

18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
20	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
21	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
22	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						10.1	9.95	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						20.2	19.9	

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

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.5	N	1	1	1	6.5	6.5	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. Restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
14	Fast SAR z-Approximation	B	14.0	R	$\sqrt{3}$	1	1	8.1	8.1	∞
Test sample related										
15	Test sample	A	3.3	N	1	1	1	3.3	3.3	71

	positioning									
16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
17	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
20	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
21	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
22	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						13.3	13.2	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						26.6	26.4	

17 MAIN TEST INSTRUMENTS

Table 17.1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	E5071C	MY46110673	February 15, 2014	One year
02	Power meter	NRVD	102083	September 11, 2013	One year
03	Power sensor	NRV-Z5	100542		
04	Signal Generator	E4438C	MY49070393	November 08, 2013	One Year
05	Amplifier	60S1G4	0331848	No Calibration Requested	
06	BTS	E5515C	MY50263375	January 30, 2014	One year
07	E-field Probe	SPEAG EX3DV4	3846	September 03, 2013	One year
08	DAE	SPEAG DAE4	771	November 12, 2013	One year
09	Dipole Validation Kit	SPEAG D835V2	443	August 29, 2013	One year
10	Dipole Validation Kit	SPEAG D1900V2	5d101	July 09, 2013	One year
11	Dipole Validation Kit	SPEAG D2450V2	853	July 08, 2013	One year
12	Dipole Validation Kit	SPEAG D835V2	4d120	June 16, 2014	One year
13	Dipole Validation Kit	SPEAG D1900V2	5d018	June 18, 2014	One year

END OF REPORT BODY

ANNEX A Graph Results

850 Left Cheek High

Date: 2014-5-9

Electronics: DAE4 Sn771

Medium: Head 850 MHz

Medium parameters used (interpolated): $f = 848.8$ MHz; $\sigma = 0.902$ S/m; $\epsilon_r = 40.802$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.1°C Liquid Temperature: 21.6°C

Communication System: GSM 850 Frequency: 848.8 MHz Duty Cycle: 1:8.3

Probe: EX3DV4 - SN3846 ConvF(8.92, 8.92, 8.92)

Cheek High/Area Scan (61x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.735 W/kg

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

Reference Value = 13.471 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 0.830 W/kg

SAR(1 g) = 0.697 W/kg; SAR(10 g) = 0.536 W/kg

Maximum value of SAR (measured) = 0.734 W/kg

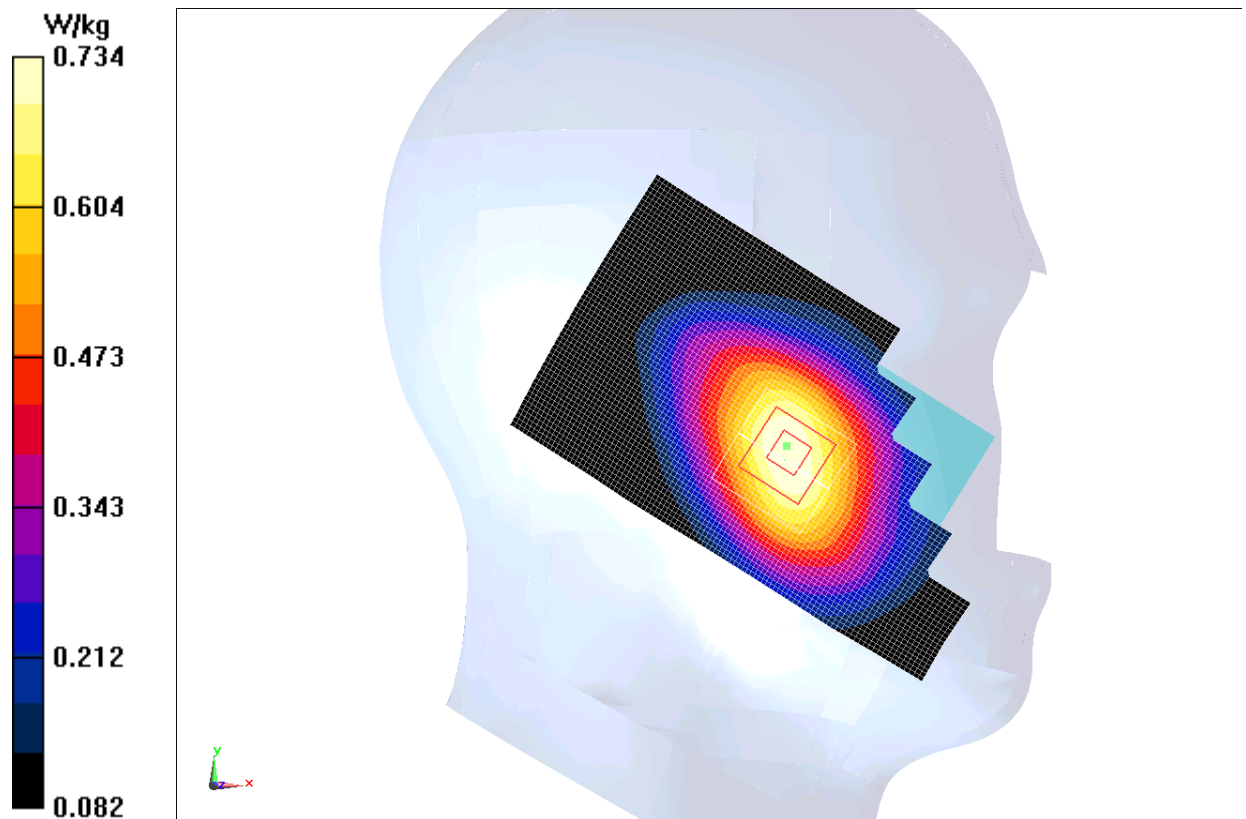


Fig.1 850MHz CH251

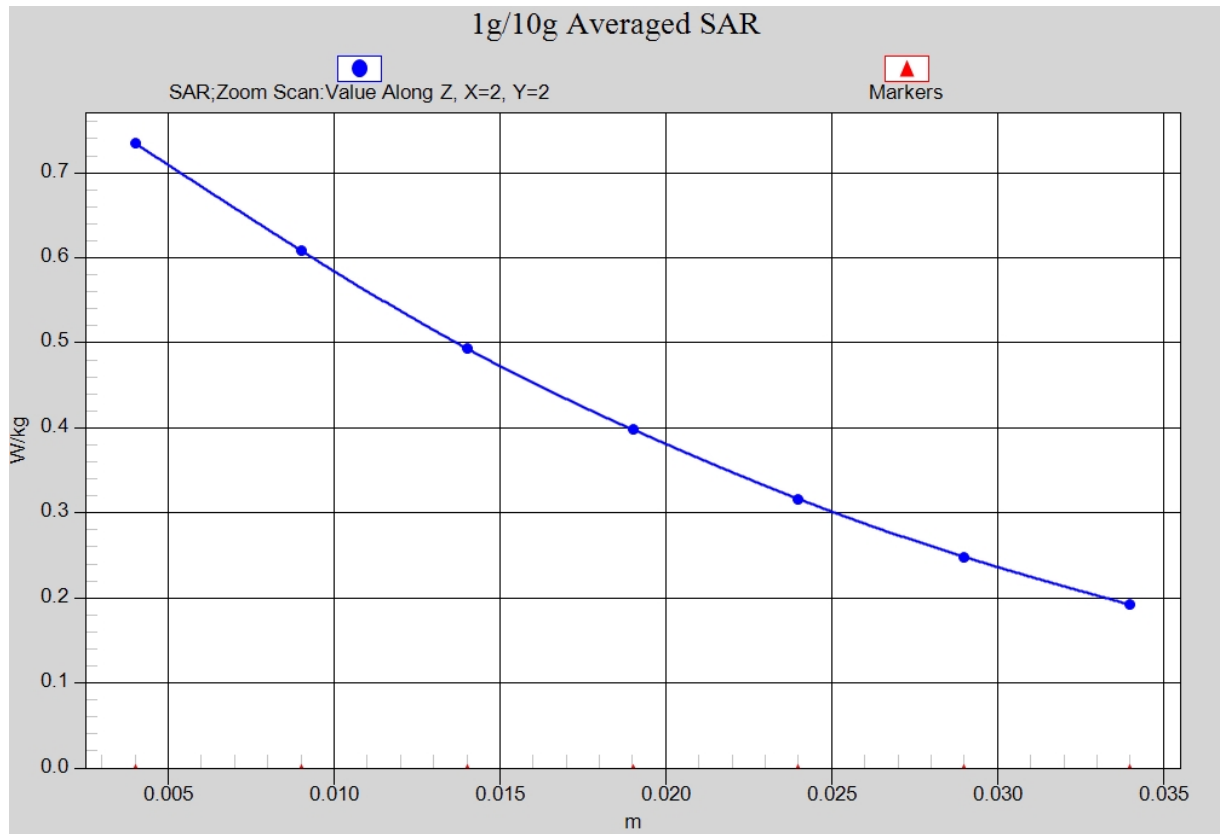


Fig. 1-1 Z-Scan at power reference point (850 MHz CH251)

