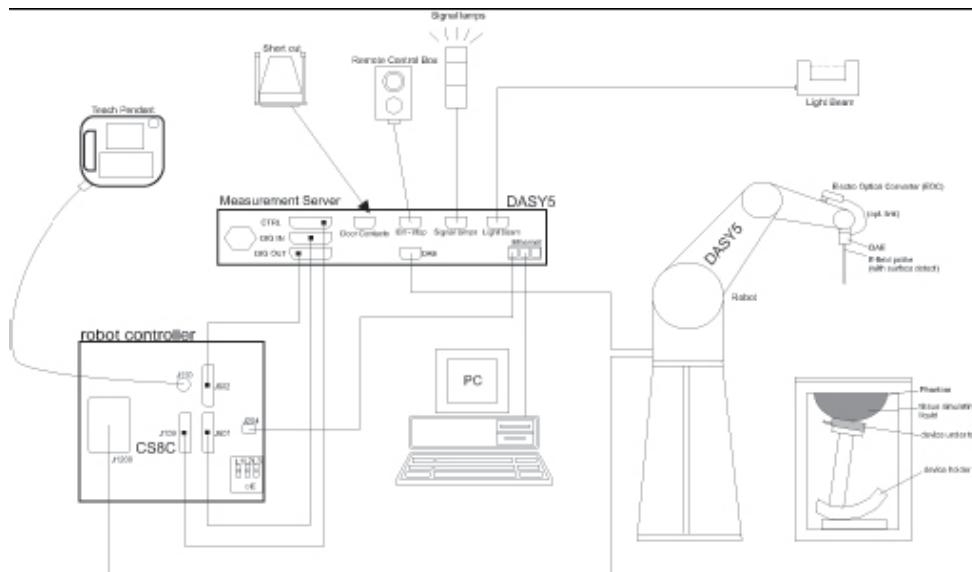
Table B.1 Comparison between area scan and zoom scan for system verification

Date	Band	Position	Area scan (1g)	Zoom scan (1g)	Drift (%)
2016-03-21	835	Head	2.26	2.3	-1.74
	835	Body	2.33	2.38	-2.10
2016-03-22	1900	Head	10.6	10.4	1.92
	1900	Body	10.4	10.2	1.96
2016-03-23	2450	Head	13.3	13.2	0.76
	2450	Body	12.5	12.7	-1.57
2016-04-14	1750	Head	8.99	9.15	-1.75
	1750	Body	9.35	9.14	2.30

ANNEX C SAR Measurement Setup

C.1 Measurement Set-up

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



Picture C.1SAR Lab Test Measurement Set-up

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