

Combined standard uncertainty	$u_c = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$					9.25	9.12	257
Expanded uncertainty (confidence interval of 95 %)	$u_e = 2u_c$					18.5	18.2	

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

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
<b>Measurement system</b>										
1	Probe calibration	B	6.5	N	1	1	1	6.5	6.5	$\infty$
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	$\infty$
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	$\infty$
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	$\infty$
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	$\infty$
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	$\infty$
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	$\infty$
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	$\infty$
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	$\infty$
11	Probe positioned mech. restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	$\infty$
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	$\infty$
13	Post-processing	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	$\infty$
<b>Test sample related</b>										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	$\infty$
<b>Phantom and set-up</b>										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	$\infty$
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	$\infty$
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43

20	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	$\infty$
21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						10.8	10.7	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						21.6	21.4	

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

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
<b>Measurement system</b>										
1	Probe calibration	B	5.5	N	1	1	1	5.5	5.5	$\infty$
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	$\infty$
3	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	$\infty$
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	$\infty$
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	$\infty$
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	$\infty$
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	$\infty$
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	$\infty$
11	Probe positioned mech. Restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	$\infty$
12	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	$\infty$
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
14	Fast SAR z-Approximation	B	7.0	R	$\sqrt{3}$	1	1	4.0	4.0	$\infty$
<b>Test sample related</b>										
15	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
17	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	$\infty$

Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	$\infty$
19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	$\infty$
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	$\infty$
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
<b>Measurement system</b>										
1	Probe calibration	B	6.5	N	1	1	1	6.5	6.5	$\infty$
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	$\infty$
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	$\infty$
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	$\infty$
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	$\infty$
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	$\infty$
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	$\infty$
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	$\infty$
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	$\infty$
11	Probe positioned mech. Restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	$\infty$
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	$\infty$
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
14	Fast SAR z-Approximation	B	14.0	R	$\sqrt{3}$	1	1	8.1	8.1	$\infty$

Test sample related										
15	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
17	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	$\infty$
Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	$\infty$
19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	$\infty$
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	$\infty$
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, 2013	One year
02	Power meter	NRVD	102083	September 11, 2012	One year
03	Power sensor	NRV-Z5	100542		
04	Signal Generator	E4438C	MY49070393	November 13, 2012	One Year
05	Amplifier	VTL5400	0505	No Calibration Requested	
06	BTS	E5515C	MY48363198	July 11, 2012	One year
07	E-field Probe	SPEAG ES3DV3	3149	April 24, 2012	One year
08	DAE	SPEAG DAE4	771	November 20, 2012	One year
09	Dipole Validation Kit	SPEAG D835V2	443	May 03, 2012	One year
10	Dipole Validation Kit	SPEAG D1900V2	541	May 09, 2012	One year
11	Dipole Validation Kit	SPEAG D2450V2	853	May 02, 2012	One year

\*\*\*END OF REPORT BODY\*\*\*

## ANNEX A Graph Results

### 850 Left Cheek Middle

Date: 2013-4-1

Electronics: DAE4 Sn771

Medium: Head 850 MHz

Medium parameters used (interpolated):  $f = 836.6$  MHz;  $\sigma = 0.887$  mho/m;  $\epsilon_r = 40.795$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.6°C      Liquid Temperature: 22.1°C

Communication System: GSM 850 Frequency: 836.6 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3149 ConvF(6.26, 6.26, 6.26)

**Cheek Middle/Area Scan (61x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.274 W/kg

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

Reference Value = 5.569 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.312 W/kg

**SAR(1 g) = 0.255 W/kg; SAR(10 g) = 0.195 W/kg**

Maximum value of SAR (measured) = 0.268 W/kg

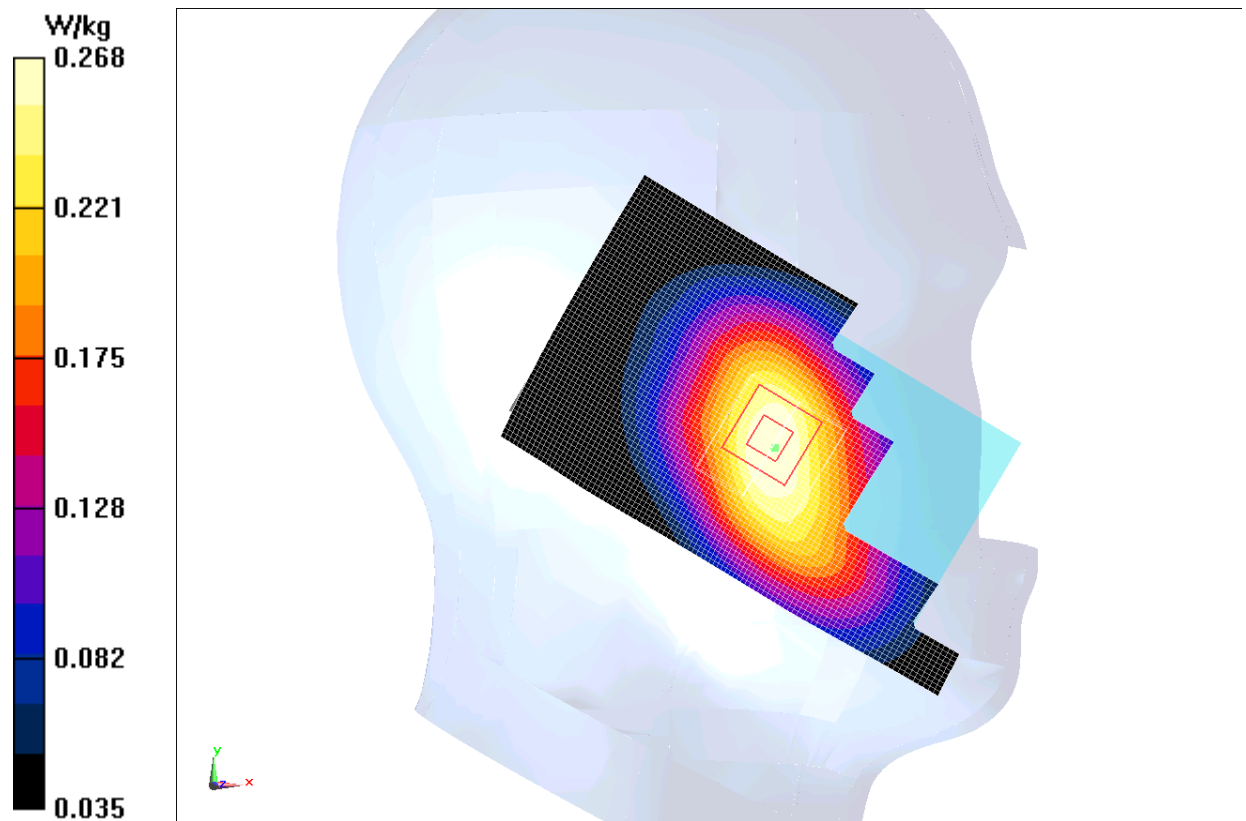
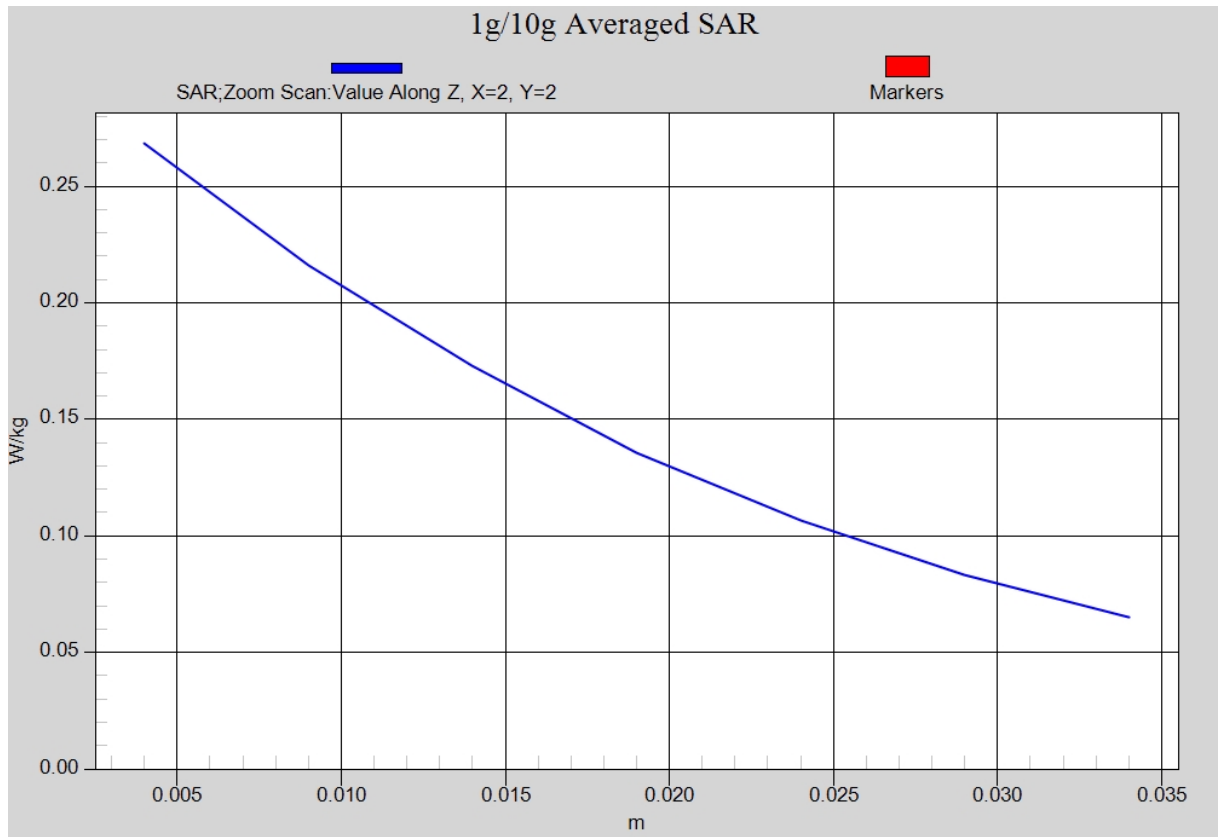


Fig.1 850MHz CH190



**Fig. 1-1 Z-Scan at power reference point (850 MHz CH190)**

### 850 Body Rear Low

Date: 2013-4-1

Electronics: DAE4 Sn771

Medium: Body 850 MHz

Medium parameters used:  $f = 825$  MHz;  $\sigma = 0.973$  mho/m;  $\epsilon_r = 56.485$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.6°C      Liquid Temperature: 22.1°C

Communication System: GSM 850 GPRS Frequency: 824.2 MHz Duty Cycle: 1:4

Probe: ES3DV3 - SN3149 ConvF(6.14, 6.14, 6.14)

**Rear Low/Area Scan (61x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.923 W/kg

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

Reference Value = 29.489 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.09 W/kg

**SAR(1 g) = 0.879 W/kg; SAR(10 g) = 0.675 W/kg**

Maximum value of SAR (measured) = 0.919 W/kg

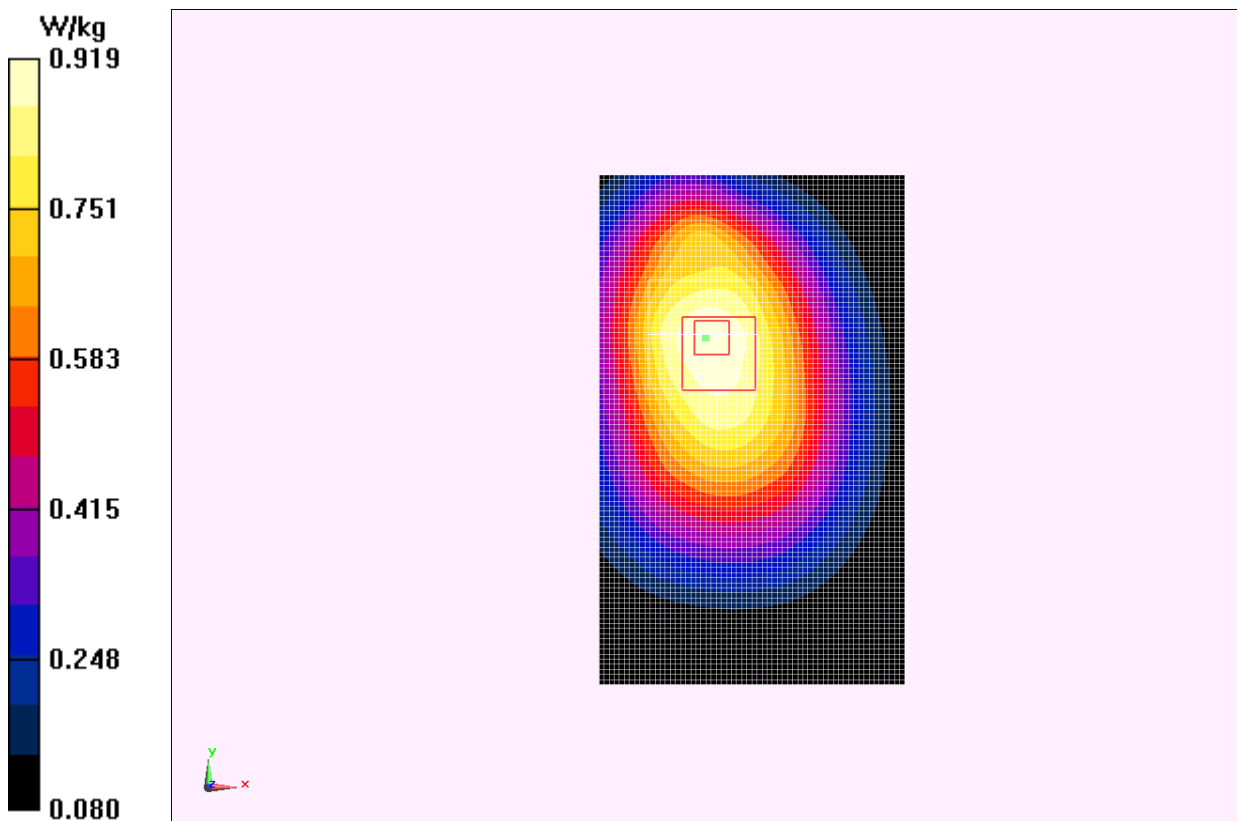
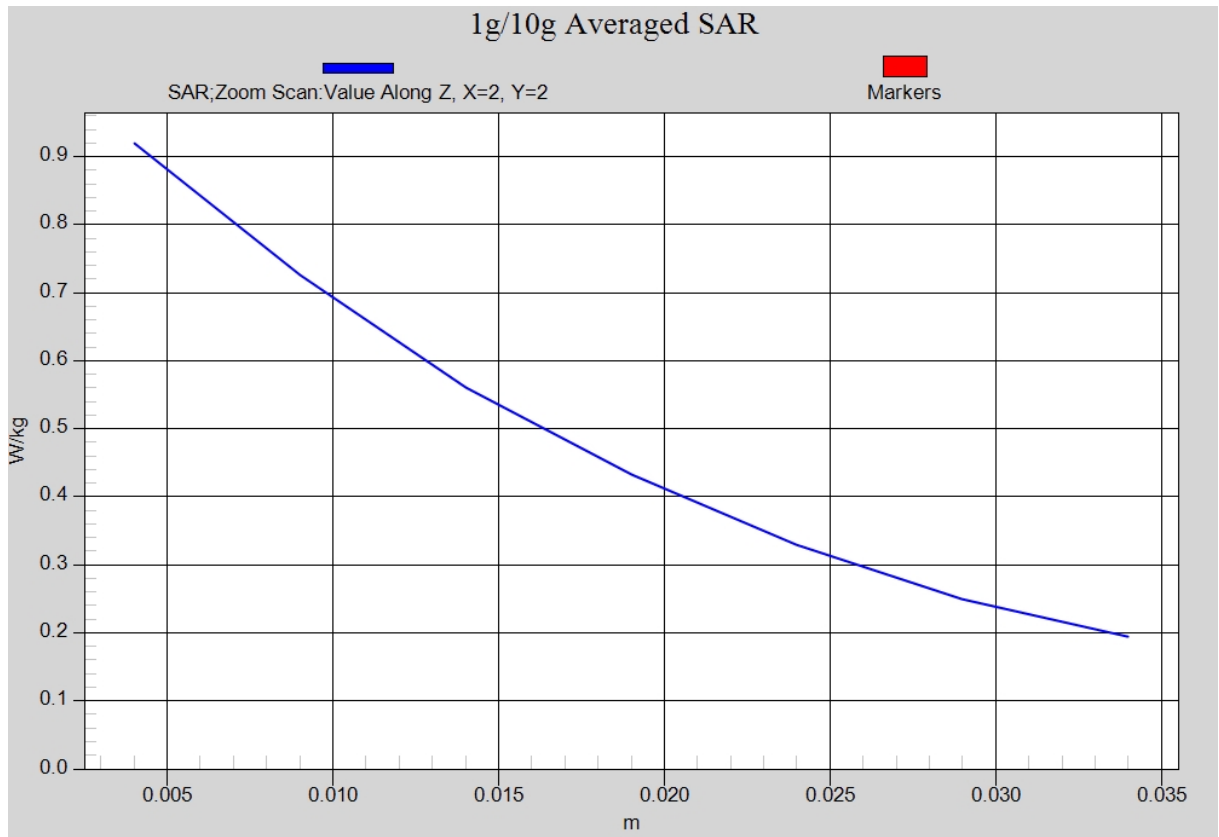