850 Body Rear High

Date: 2014-5-9

Electronics: DAE4 Sn771

Medium: Body 850 MHz

Medium parameters used (interpolated): $f = 848.8$ MHz; $\sigma = 0.98$ S/m; $\epsilon_r = 54.649$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.1°C Liquid Temperature: 21.6°C

Communication System: GSM 850 EGPRS Frequency: 848.8 MHz Duty Cycle: 1:4

Probe: EX3DV4 - SN3846 ConvF(8.73, 8.73, 8.73)

Rear High/Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.912 W/kg

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

Reference Value = 28.847 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.09 W/kg

SAR(1 g) = 0.852 W/kg; SAR(10 g) = 0.648 W/kg

Maximum value of SAR (measured) = 0.918 W/kg

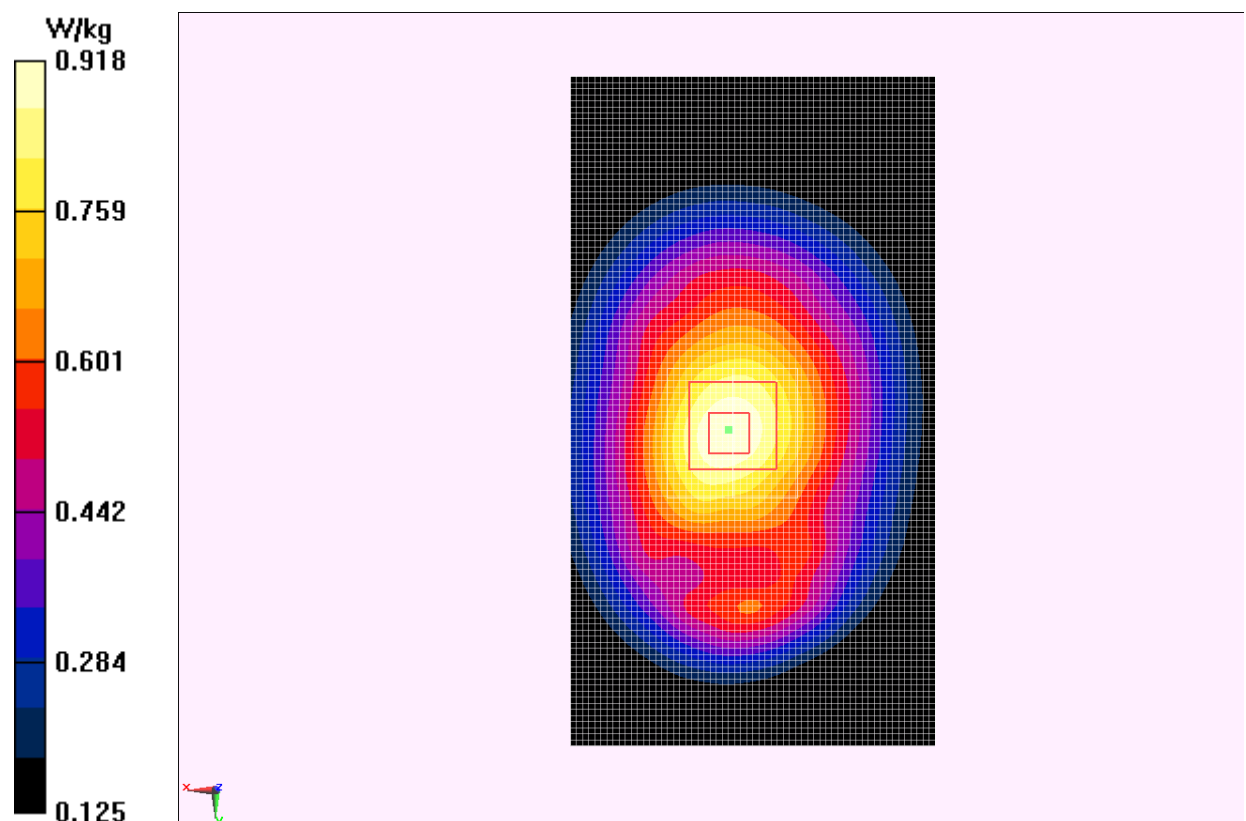


Fig.2 850 MHz CH251

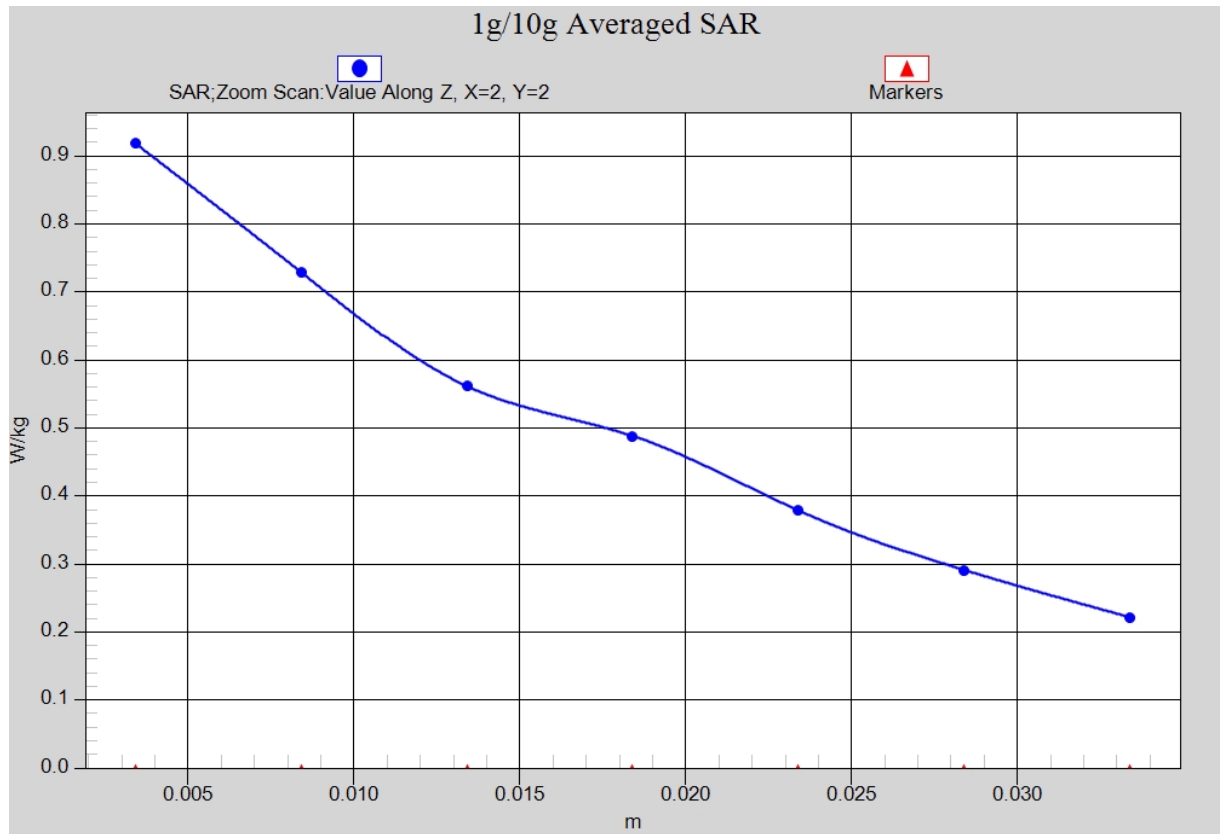


Fig. 2-1 Z-Scan at power reference point (850 MHz CH251)

GSM1900 Left Cheek High

Date: 2014-5-10

Electronics: DAE4 Sn771

Medium: Head 1900 MHz

Medium parameters used: $f = 1910$ MHz; $\sigma = 1.437$ S/m; $\epsilon_r = 39.557$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.1°C Liquid Temperature: 21.6°C

Communication System: GSM 1900MHz Frequency: 1909.8 MHz Duty Cycle: 1:8.3

Probe: EX3DV4 - SN3846 ConvF(7.57, 7.57, 7.57)

Cheek High/Area Scan (61x101x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.387 W/kg

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

Reference Value = 7.616 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.526 W/kg

SAR(1 g) = 0.362 W/kg; SAR(10 g) = 0.219 W/kg

Maximum value of SAR (measured) = 0.384 W/kg

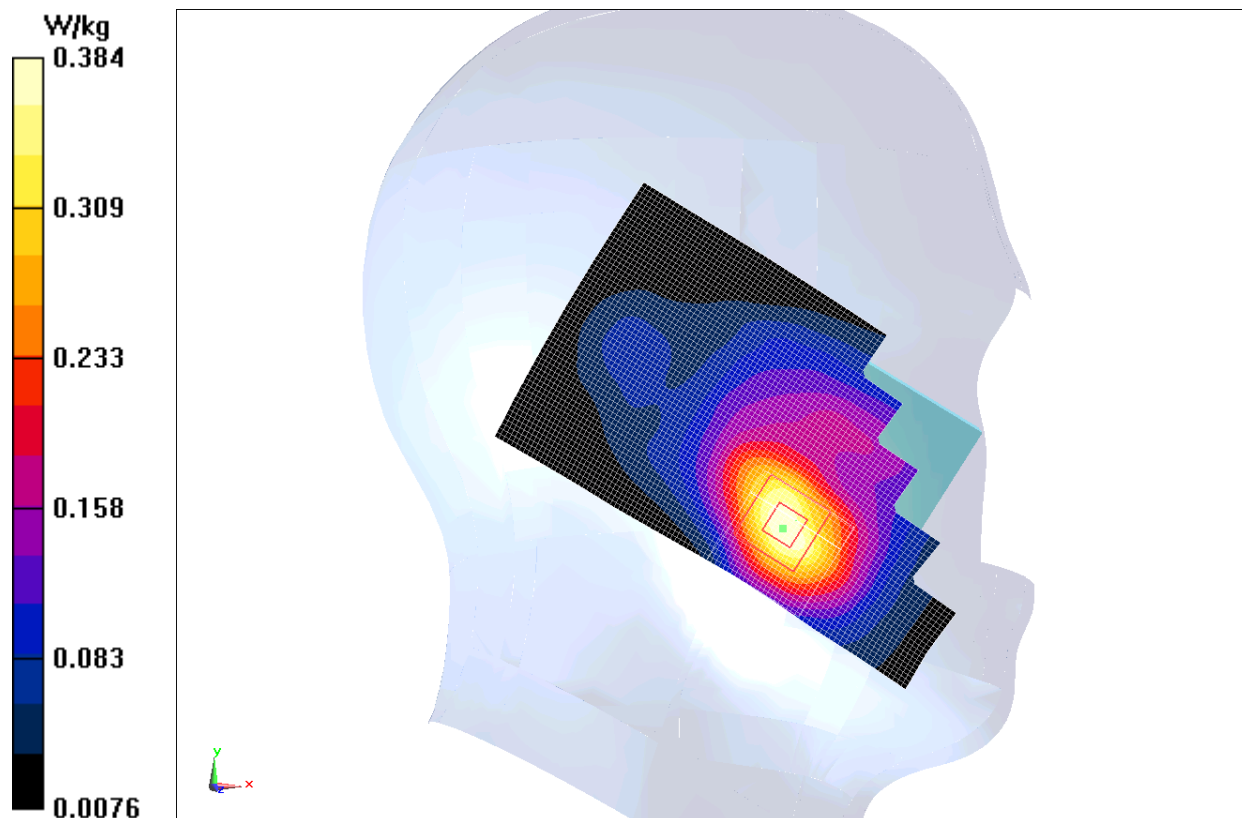


Fig.3 1900 MHz CH810

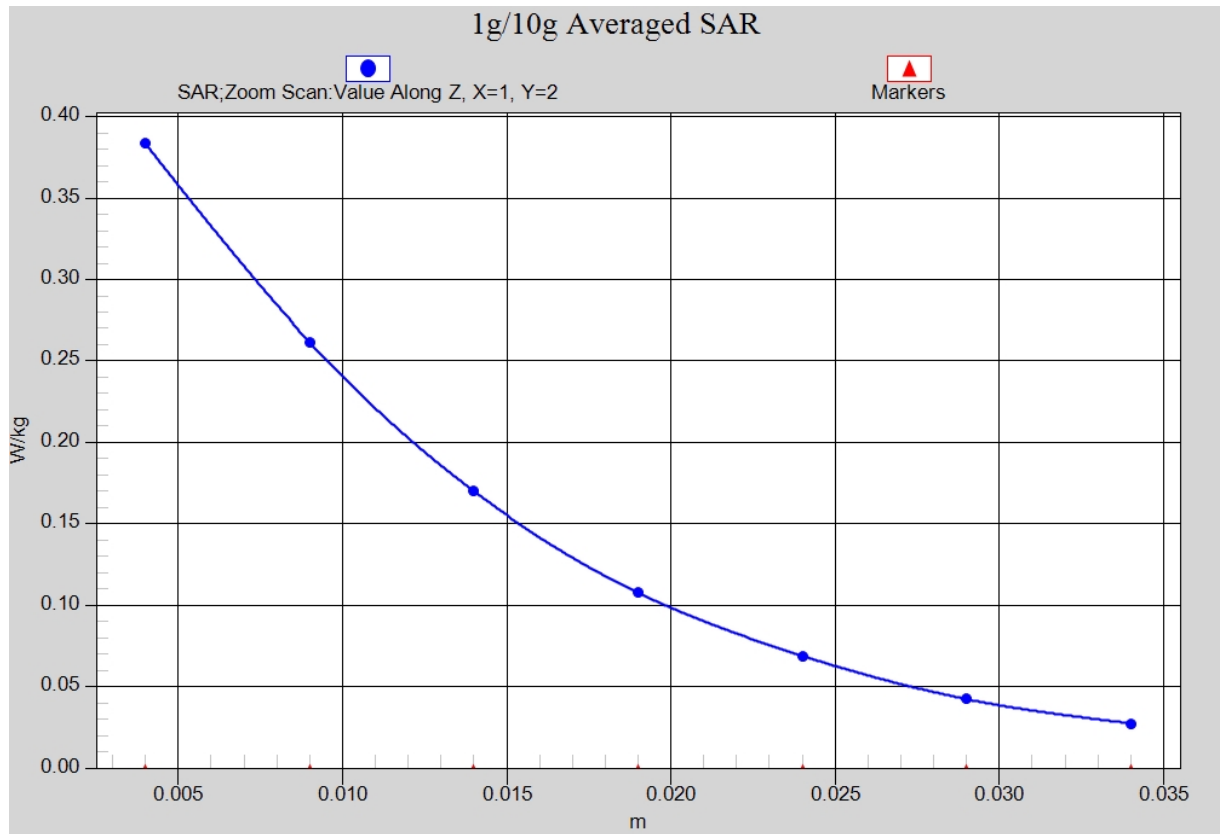


Fig. 3-1 Z-Scan at power reference point (1900 MHz CH810)

GSM1900 Body Front Low

Date: 2014-5-10

Electronics: DAE4 Sn771

Medium: Body 1900 MHz

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.508$ S/m; $\epsilon_r = 51.817$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.1°C Liquid Temperature: 21.6°C

Communication System: GSM 1900MHz GPRS Frequency: 1850.2 MHz Duty Cycle: 1:2

Probe: EX3DV4 - SN3846 ConvF(7.03, 7.03, 7.03)

Front Low/Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.712 W/kg

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

Reference Value = 11.101 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.913 W/kg