Fig.2 850 MHz CH128



**Fig. 2-1 Z-Scan at power reference point (850 MHz CH128)**



**1900 Left Cheek Low**

Date: 2013-4-2

Electronics: DAE4 Sn771

Medium: Head 1900 MHz

Medium parameters used (interpolated):  $f = 1850.2$  MHz;  $\sigma = 1.375$  mho/m;  $\epsilon_r = 39.707$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.7°C      Liquid Temperature: 22.2°C

Communication System: GSM 1900MHz Frequency: 1850.2 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 - SN3149 ConvF(5.19, 5.19, 5.19)

**Cheek Low/Area Scan (61x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.241 mW/g

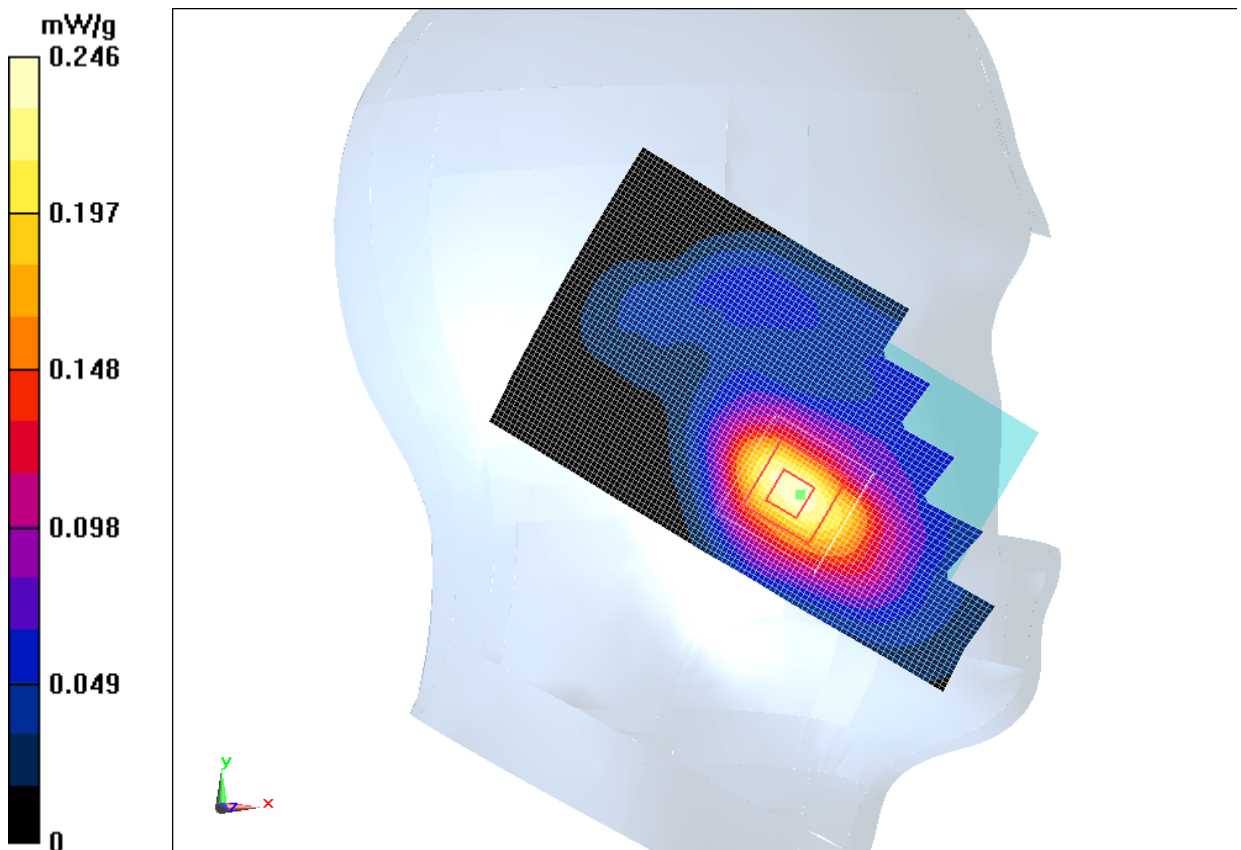
**Cheek Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.674 V/m; Power Drift = 0.15 dB

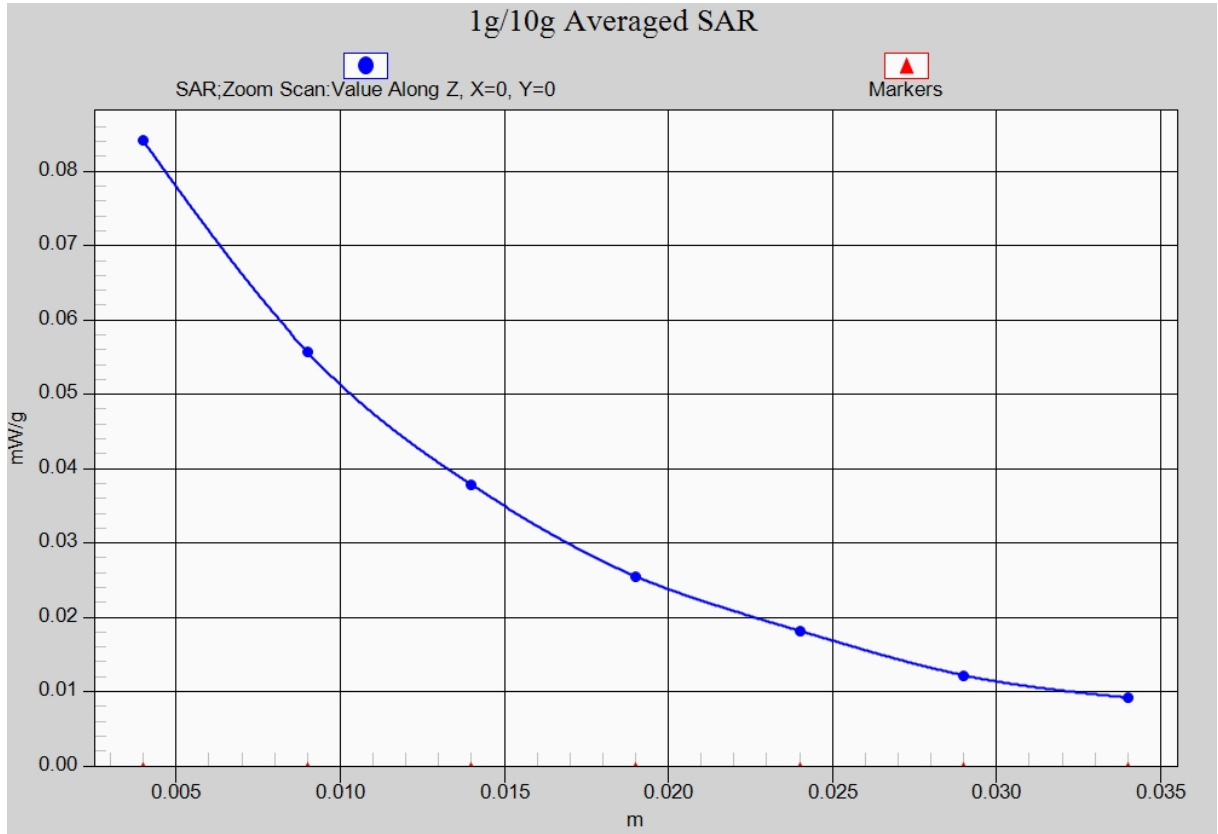
Peak SAR (extrapolated) = 0.344 mW/g

**SAR(1 g) = 0.222 mW/g; SAR(10 g) = 0.134 mW/g**

Maximum value of SAR (measured) = 0.246 mW/g



**Fig.3 1900 MHz CH512**



**Fig. 3-1 Z-Scan at power reference point (1900 MHz CH512)**

### 1900 Body Bottom Edge High

Date: 2013-4-2

Electronics: DAE4 Sn771

Medium: Body 1900 MHz

Medium parameters used:  $f = 1910$  MHz;  $\sigma = 1.545$  mho/m;  $\epsilon_r = 52.667$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.7°C      Liquid Temperature: 22.2°C

Communication System: GSM 1900MHz Frequency: 1909.8 MHz Duty Cycle: 1:4

Probe: ES3DV3 - SN3149 ConvF(4.64, 4.64, 4.64)

**Bottom Edge High/Area Scan (61x111x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.42 mW/g

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

Reference Value = 29.536 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 2.175 mW/g

**SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.642 mW/g**

Maximum value of SAR (measured) = 1.36 mW/g

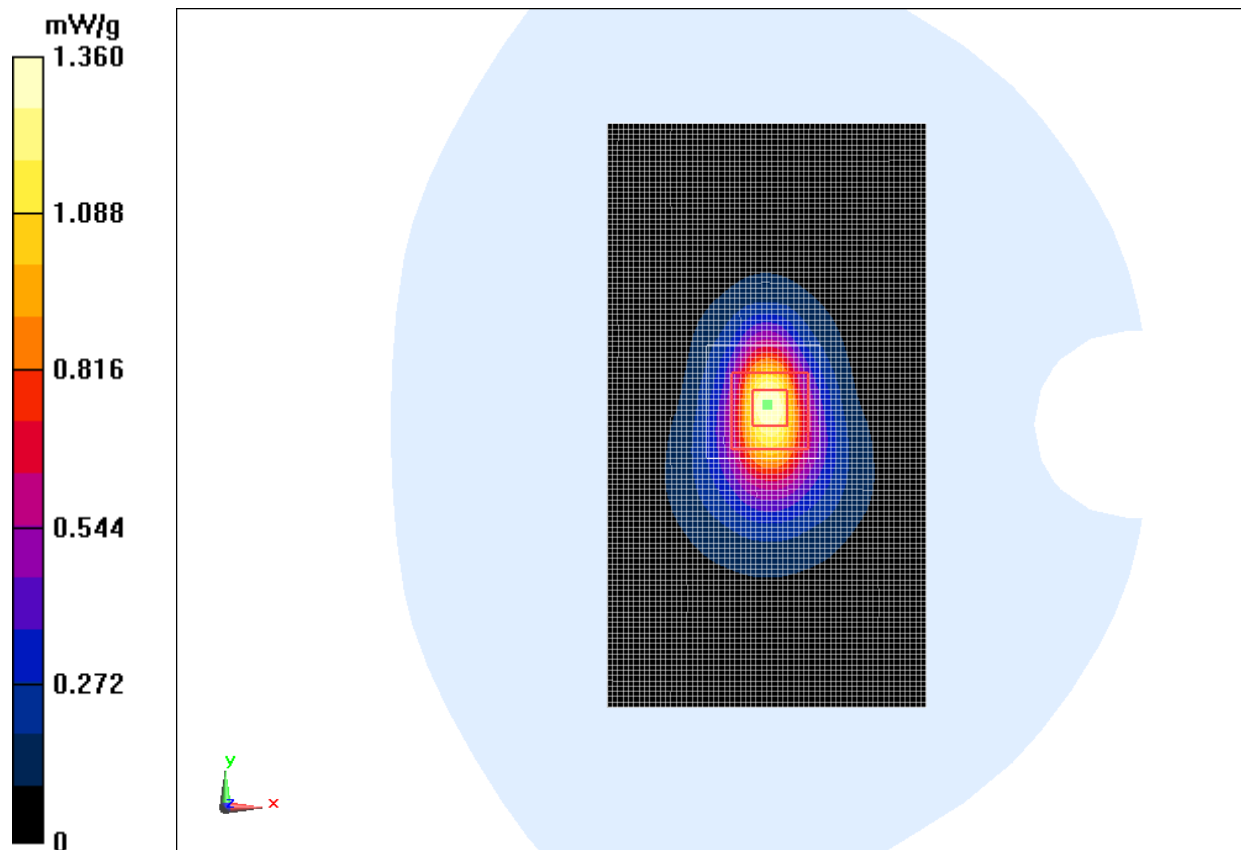


Fig.4 1900 MHz CH810

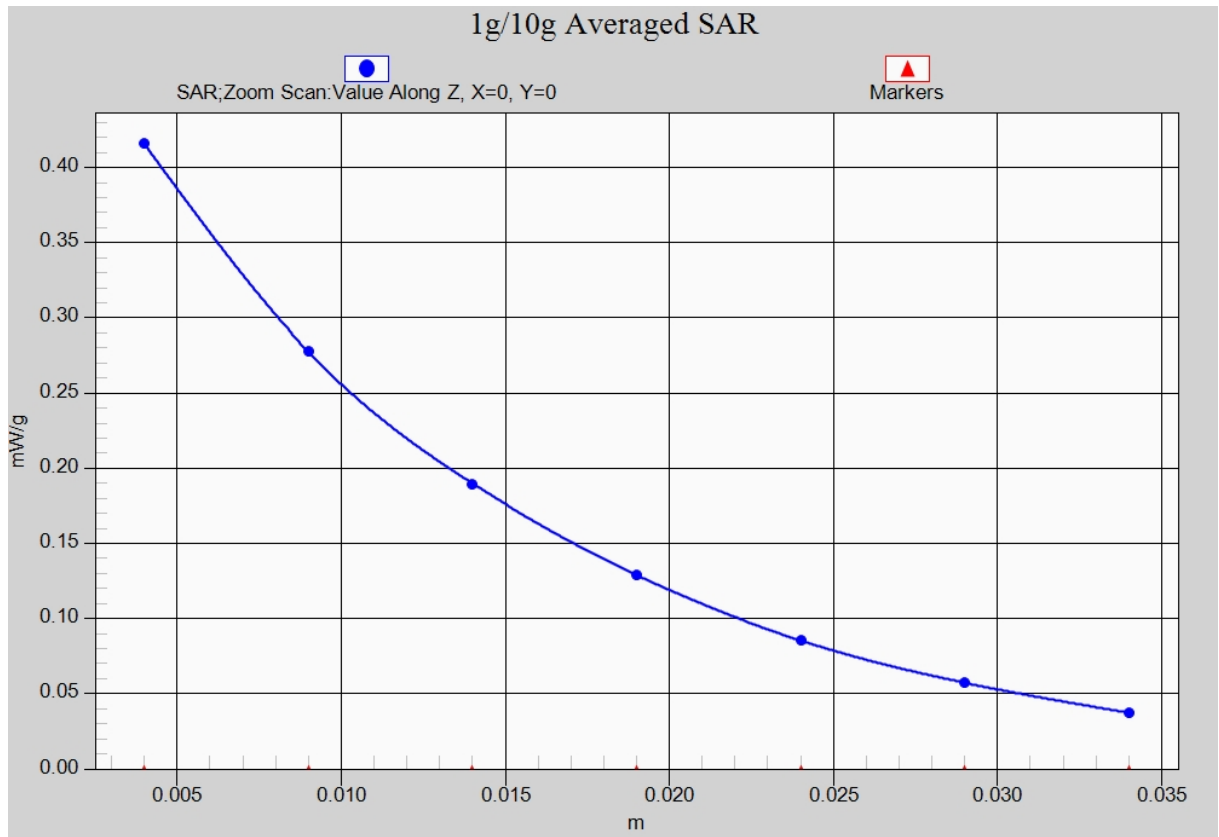


Fig.4-1 Z-Scan at power reference point (1900 MHz CH810)