SAR(1 g) = 0.660 W/kg; SAR(10 g) = 0.436 W/kg

Maximum value of SAR (measured) = 0.744 W/kg

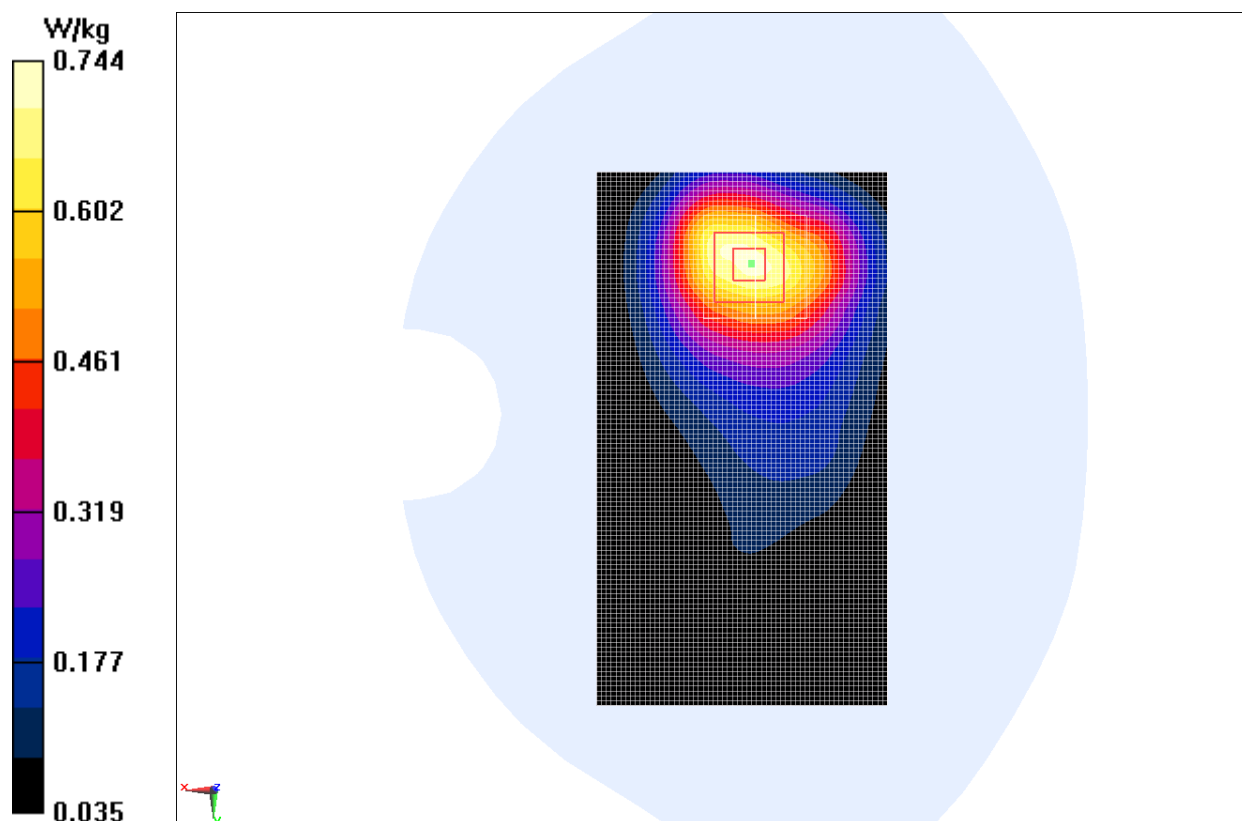


Fig.4 1900 MHz CH512

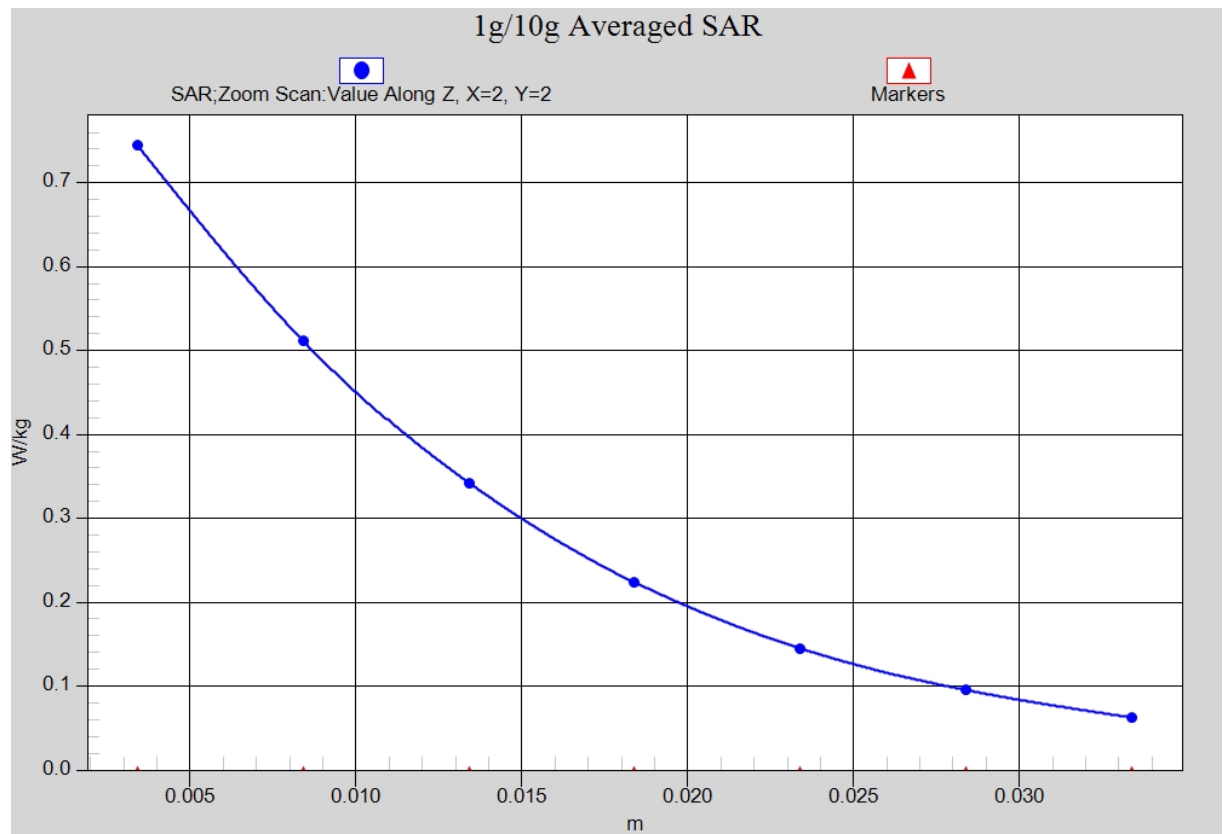


Fig.4-1 Z-Scan at power reference point (1900 MHz CH512)

WCDMA 850 Left Cheek High

Date: 2014-5-9

Electronics: DAE4 Sn771

Medium: Head 850 MHz

Medium parameters used (interpolated): $f = 846.6$ MHz; $\sigma = 0.899$ S/m; $\epsilon_r = 40.83$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.1°C Liquid Temperature: 21.6°C

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

Probe: EX3DV4 - SN3846 ConvF(8.92, 8.92, 8.92)

Cheek High/Area Scan (61x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.772 W/kg

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

Reference Value = 10.288 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.910 W/kg