### WCDMA 850 Left Cheek High

Date: 2013-4-1

Electronics: DAE4 Sn771

Medium: Head 850 MHz

Medium parameters used (interpolated):  $f = 846.6$  MHz;  $\sigma = 0.898$  mho/m;  $\epsilon_r = 40.653$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.6°C      Liquid Temperature: 22.1°C

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

Probe: ES3DV3 - SN3149 ConvF(6.26, 6.26, 6.26)

**Cheek High/Area Scan (61x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.229 W/kg

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

Reference Value = 4.916 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.273 W/kg

**SAR(1 g) = 0.220 W/kg; SAR(10 g) = 0.167 W/kg**

Maximum value of SAR (measured) = 0.232 W/kg

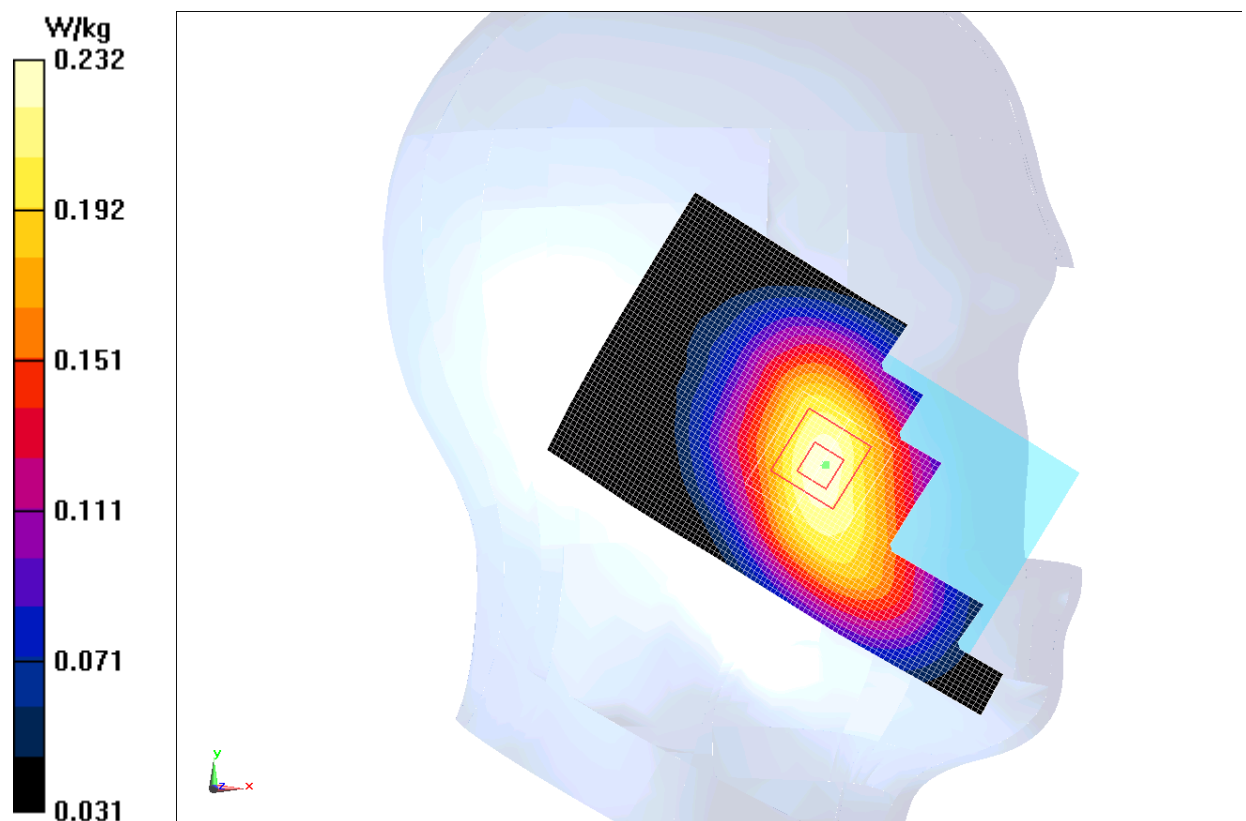
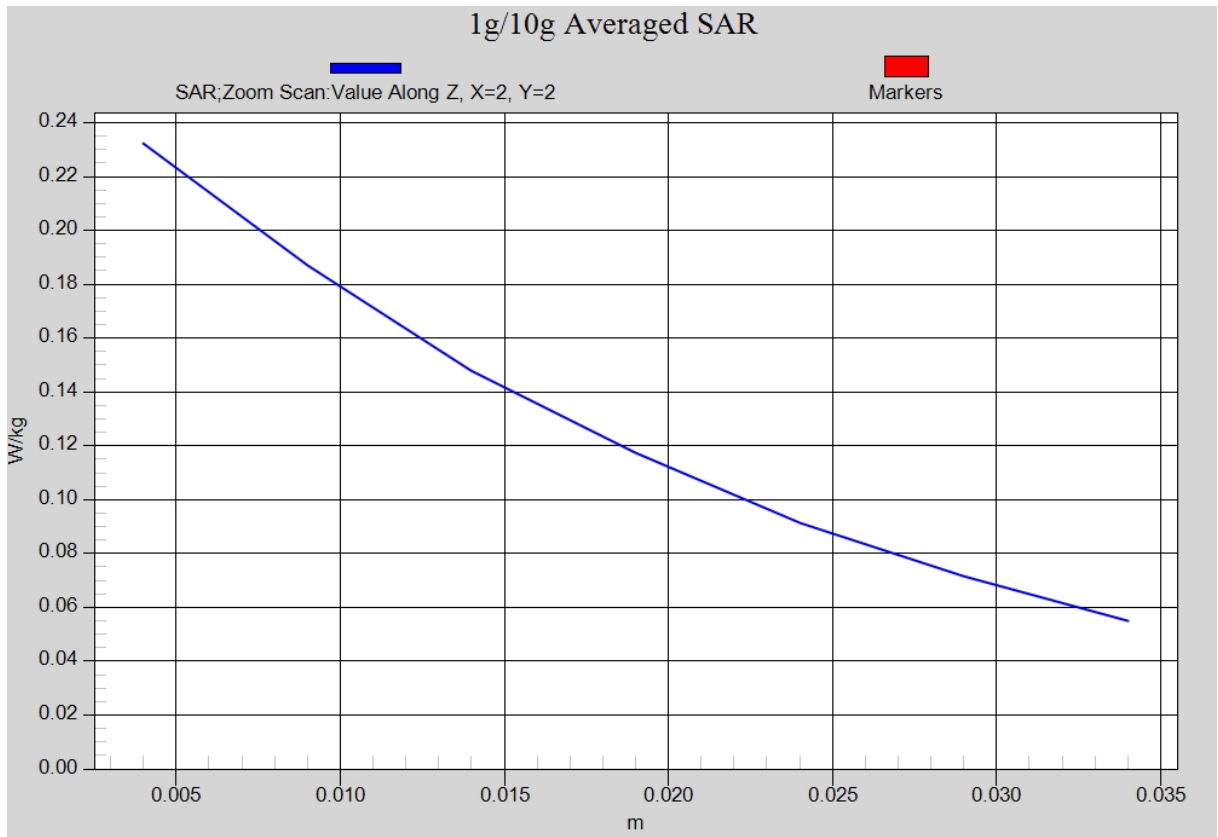


Fig.5 WCDMA 850 CH4233



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

### WCDMA 850 Body Rear Middle

Date: 2013-4-1

Electronics: DAE4 Sn771

Medium: Body 850 MHz

Medium parameters used (interpolated):  $f = 836.4$  MHz;  $\sigma = 0.983$  mho/m;  $\epsilon_r = 56.352$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.6°C      Liquid Temperature: 22.1°C

Communication System: WCDMA; Frequency: 836.4 MHz; Duty Cycle: 1:1

Probe: ES3DV3 - SN3149 ConvF(6.14, 6.14, 6.14)

**Rear Middle/Area Scan (61x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.450 W/kg

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

Reference Value = 17.030 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.529 W/kg

**SAR(1 g) = 0.427 W/kg; SAR(10 g) = 0.327 W/kg**

Maximum value of SAR (measured) = 0.448 W/kg

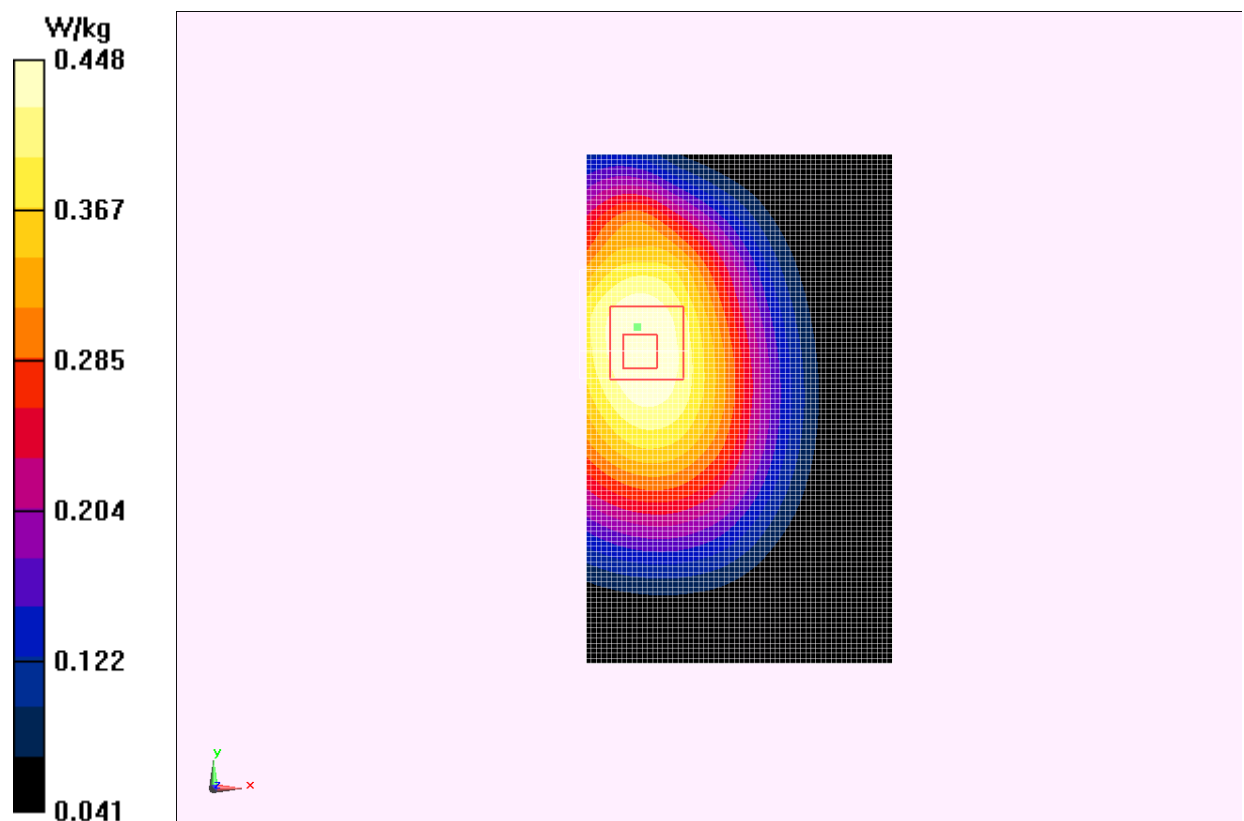
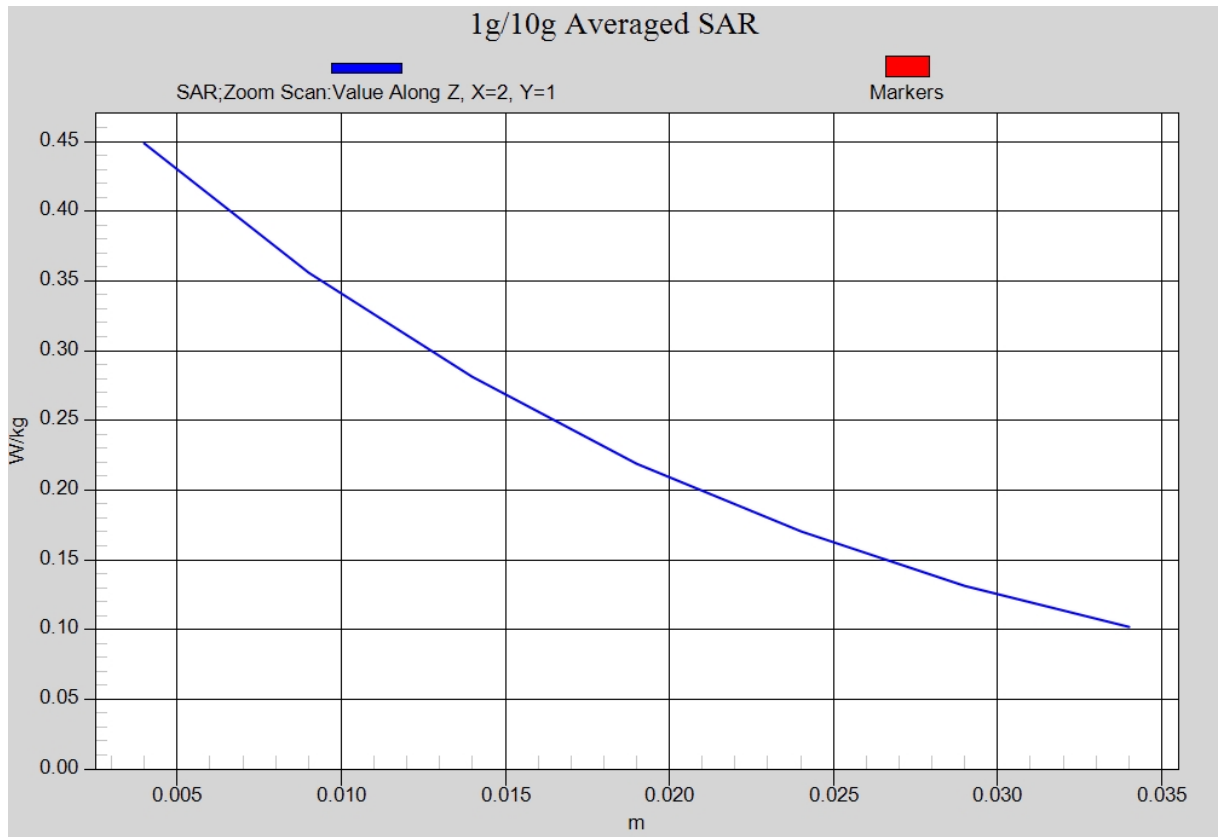


Fig.6 WCDMA 850 CH4182



**Fig. 6-1 Z-Scan at power reference point (WCDMA850 CH4182)**



### WCDMA 1900 Left Cheek Low

Date: 2013-4-2

Electronics: DAE4 Sn771

Medium: Head 1900 MHz

Medium parameters used (interpolated):  $f = 1852.4$  MHz;  $\sigma = 1.376$  mho/m;  $\epsilon_r = 39.695$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.7°C      Liquid Temperature: 22.2°C

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

Probe: ES3DV3 - SN3149 ConvF(5.19, 5.19, 5.19)

**Cheek Low/Area Scan (61x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.214 mW/g

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

Reference Value = 5.185 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.313 mW/g

**SAR(1 g) = 0.203 mW/g; SAR(10 g) = 0.125 mW/g**

Maximum value of SAR (measured) = 0.218 mW/g

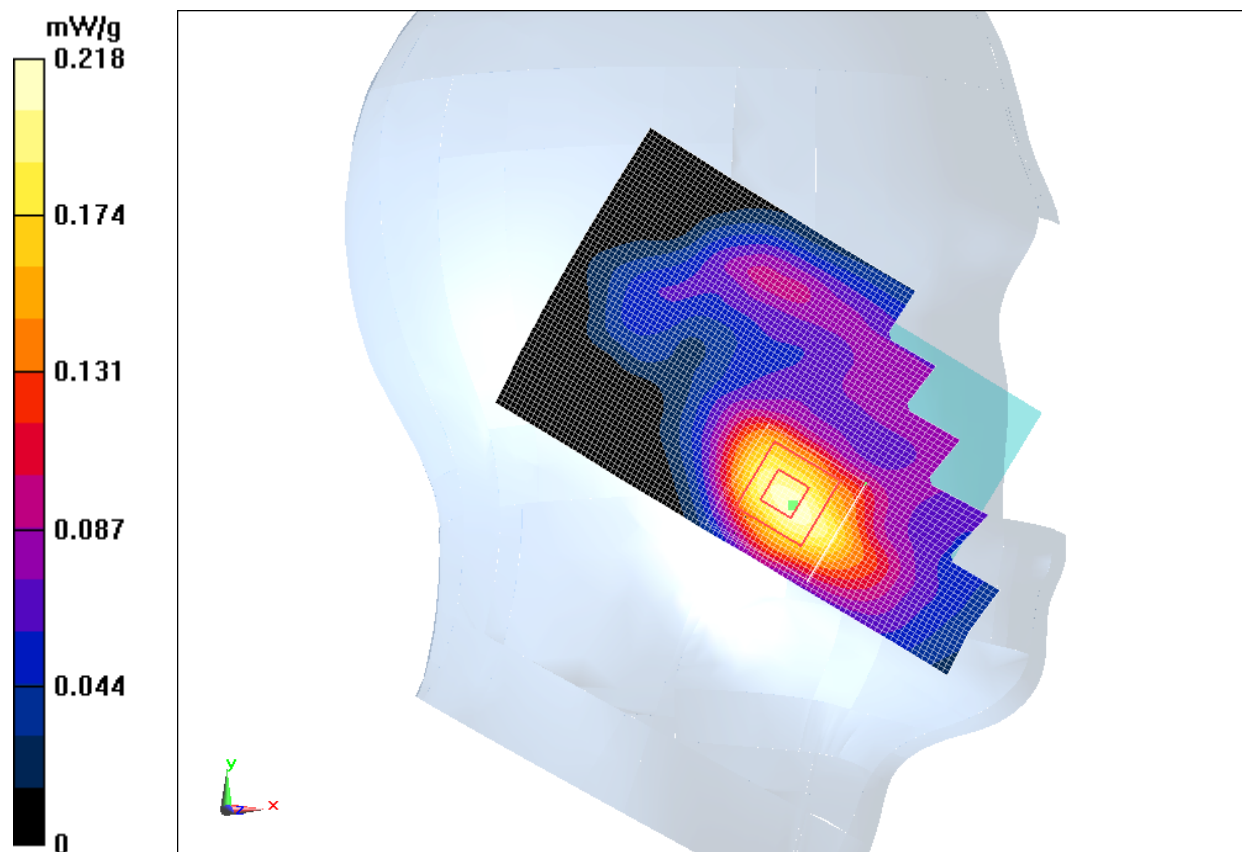


Fig.7 WCDMA1900 CH9262

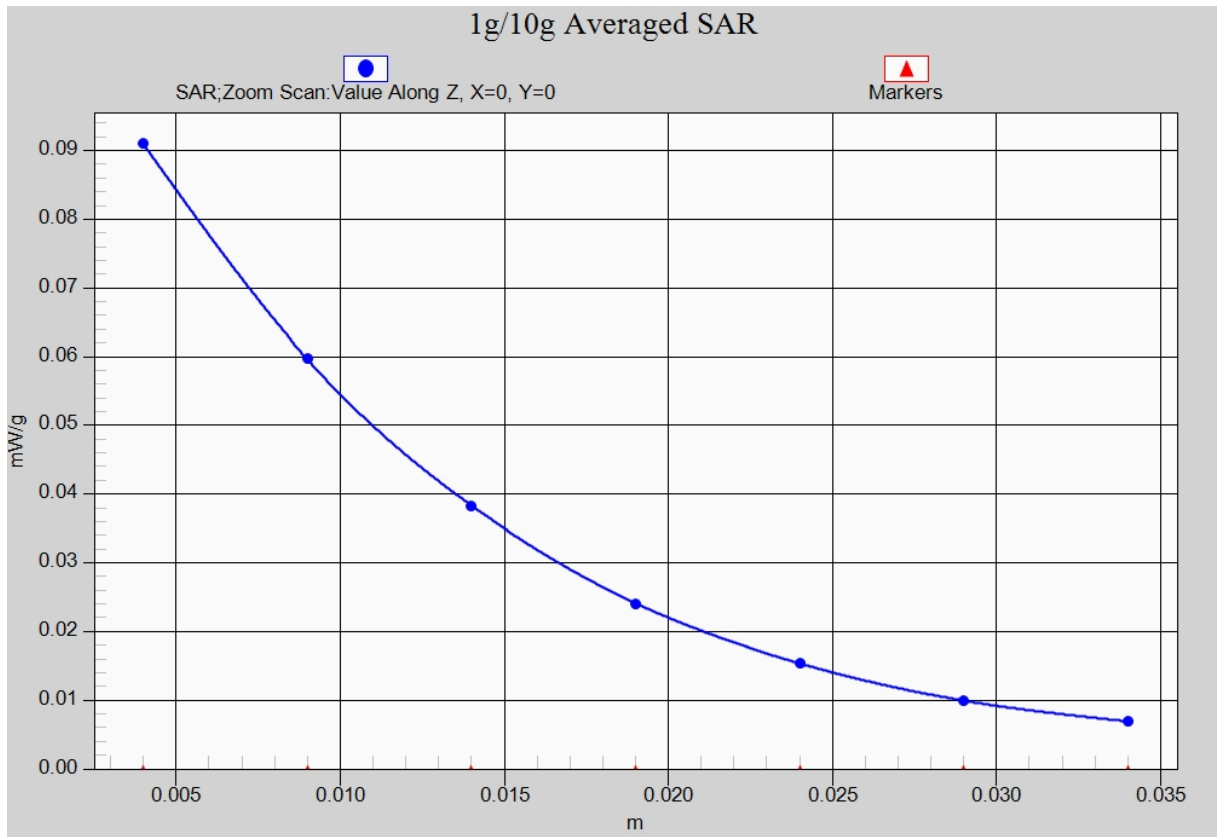


Fig. 7-1 Z-Scan at power reference point (WCDMA1900 CH9262)

### WCDMA 1900 Body Bottom Edge Middle

Date: 2013-4-2

Electronics: DAE4 Sn771

Medium: Body 1900 MHz

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.507$  mho/m;  $\epsilon_r = 52.723$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.7°C      Liquid Temperature: 22.2°C

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

Probe: ES3DV3 - SN3149 ConvF(4.64, 4.64, 4.64)

**Bottom Edge Middle/Area Scan (61x111x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.45 mW/g

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

Reference Value = 28.404 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 2.247 mW/g

**SAR(1 g) = 1.28 mW/g; SAR(10 g) = 0.681 mW/g**

Maximum value of SAR (measured) = 1.43 mW/g

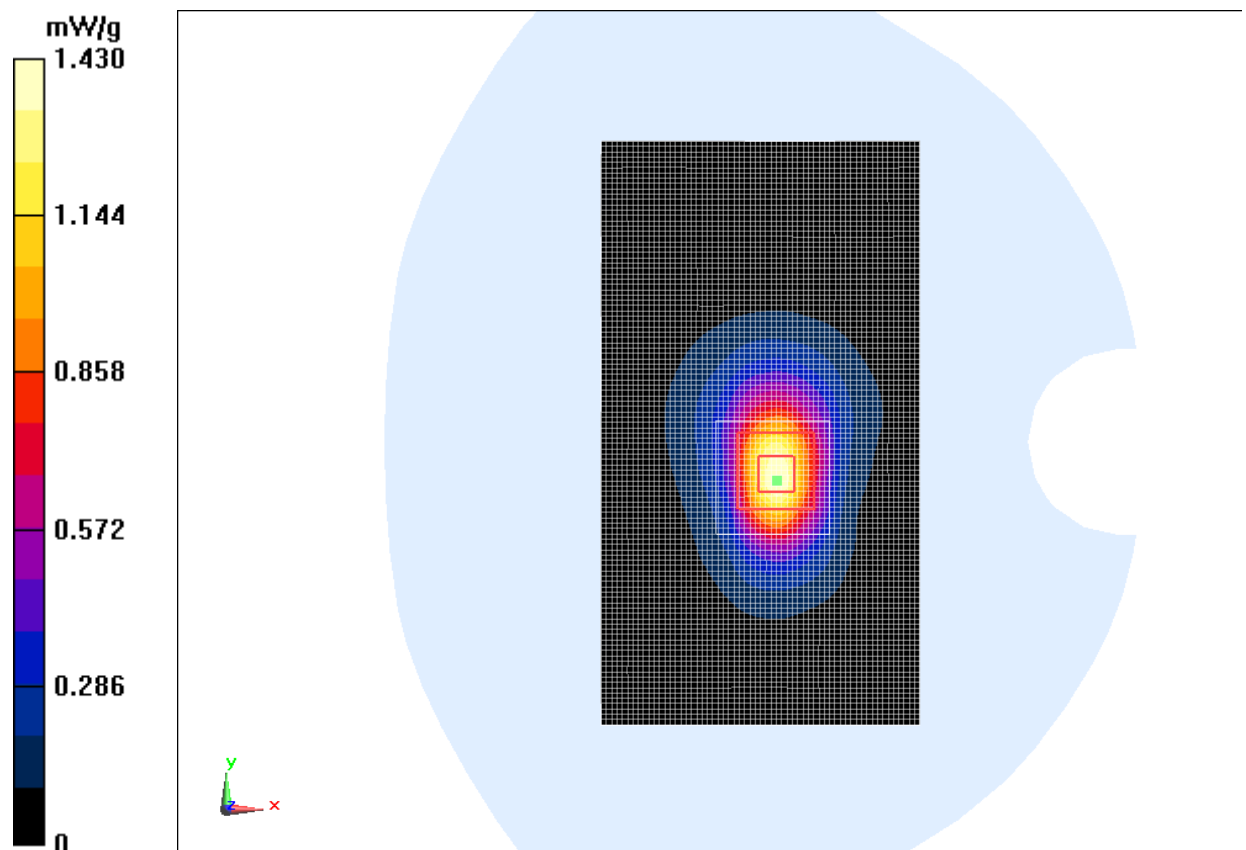
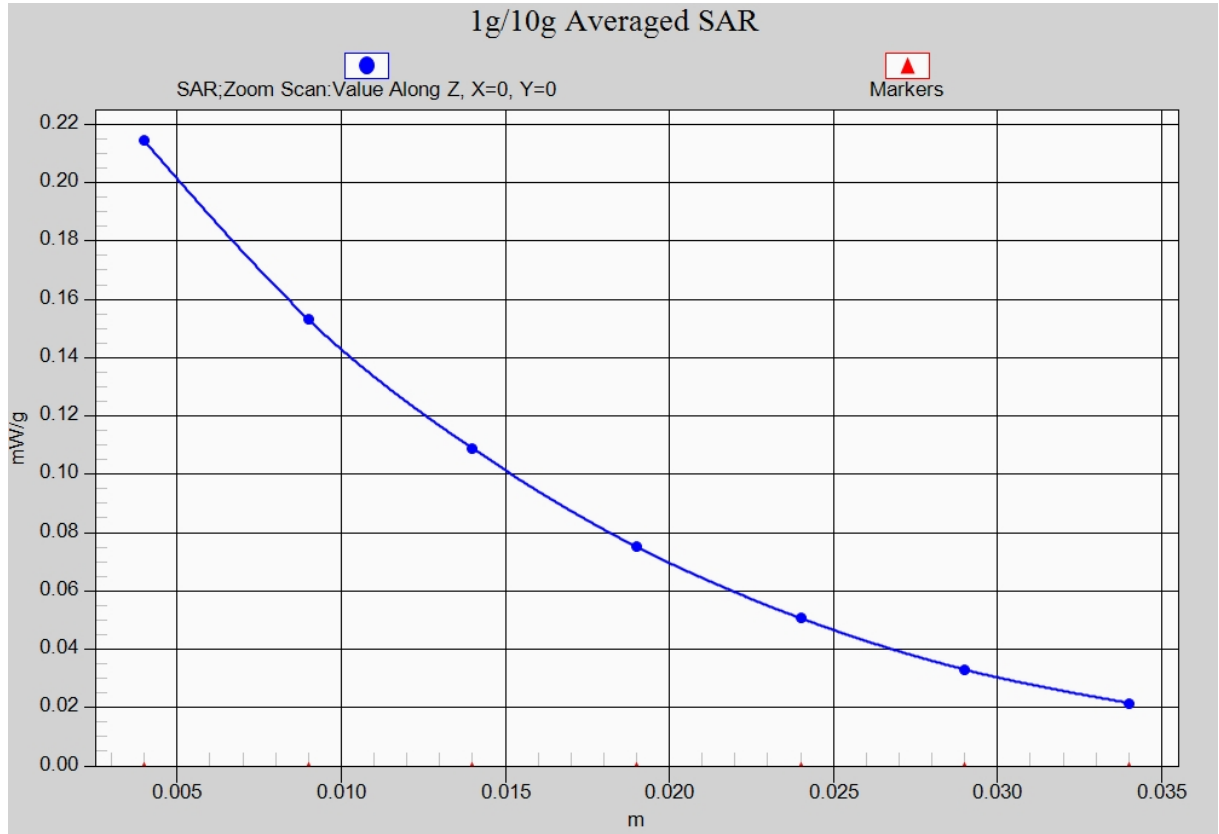