SAR(1 g) = 0.713 W/kg; SAR(10 g) = 0.535 W/kg

Maximum value of SAR (measured) = 0.749 W/kg

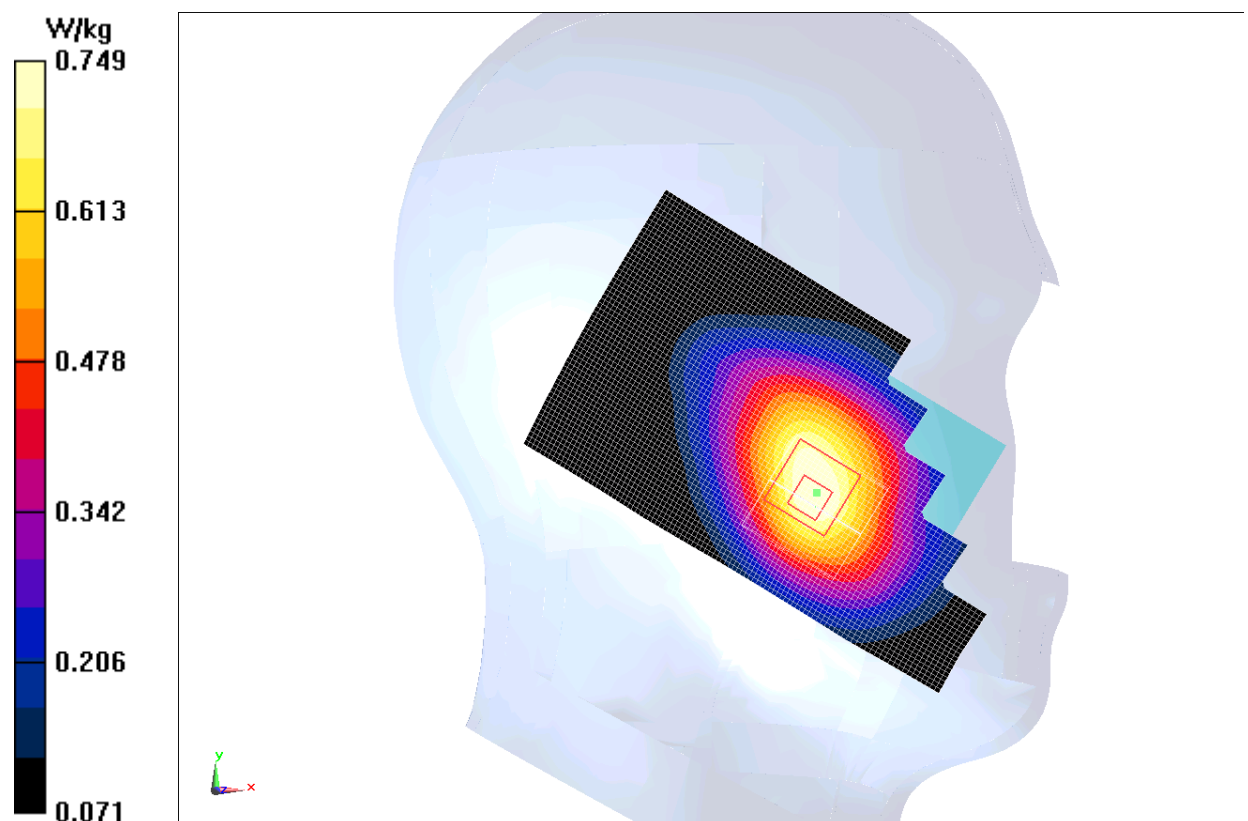


Fig.5 WCDMA 850 CH4233

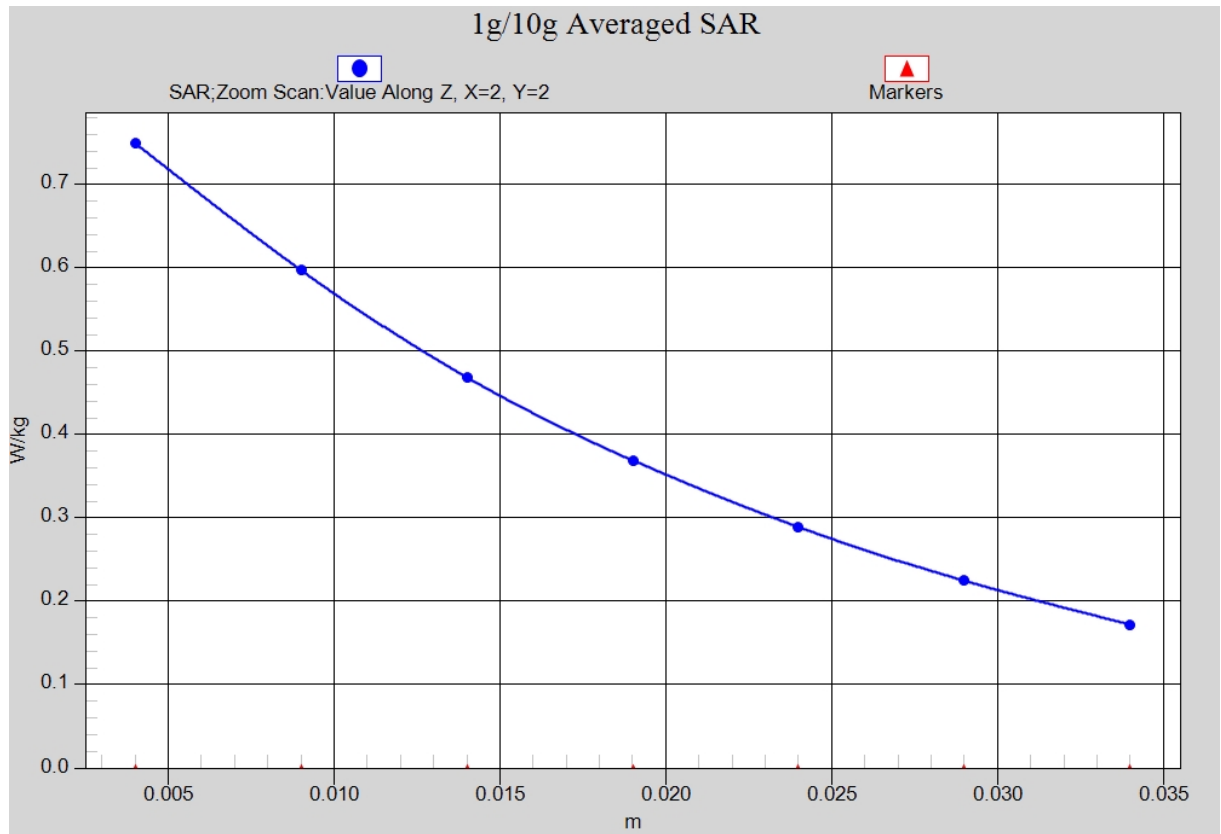


Fig. 5-1 Z-Scan at power reference point (WCDMA 850 CH4233)

WCDMA 850 Body Rear High

Date: 2014-5-9

Electronics: DAE4 Sn771

Medium: Body 850 MHz

Medium parameters used (interpolated): $f = 846.6$ MHz; $\sigma = 0.978$ S/m; $\epsilon_r = 54.676$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.1°C Liquid Temperature: 21.6°C

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

Probe: EX3DV4 - SN3846 ConvF(8.73, 8.73, 8.73)

Rear High/Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.895 W/kg

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

Reference Value = 29.310 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.13 W/kg

SAR(1 g) = 0.867 W/kg; SAR(10 g) = 0.680 W/kg

Maximum value of SAR (measured) = 0.931 W/kg

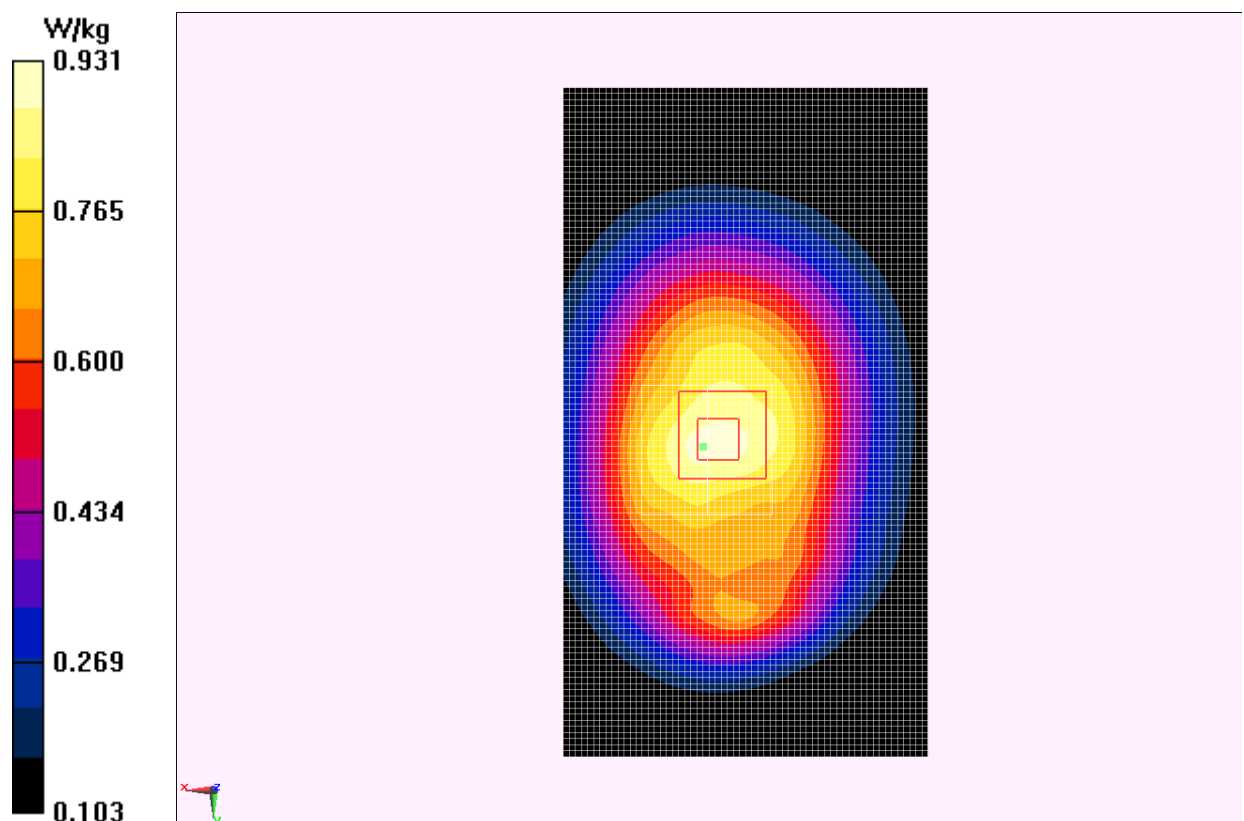


Fig.6 WCDMA 850 CH4233

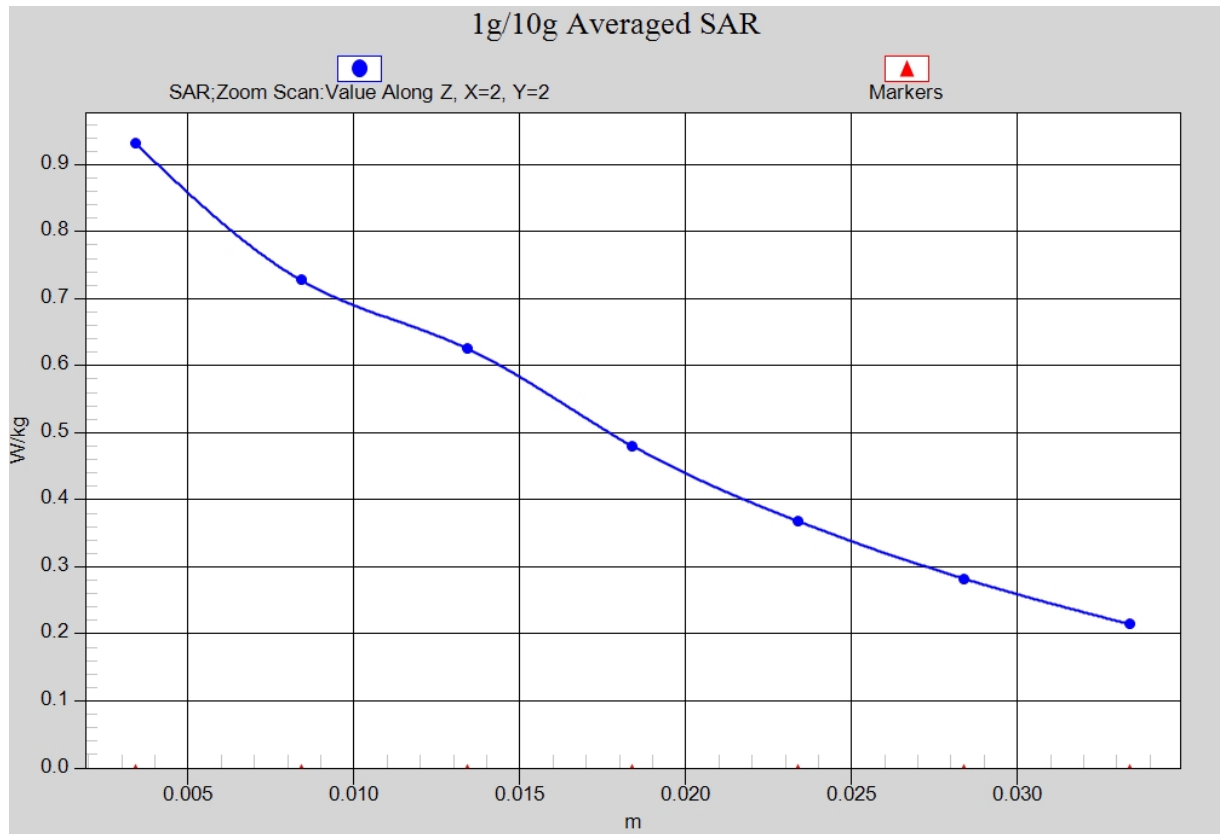


Fig. 6-1 Z-Scan at power reference point (WCDMA850 CH4233)