Fig.8 WCDMA1900 CH9400



**Fig. 8-1 Z-Scan at power reference point (WCDMA1900 CH9400)**

### WCDMA 1900 Body Bottom Edge Low

Date: 2013-4-2

Electronics: DAE4 Sn771

Medium: Body 1900 MHz

Medium parameters used (interpolated):  $f = 1852.4$  MHz;  $\sigma = 1.485$  mho/m;  $\epsilon_r = 52.881$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.7°C      Liquid Temperature: 22.2°C

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

Probe: ES3DV3 - SN3149 ConvF(4.64, 4.64, 4.64)

**Bottom Edge Low/Area Scan (61x111x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.39 mW/g

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

Reference Value = 19.396 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 2.122 mW/g

**SAR(1 g) = 1.21 mW/g; SAR(10 g) = 0.635 mW/g**

Maximum value of SAR (measured) = 1.34 mW/g

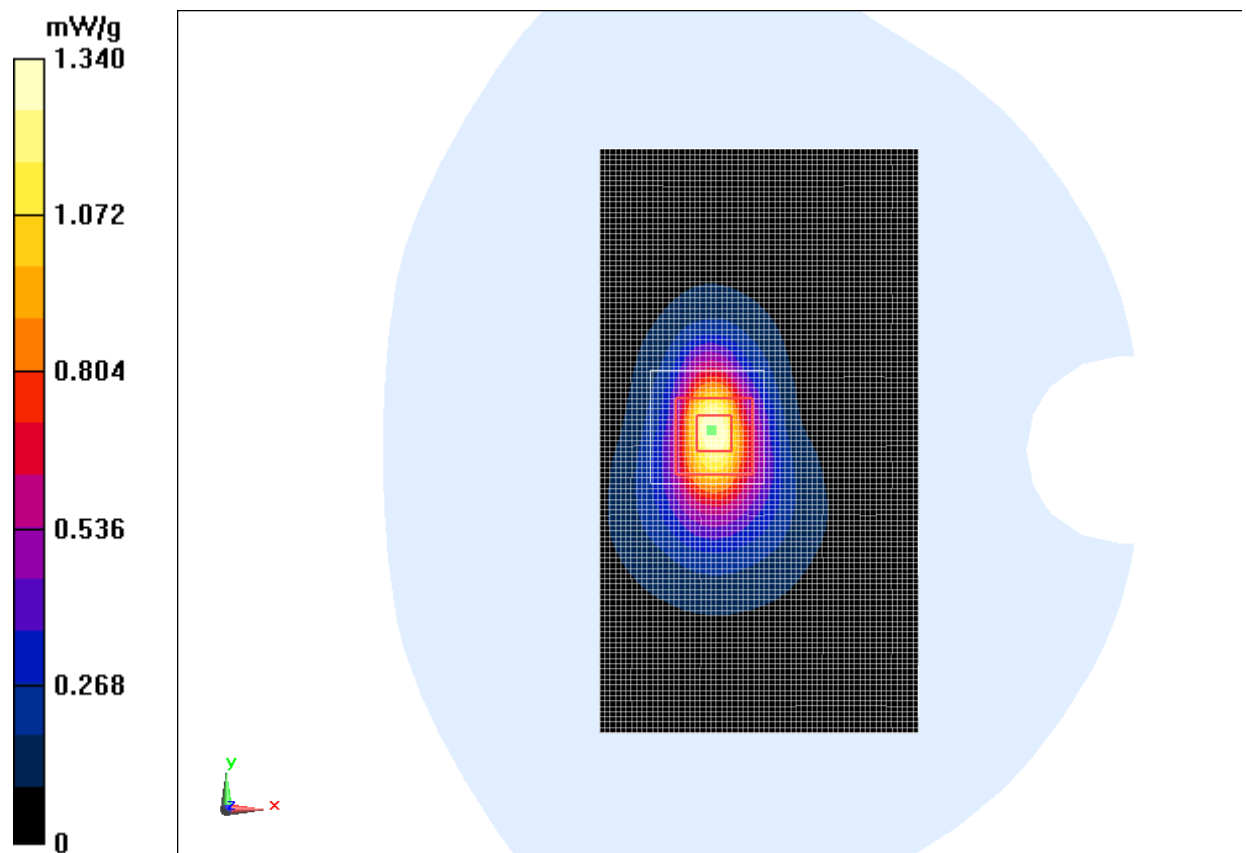


Fig.9 WCDMA1900 CH9262

**WCDMA 1900 Body Bottom Edge Middle with Headset CCB3001A14C1**

Date: 2013-4-2

Electronics: DAE4 Sn771

Medium: Body 1900 MHz

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.507$  mho/m;  $\epsilon_r = 52.723$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.7°C      Liquid Temperature: 22.2°C

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

Probe: ES3DV3 - SN3149 ConvF(4.64, 4.64, 4.64)

**Bottom Edge Middle/Area Scan (61x111x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.48 mW/g

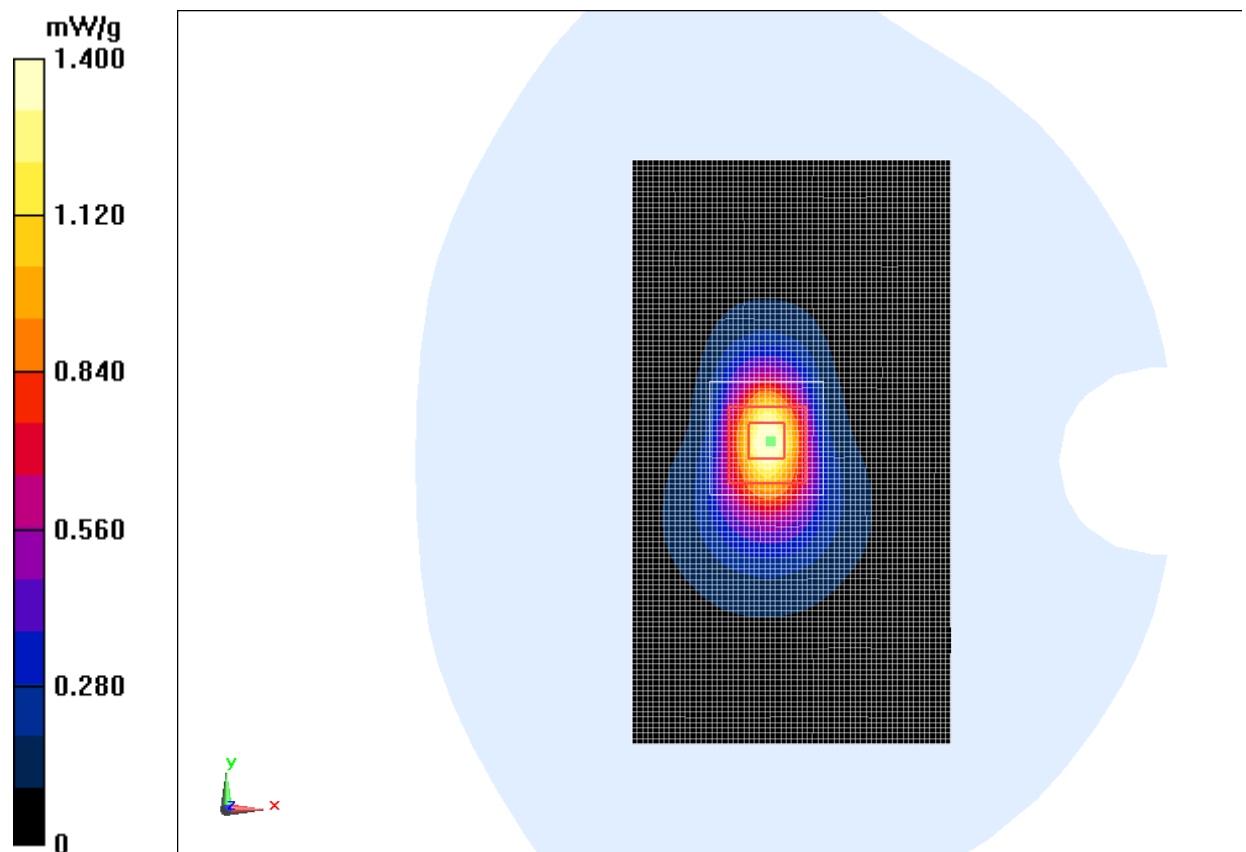
**Bottom Edge Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.860 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 2.184 mW/g

**SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.646 mW/g**

Maximum value of SAR (measured) = 1.40 mW/g



**Fig.10 WCDMA1900 CH9400**

**WCDMA 1900 Body Bottom Edge Middle with Headset CCB3001A14C2**

Date: 2013-4-2

Electronics: DAE4 Sn771

Medium: Body 1900 MHz

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.507$  mho/m;  $\epsilon_r = 52.723$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.7°C      Liquid Temperature: 22.2°C

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

Probe: ES3DV3 - SN3149 ConvF(4.64, 4.64, 4.64)

**Bottom Edge Middle/Area Scan (61x111x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.45 mW/g

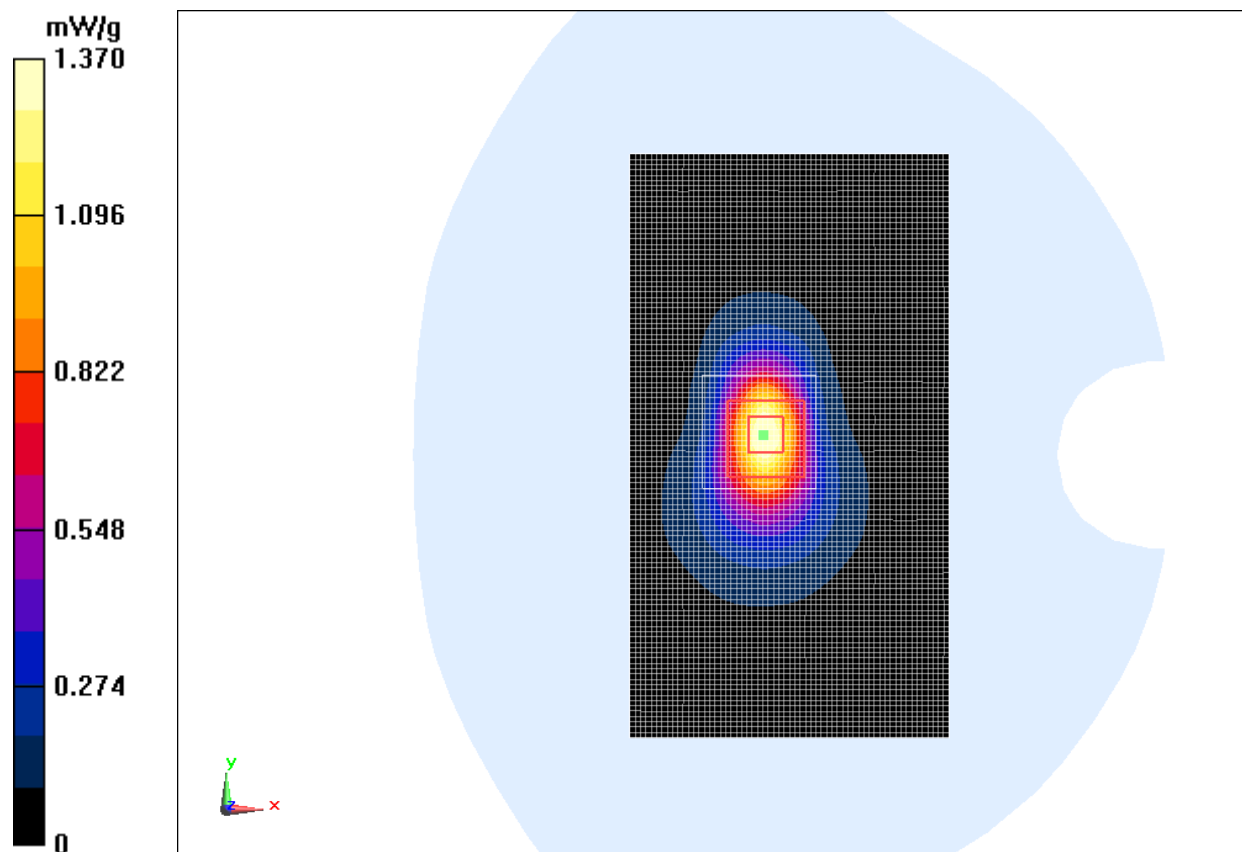
**Bottom Edge Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.502 V/m; Power Drift = -0.00 dB

Peak SAR (extrapolated) = 2.167 mW/g

**SAR(1 g) = 1.22 mW/g; SAR(10 g) = 0.636 mW/g**

Maximum value of SAR (measured) = 1.37 mW/g



**Fig.11 WCDMA1900 CH9400**

**WCDMA 1900 Body Bottom Edge Middle with HUSPA**

Date: 2013-4-2

Electronics: DAE4 Sn771

Medium: Body 1900 MHz

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.507$  mho/m;  $\epsilon_r = 52.723$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.7°C      Liquid Temperature: 22.2°C

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

Probe: ES3DV3 - SN3149 ConvF(4.64, 4.64, 4.64)

**Bottom Edge Middle/Area Scan (61x111x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 1.45 mW/g

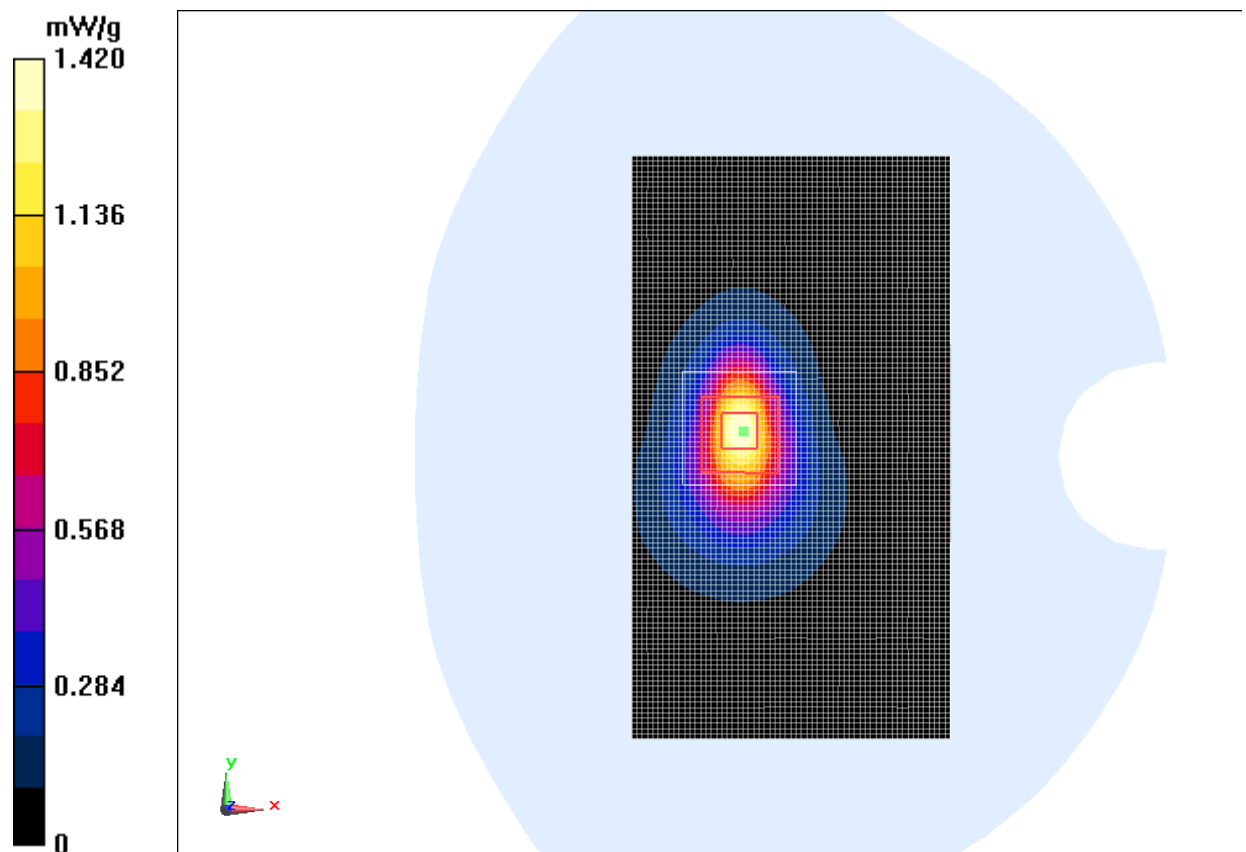
**Bottom Edge Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.628 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 2.105 mW/g

**SAR(1 g) = 1.23 mW/g; SAR(10 g) = 0.658 mW/g**

Maximum value of SAR (measured) = 1.42 mW/g



**Fig.12 WCDMA1900 CH9400**



**Wifi 802.11b Left Tilt Channel 6**

Date: 2013-3-26

Electronics: DAE4 Sn771

Medium: Head 2450 MHz

Medium parameters used (interpolated):  $f = 2437$  MHz;  $\sigma = 1.8$  mho/m;  $\epsilon_r = 39.842$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

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

Probe: ES3DV3 - SN3149 ConvF(4.49, 4.49, 4.49)

**Tilt Middle/Area Scan (91x151x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.789 mW/g

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

Reference Value = 12.439 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 1.510 mW/g

**SAR(1 g) = 0.682 mW/g; SAR(10 g) = 0.338 mW/g**

Maximum value of SAR (measured) = 0.752 mW/g

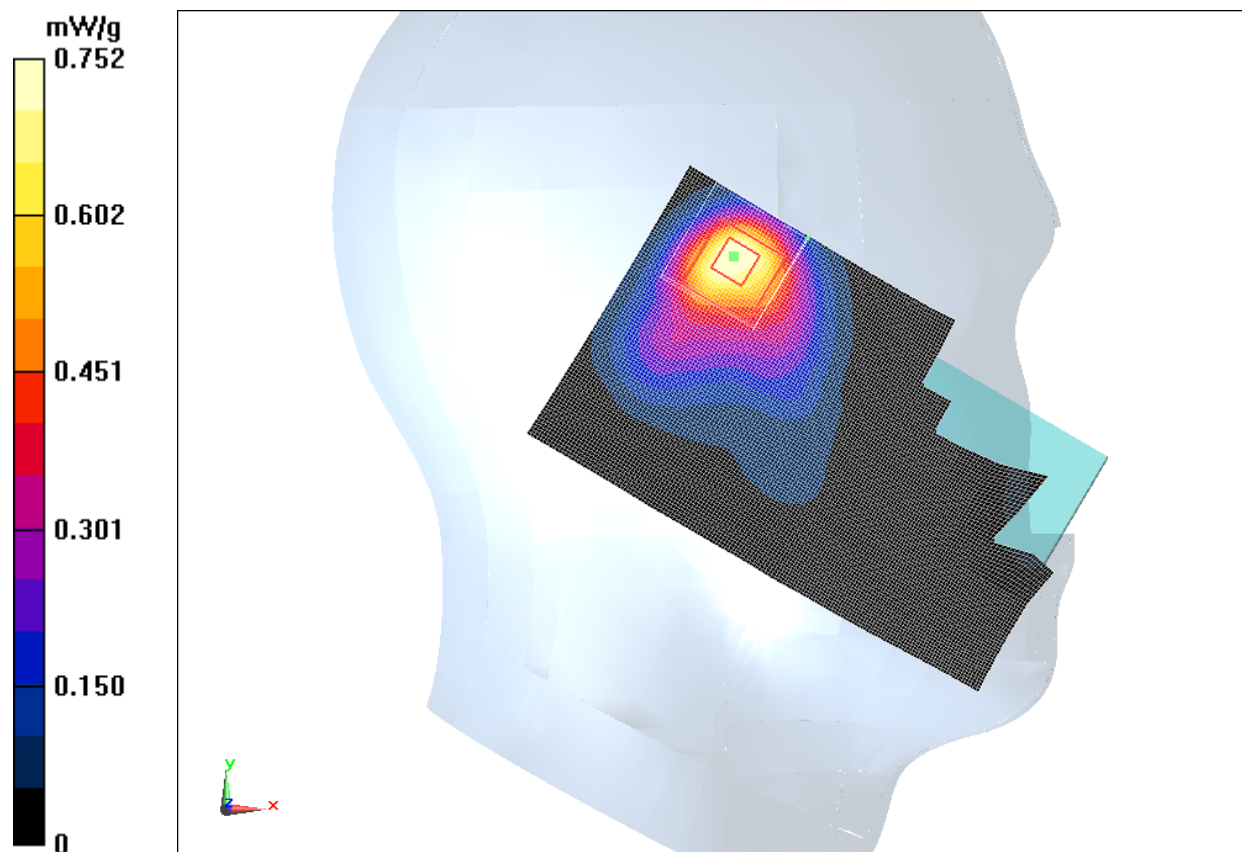
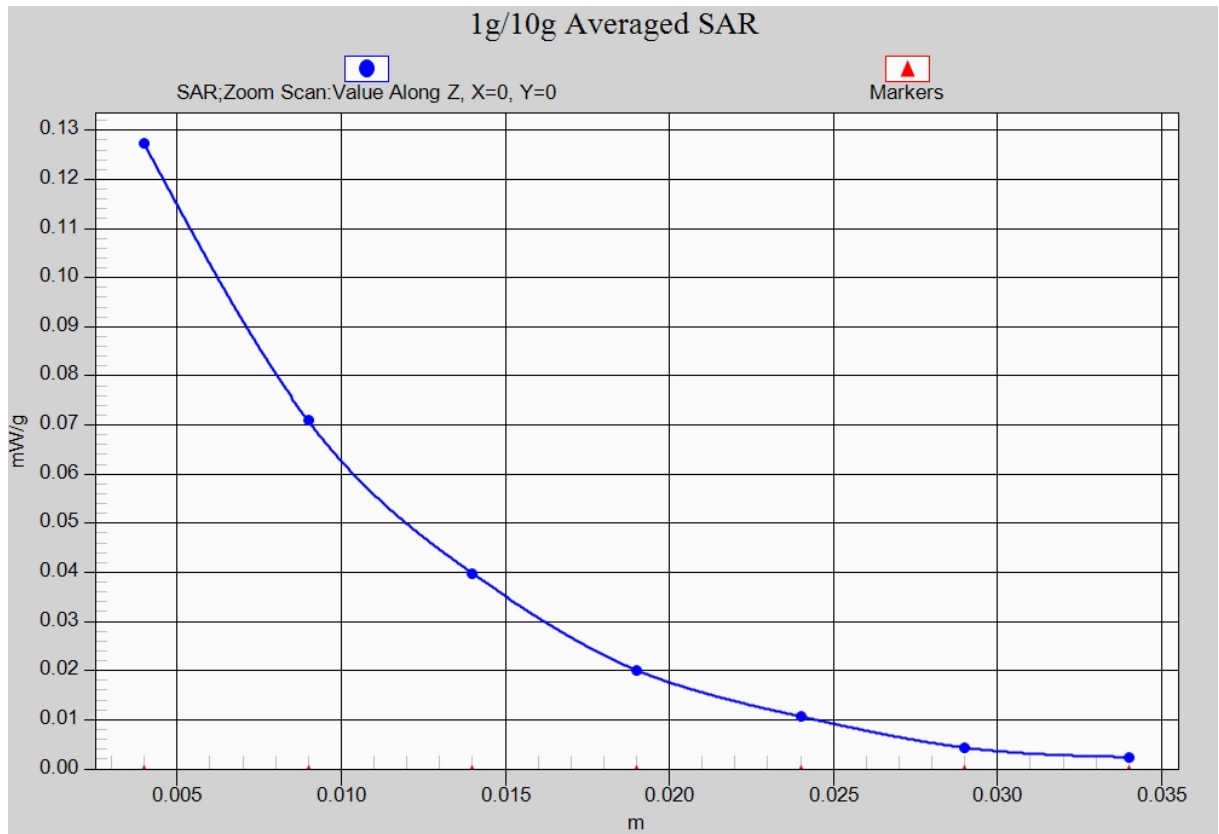


Fig.13 2450 MHz CH6



**Fig. 13-1 Z-Scan at power reference point (2450 MHz CH6)**

### Wifi 802.11b Body Rear Channel 6

Date: 2013-3-26

Electronics: DAE4 Sn771

Medium: Body 2450 MHz

Medium parameters used (interpolated):  $f = 2437$  MHz;  $\sigma = 1.948$  mho/m;  $\epsilon_r = 51.907$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

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

Probe: ES3DV3 - SN3149 ConvF(4.15, 4.15, 4.15)

**Rear Middle/Area Scan (101x161x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.174 mW/g

**Rear Middle/Zoom Scan (10x10x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.166 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.301 mW/g

**SAR(1 g) = 0.161 mW/g; SAR(10 g) = 0.090 mW/g**

Maximum value of SAR (measured) = 0.175 mW/g

**Rear Middle/Zoom Scan (10x10x7)/Cube 1:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.166 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.296 mW/g

**SAR(1 g) = 0.144 mW/g; SAR(10 g) = 0.077 mW/g**

Maximum value of SAR (measured) = 0.168 mW/g

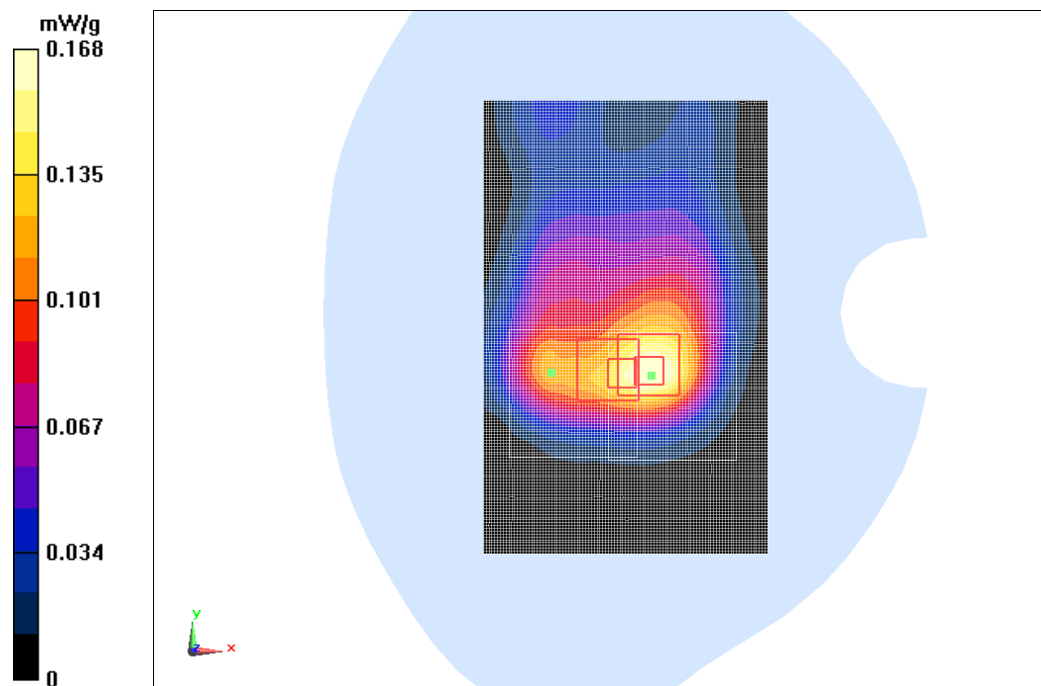


Fig.14 2450 MHz CH6

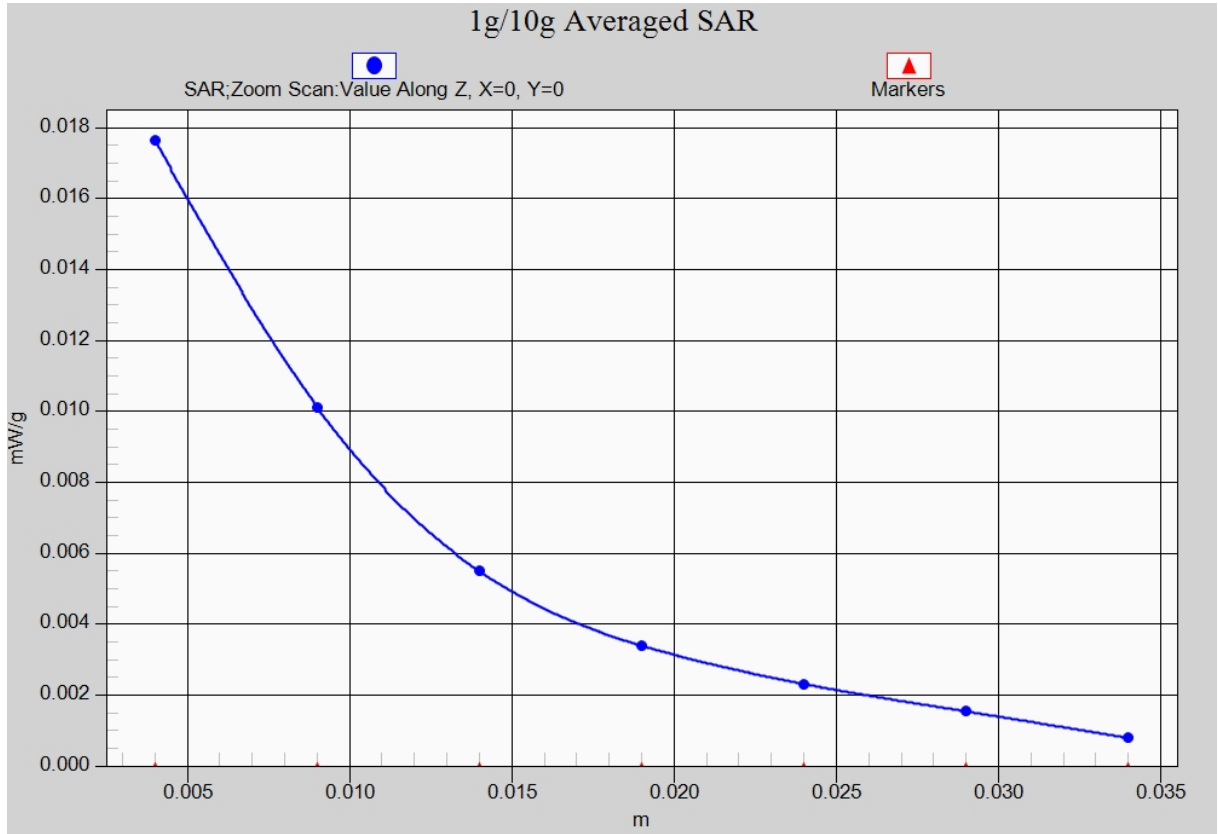


Fig. 14-1 Z-Scan at power reference point (2450 MHz CH6)