WCDMA 1900 Right Cheek High

Date: 2014-5-10

Electronics: DAE4 Sn771

Medium: Head 1900 MHz

Medium parameters used (interpolated): $f = 1907.6$ MHz; $\sigma = 1.434$ S/m; $\epsilon_r = 39.559$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.1°C Liquid Temperature: 21.6°C

Communication System: WCDMA 1900 Frequency: 1907.6 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN3846 ConvF(7.57, 7.57, 7.57)

Cheek High/Area Scan (61x101x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.671 W/kg

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

Reference Value = 9.328 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.949 W/kg

SAR(1 g) = 0.654 W/kg; SAR(10 g) = 0.403 W/kg

Maximum value of SAR (measured) = 0.693 W/kg

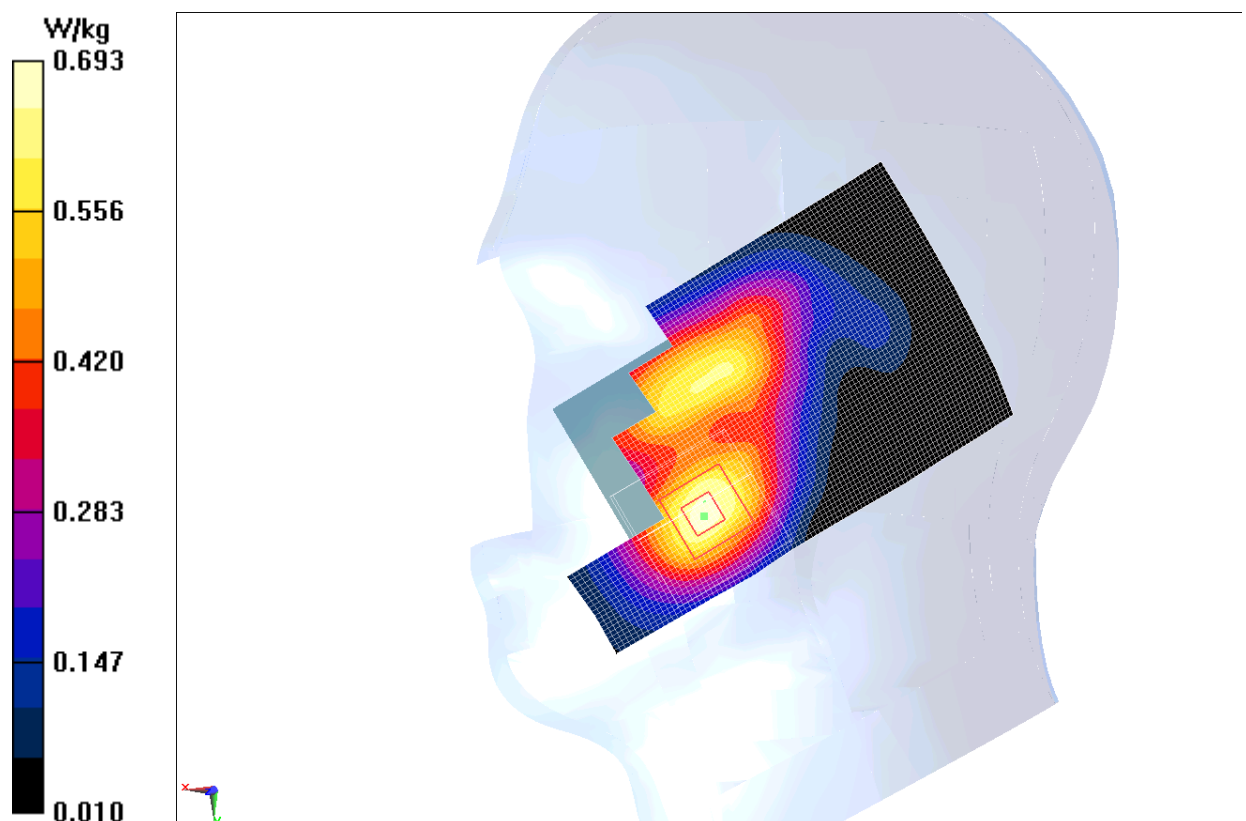


Fig.7 WCDMA1900 CH9538

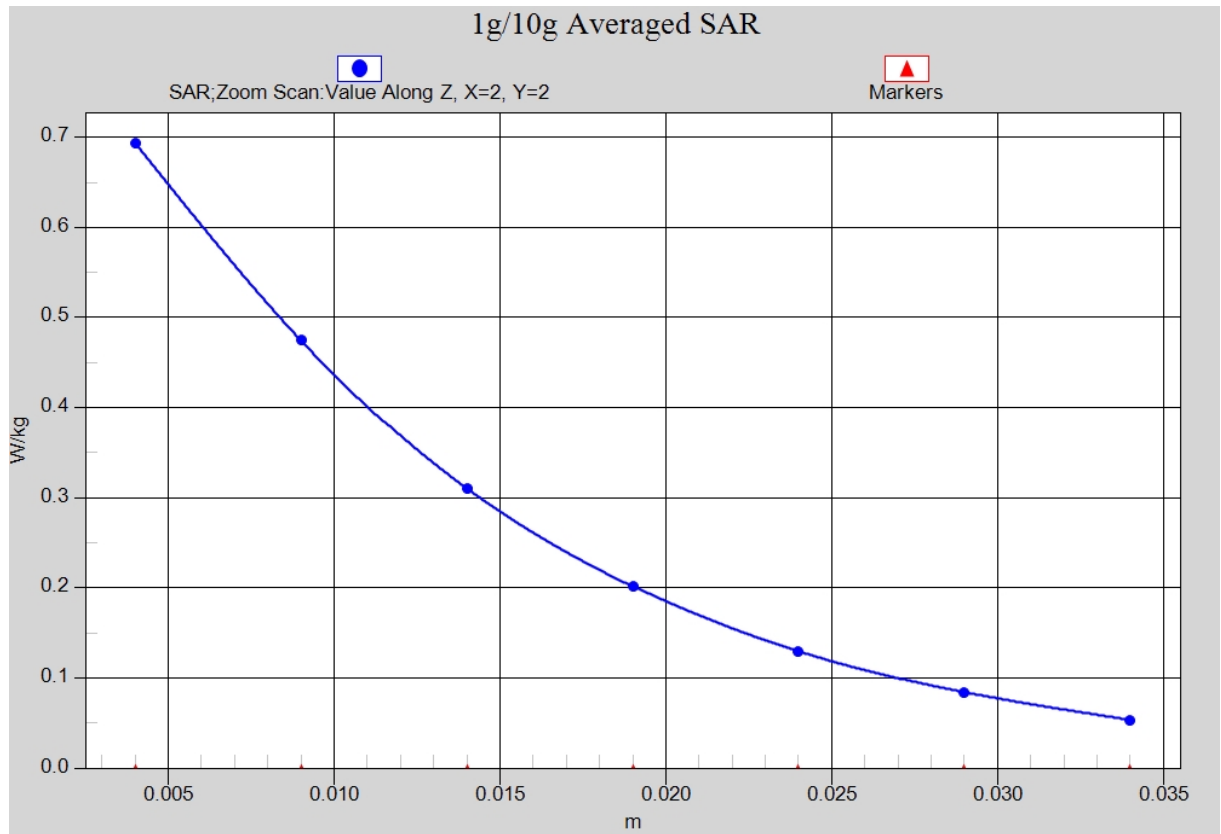


Fig. 7-1 Z-Scan at power reference point (WCDMA1900 CH9538)

WCDMA 1900 Body Rear Low

Date: 2014-5-10

Electronics: DAE4 Sn771

Medium: Body 1900 MHz

Medium parameters used (interpolated): $f = 1852.4$ MHz; $\sigma = 1.445$ S/m; $\epsilon_r = 50.411$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.1°C Liquid Temperature: 21.6°C

Communication System: WCDMA 1900 Frequency: 1852.4 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN3846 ConvF(7.03, 7.03, 7.03)

Rear Low/Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.21 W/kg

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

Reference Value = 13.881 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.52 W/kg