## ANNEX B System Verification Results

### 835MHz

Date: 2013-4-1

Electronics: DAE4 Sn771

Medium: Head 850 MHz

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.888 \text{ mho/m}$ ;  $\epsilon_r = 40.79$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.6^\circ\text{C}$       Liquid Temperature:  $22.1^\circ\text{C}$

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

Probe: ES3DV3 - SN3149 ConvF(6.26, 6.26, 6.26)

**System Validation /Area Scan (81x161x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

Reference Value = 53.356 V/m; Power Drift = -0.09 dB

**Fast SAR: SAR(1 g) = 2.35 mW/g; SAR(10 g) = 1.52 mW/g**

Maximum value of SAR (interpolated) = 2.59 mW/g

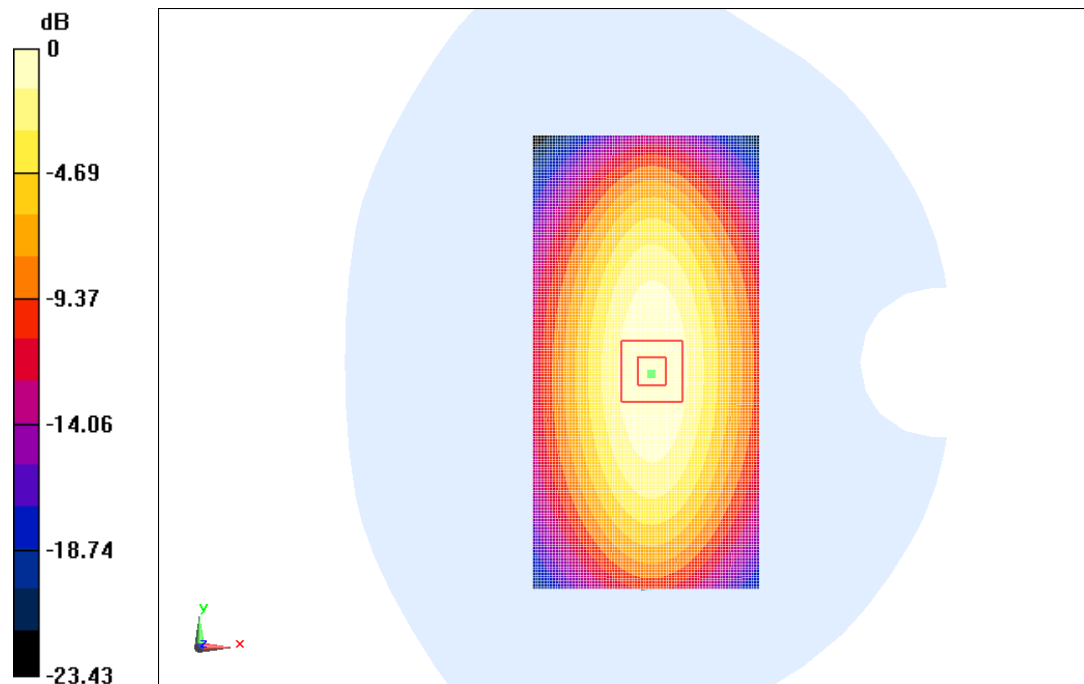
**System Validation /Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 53.356 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 3.548 W/kg

**SAR(1 g) = 2.41 mW/g; SAR(10 g) = 1.56 mW/g**

Maximum value of SAR (measured) = 2.60 mW/g



0 dB = 2.59 mW/g = 8.27 dB mW/g

**Fig.B.1 validation 835MHz 250mW**

## 835MHz

Date: 2013-4-1

Electronics: DAE4 Sn771

Medium: Body 850 MHz

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.981 \text{ mho/m}$ ;  $\epsilon_r = 56.37$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.6^\circ\text{C}$       Liquid Temperature:  $22.1^\circ\text{C}$

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

Probe: ES3DV3 - SN3149 ConvF(6.14, 6.14, 6.14)

**System Validation /Area Scan (81x171x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

Reference Value =  $46.174 \text{ V/m}$ ; Power Drift =  $-0.08 \text{ dB}$

**Fast SAR: SAR(1 g) =  $2.33 \text{ mW/g}$ ; SAR(10 g) =  $1.57 \text{ mW/g}$**

Maximum value of SAR (interpolated) =  $2.55 \text{ mW/g}$

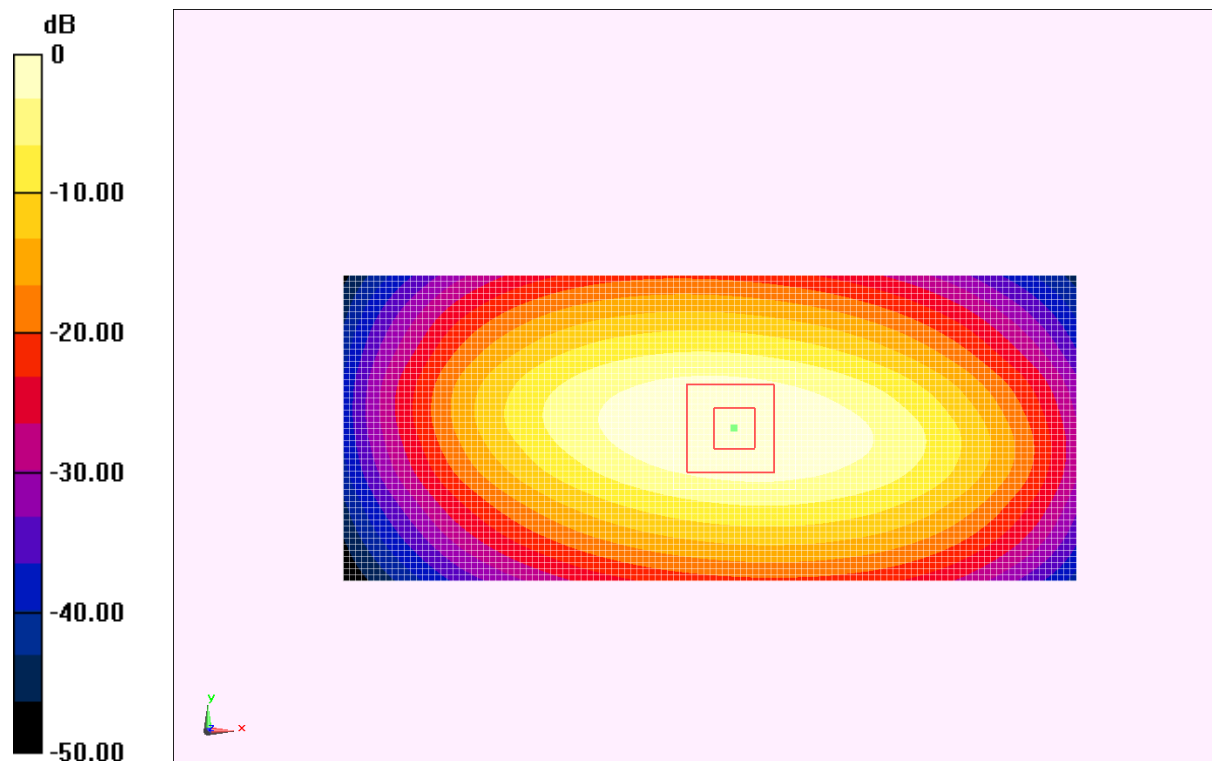
**System Validation /Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $46.174 \text{ V/m}$ ; Power Drift =  $-0.08 \text{ dB}$

Peak SAR (extrapolated) =  $3.551 \text{ W/kg}$

**SAR(1 g) =  $2.36 \text{ mW/g}$ ; SAR(10 g) =  $1.58 \text{ mW/g}$**

Maximum value of SAR (measured) =  $2.56 \text{ mW/g}$



$0 \text{ dB} = 2.55 \text{ mW/g} = 8.13 \text{ dB mW/g}$

**Fig.B.2 validation 835MHz 250mW**

## 1900MHz

Date: 2013-4-2

Electronics: DAE4 Sn771

Medium: Head 1900 MHz

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.423 \text{ mho/m}$ ;  $\epsilon_r = 39.58$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.7^\circ\text{C}$       Liquid Temperature:  $22.2^\circ\text{C}$

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

Probe: ES3DV3 - SN3149 ConvF(5.19, 5.19, 5.19)

**System Validation/Area Scan (81x121x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

Reference Value =  $95.048 \text{ V/m}$ ; Power Drift =  $0.05 \text{ dB}$

**Fast SAR: SAR(1 g) =  $9.71 \text{ mW/g}$ ; SAR(10 g) =  $5.11 \text{ mW/g}$**

Maximum value of SAR (interpolated) =  $11.1 \text{ mW/g}$

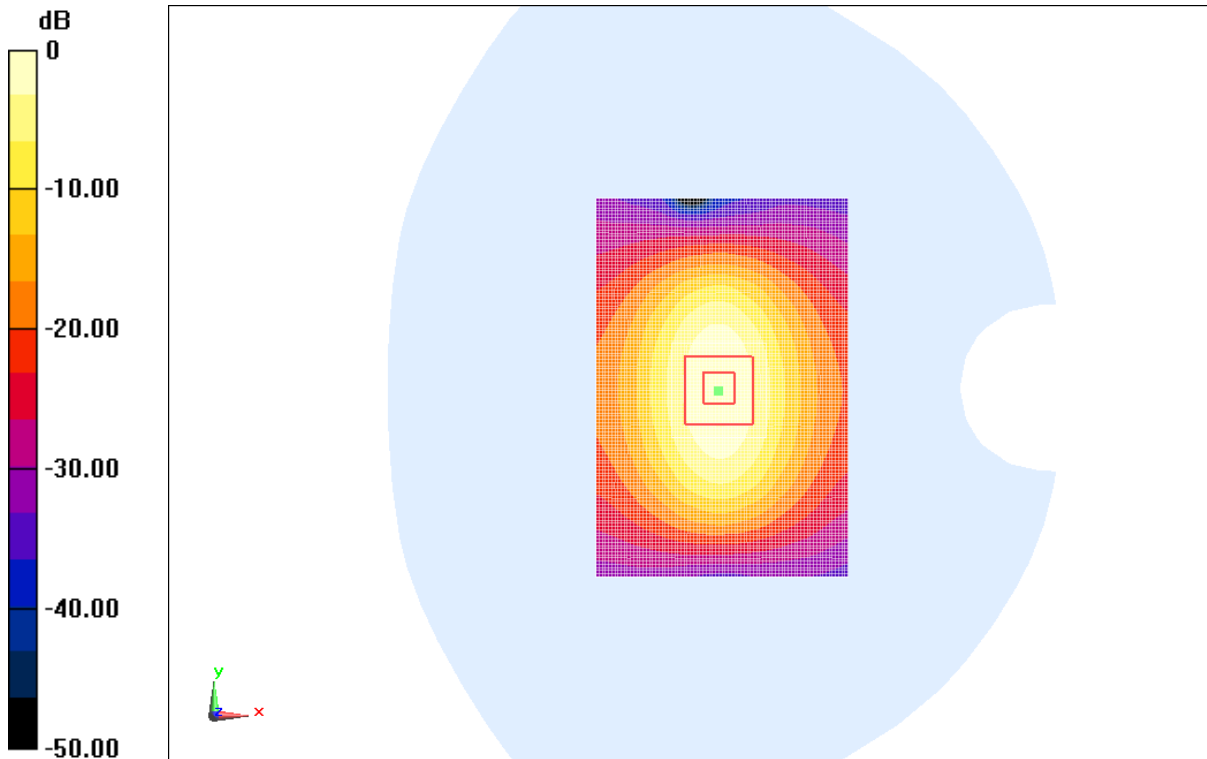
**System Validation/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $95.048 \text{ V/m}$ ; Power Drift =  $0.05 \text{ dB}$

Peak SAR (extrapolated) =  $17.974 \text{ W/kg}$

**SAR(1 g) =  $9.65 \text{ mW/g}$ ; SAR(10 g) =  $5.07 \text{ mW/g}$**

Maximum value of SAR (measured) =  $11.0 \text{ mW/g}$



0 dB =  $11.1 \text{ mW/g}$  =  $20.91 \text{ dB mW/g}$

**Fig.B.3 validation 1900MHz 250mW**

## 1900MHz

Date: 2013-4-2

Electronics: DAE4 Sn771

Medium: Body 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.532$  mho/m;  $\epsilon_r = 52.68$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.7°C      Liquid Temperature: 22.2°C

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

Probe: ES3DV3 - SN3149 ConvF(4.64, 4.64, 4.64)

**System Validation/Area Scan (81x121x1):** Measurement grid: dx=10mm, dy=10mm

Reference Value = 85.159 V/m; Power Drift = -0.06 dB

**Fast SAR: SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.39 mW/g**

Maximum value of SAR (interpolated) = 11.6 mW/g

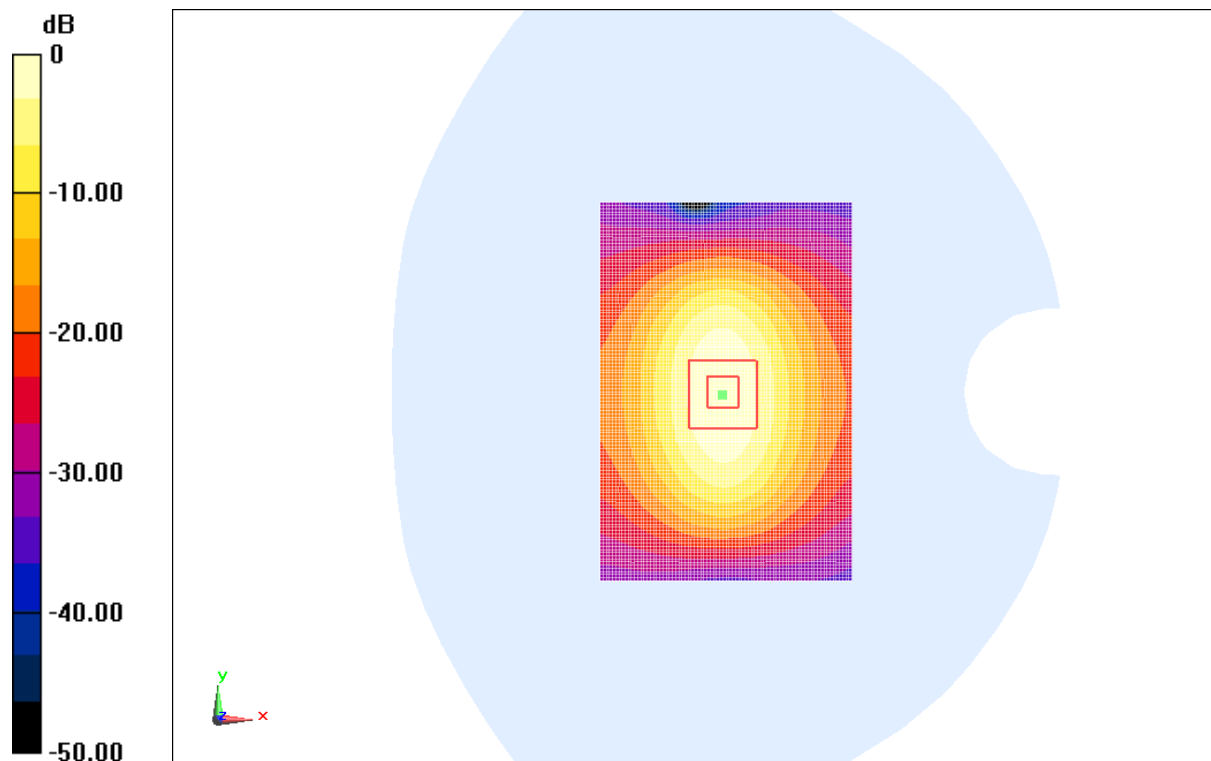
**System Validation/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 85.159 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 16.69 W/kg