SAR(1 g) = 1.02 W/kg; SAR(10 g) = 0.640 W/kg

Maximum value of SAR (measured) = 1.17 W/kg

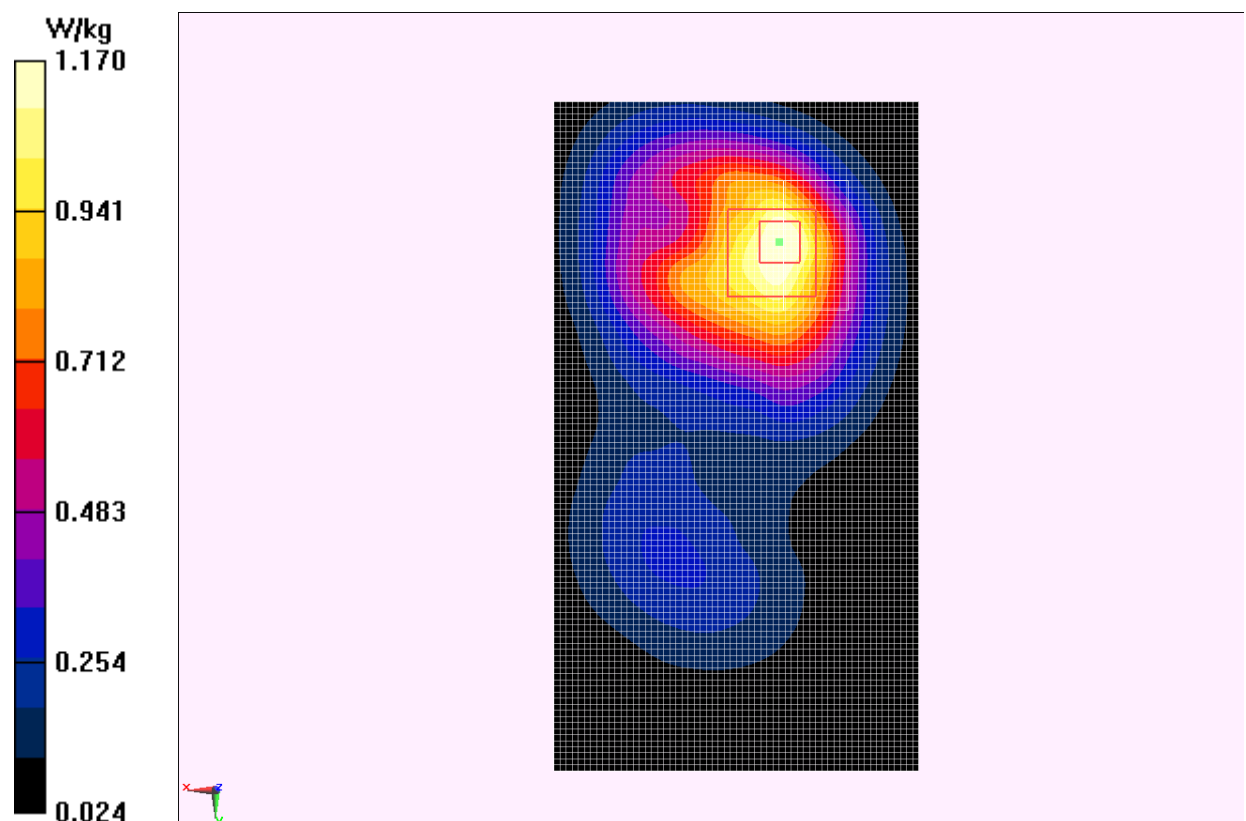


Fig.8 WCDMA1900 CH9262

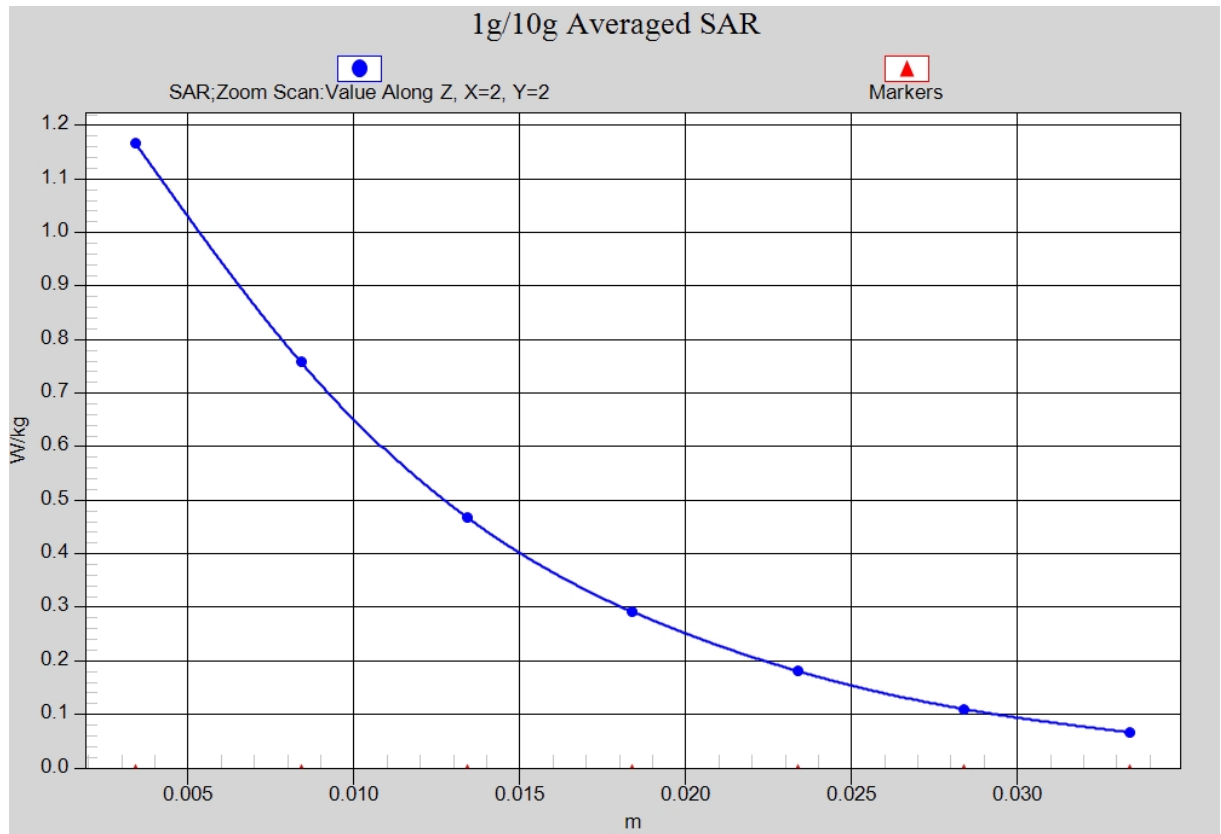


Fig. 8-1 Z-Scan at power reference point (WCDMA1900 CH9262)

Wifi 802.11b Left Cheek Channel 6

Date: 2014-5-11

Electronics: DAE4 Sn771

Medium: Head 2450 MHz

Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.794$ S/m; $\epsilon_r = 39.672$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.2°C Liquid Temperature: 21.7°C

Communication System: WLan 2450 Frequency: 2437 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN3846 ConvF(6.78, 6.78, 6.78)

Cheek Middle/Area Scan (61x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.175 W/kg

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

Reference Value = 4.735 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.374 W/kg

SAR(1 g) = 0.175 W/kg; SAR(10 g) = 0.077 W/kg

Maximum value of SAR (measured) = 0.190 W/kg

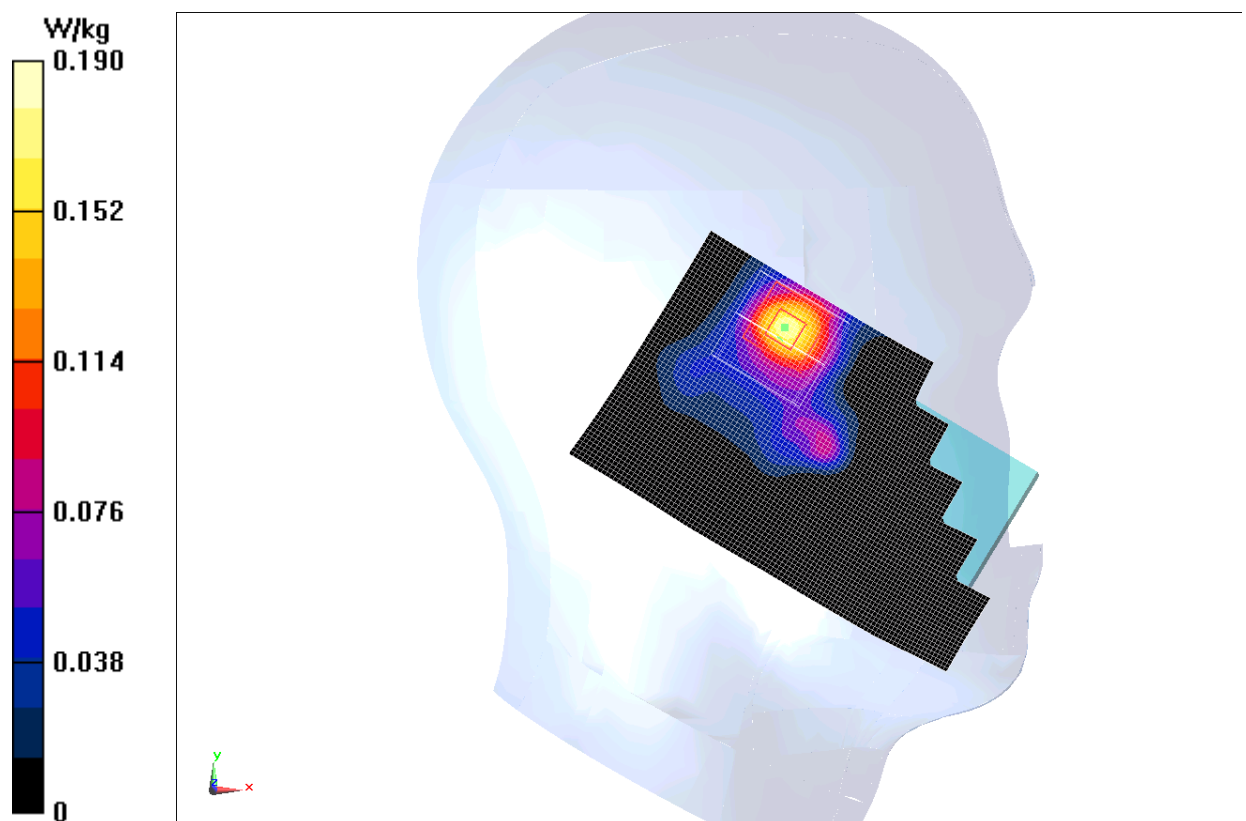


Fig.9 2450 MHz CH6

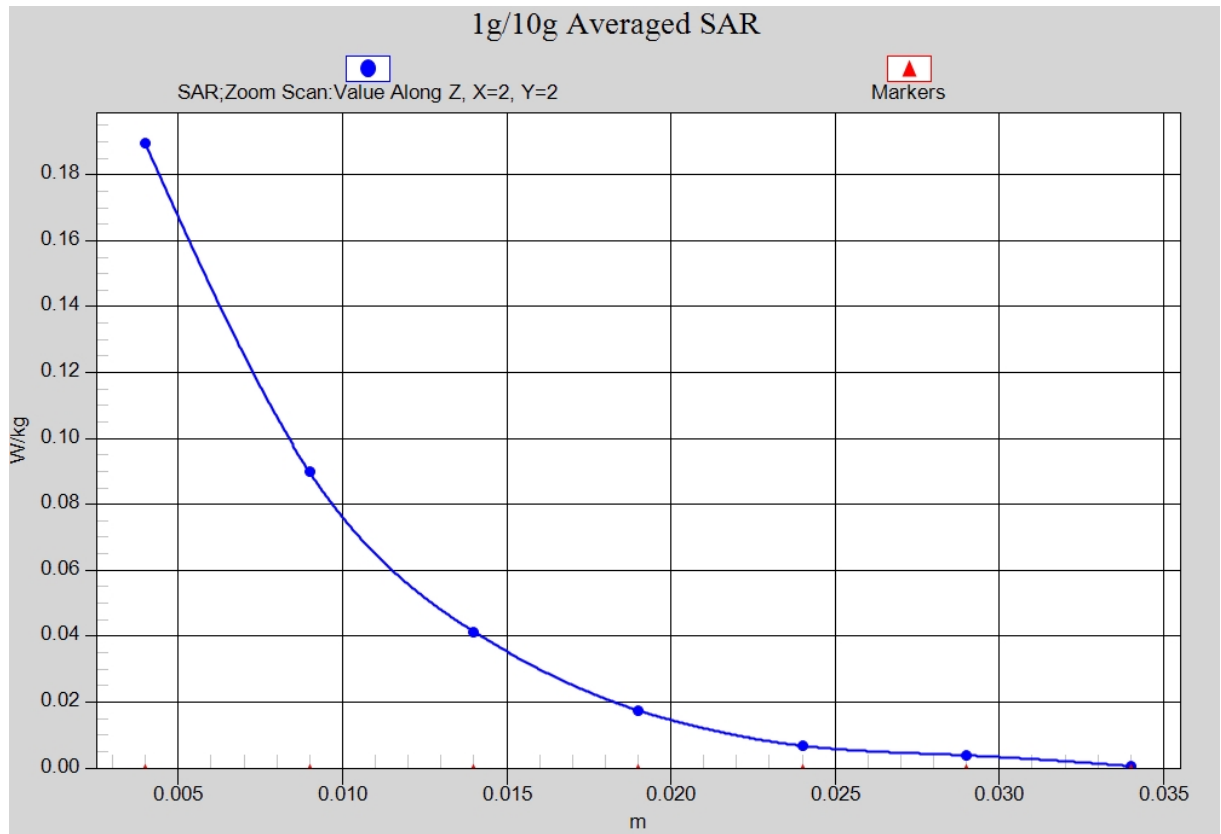


Fig. 9-1 Z-Scan at power reference point (2450 MHz CH6)

Wifi 802.11b Body Rear Channel 6

Date: 2014-5-11

Electronics: DAE4 Sn771

Medium: Body 2450 MHz

Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.959$ S/m; $\epsilon_r = 52.963$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.2°C Liquid Temperature: 21.7°C

Communication System: WLan 2450 Frequency: 2437 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN3846 ConvF(6.73, 6.73, 6.73)

Rear Middle/Area Scan (61x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.187 W/kg

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

Reference Value = 3.212 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.390 W/kg

SAR(1 g) = 0.199 W/kg; SAR(10 g) = 0.089 W/kg

Maximum value of SAR (measured) = 0.257 W/kg

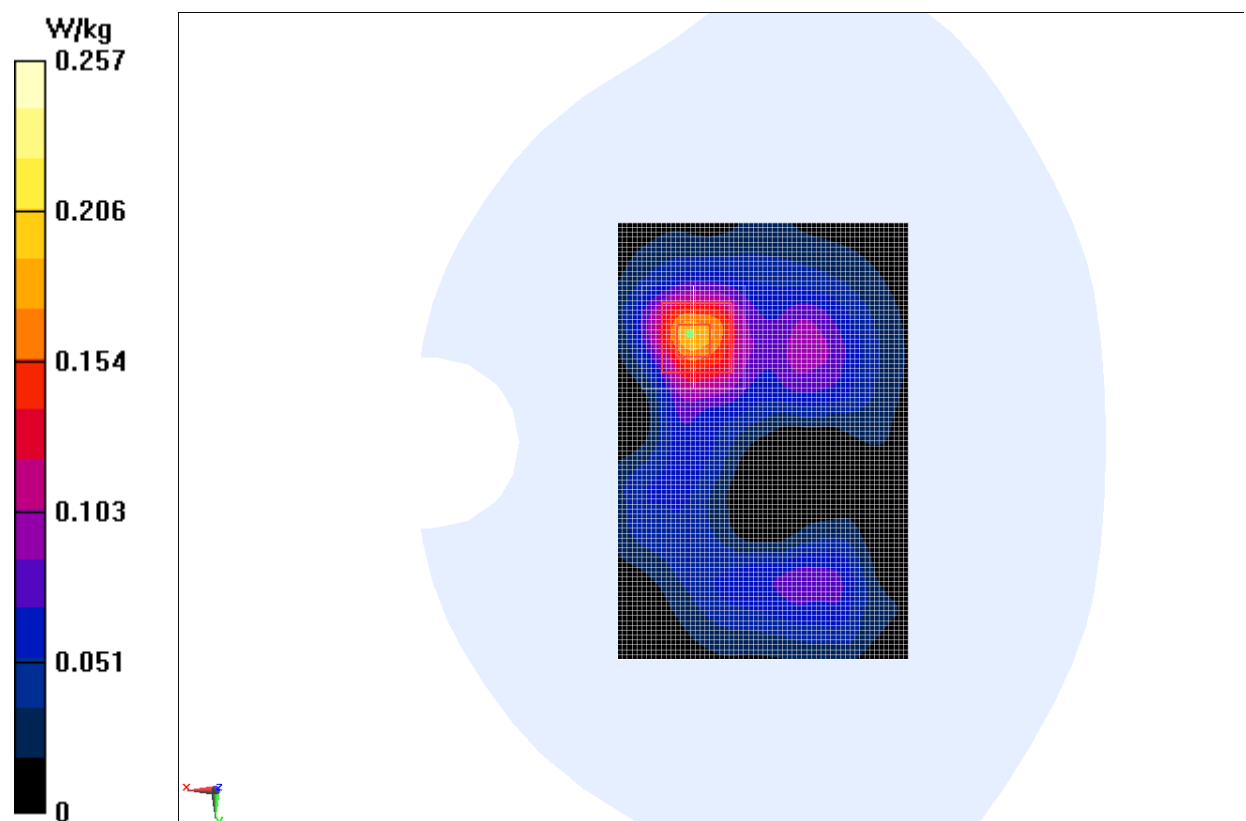


Fig.10 2450 MHz CH6