**SAR(1 g) = 10.2 mW/g; SAR(10 g) = 5.42 mW/g**

Maximum value of SAR (measured) = 11.7 mW/g



0 dB = 11.6 mW/g = 21.29 dB mW/g

**Fig.B.4 validation 1900MHz 250mW**



## 2450MHz

Date: 2013-3-26

Electronics: DAE4 Sn771

Medium: Head 2450 MHz

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.813 \text{ mho/m}$ ;  $\epsilon_r = 39.78$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature:  $22.5^\circ\text{C}$       Liquid Temperature:  $22.0^\circ\text{C}$

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

Probe: ES3DV3 - SN3149 ConvF(4.49, 4.49, 4.49)

**System Validation /Area Scan (81x101x1):** Measurement grid:  $dx=10\text{mm}$ ,  $dy=10\text{mm}$

Reference Value =  $93.276 \text{ V/m}$ ; Power Drift =  $0.04 \text{ dB}$

**Fast SAR: SAR(1 g) =  $12.9 \text{ mW/g}$ ; SAR(10 g) =  $6.05 \text{ mW/g}$**

Maximum value of SAR (interpolated) =  $14.9 \text{ mW/g}$

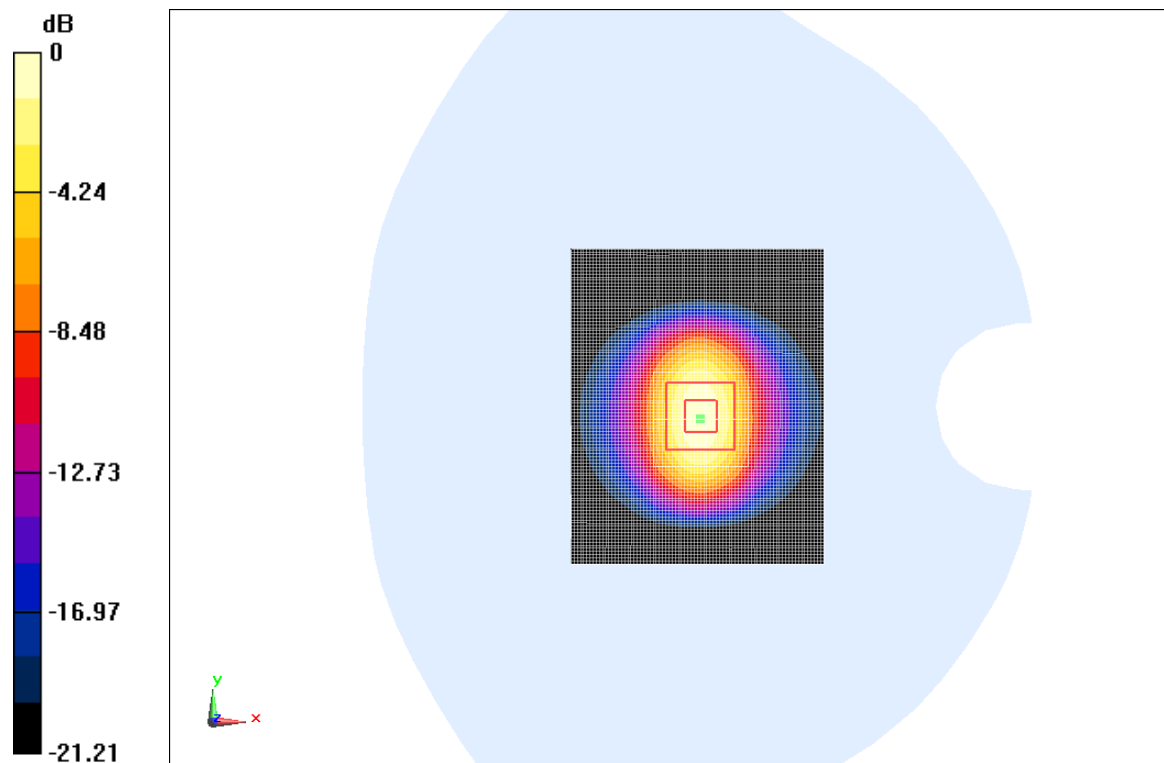
**System Validation /Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value =  $93.276 \text{ V/m}$ ; Power Drift =  $0.04 \text{ dB}$

Peak SAR (extrapolated) =  $25.964 \text{ mW/g}$

**SAR(1 g) =  $12.8 \text{ mW/g}$ ; SAR(10 g) =  $5.96 \text{ mW/g}$**

Maximum value of SAR (measured) =  $14.7 \text{ mW/g}$



0 dB =  $14.9 \text{ mW/g} = 23.46 \text{ dB mW/g}$

**Fig.B.5 validation 2450MHz 250mW**

## 2450MHz

Date: 2013-3-26

Electronics: DAE4 Sn771

Medium: Body 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.962$  mho/m;  $\epsilon_r = 51.86$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

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

Probe: ES3DV3 - SN3149 ConvF(4.15, 4.15, 4.15)

**System Validation/Area Scan (81x101x1):** Measurement grid: dx=10mm, dy=10mm

Reference Value = 97.714 V/m; Power Drift = -0.05 dB

**Fast SAR: SAR(1 g) = 13.0 mW/g; SAR(10 g) = 6.13 mW/g**

Maximum value of SAR (interpolated) = 14.9 mW/g

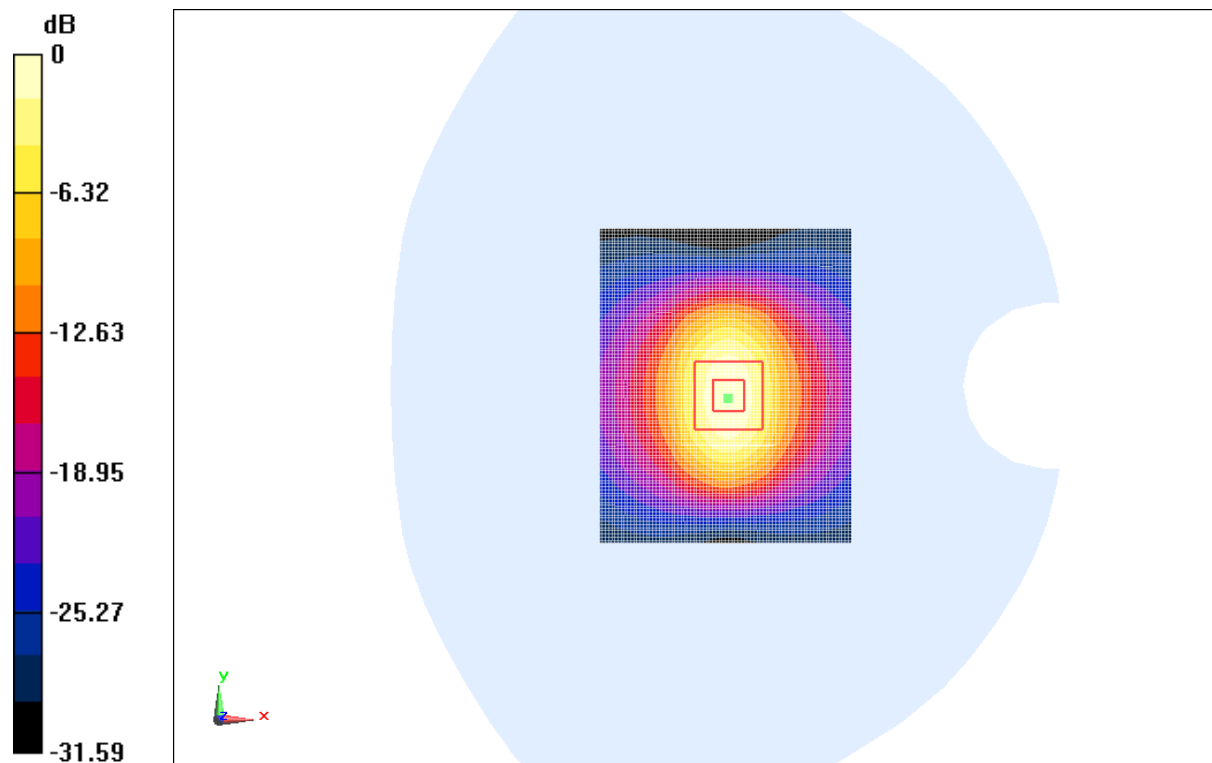
**System Validation/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.714 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 26.08 mW/g

**SAR(1 g) = 12.9 mW/g; SAR(10 g) = 6.07 mW/g**

Maximum value of SAR (measured) = 14.8 mW/g



0 dB = 14.9 mW/g = 23.46 dB mW/g

**Fig.B.6 validation 2450MHz 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.

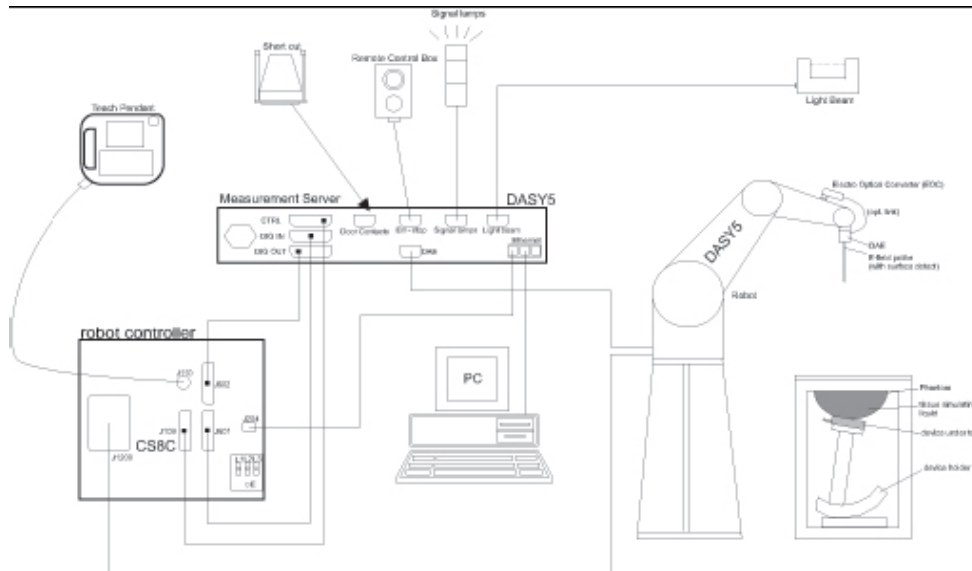
**Table B.1 Comparison between area scan and zoom scan for system verification**

<b>Band</b>	<b>Position</b>	<b>Area scan (1g)</b>	<b>Zoom scan (1g)</b>	<b>Drift (%)</b>
835	Head	2.35	2.41	-2.49
835	Body	2.33	2.36	-1.27
1900	Head	9.71	9.65	0.62
1900	Body	10.1	10.2	-0.98
2450	Head	12.9	12.8	0.78
2450	Body	13.0	12.9	0.78

## ANNEX C SAR Measurement Setup

### C.1 Measurement Set-up

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



Picture C.1 SAR Lab Test Measurement Set-up

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

## C.2 Dasy4 or DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 or DASY5 software reads the reflection during a software approach and looks for the maximum using 2<sup>nd</sup> order curve fitting. The approach is stopped at reaching the maximum.

### Probe Specifications:

<b>Model:</b>	<b>ES3DV3, EX3DV4</b>
<b>Frequency</b>	<b>10MHz — 6.0GHz(EX3DV4)</b>
<b>Range:</b>	<b>10MHz — 4GHz(ES3DV3)</b>
<b>Calibration:</b>	<b>In head and body simulating tissue at Frequencies from 835 up to 5800MHz</b>
<b>Linearity:</b>	<b>± 0.2 dB(30 MHz to 6 GHz) for EX3DV4 ± 0.2 dB(30 MHz to 4 GHz) for ES3DV3</b>
<b>Dynamic Range:</b>	<b>10 mW/kg — 100W/kg</b>
<b>Probe Length:</b>	<b>330 mm</b>
<b>Probe Tip</b>	
<b>Length:</b>	<b>20 mm</b>
<b>Body Diameter:</b>	<b>12 mm</b>
<b>Tip Diameter:</b>	<b>2.5 mm (3.9 mm for ES3DV3)</b>
<b>Tip-Center:</b>	<b>1 mm (2.0mm for ES3DV3)</b>
<b>Application:</b>	<b>SAR Dosimetry Testing Compliance tests of mobile phones Dosimetry in strong gradient fields</b>



Picture C.2 Near-field Probe



Picture C.3 E-field Probe

## C.3 E-field Probe Calibration

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density ( $1 \text{ mW/cm}^2$ ) using an RF Signal generator, TEM cell, and RF Power Meter.

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies 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 until the three channels show the maximum reading. The power density readings equates to 1 mW/ cm<sup>2</sup>:

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The E-field in the medium correlates with the temperature rise in the 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:

$\Delta t$  = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

$\Delta T$  = Temperature increase due to RF exposure.

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

Where:

$\sigma$  = Simulated tissue conductivity,

$\rho$  = Tissue density (kg/m<sup>3</sup>).

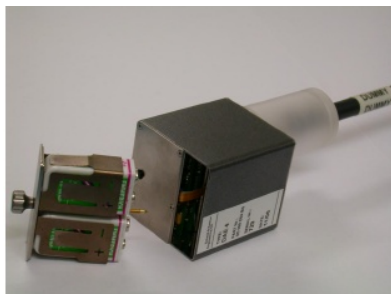
## C.4 Other Test Equipment

### C.4.1 Data Acquisition Electronics(DAE)

The data acquisition electronics consist 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 with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.



PictureC.4: DAE

### C.4.2 Robot

The SPEAG DASY system uses the high precision robots (DASY4: RX90XL; DASY5: RX160L) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability 0.02mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements (brushless synchron motors; no stepper motors)
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)



Picture C.5 DASY 4



Picture C.6 DASY 5

### C.4.3 Measurement Server

The Measurement server is based on a PC/104 CPU board with CPU (dasy4: 166 MHz, Intel Pentium; DASY5: 400 MHz, Intel Celeron), chipdisk (DASY4: 32 MB; DASY5: 128MB), RAM (DASY4: 64 MB, DASY5: 128MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all real-time data evaluation of field measurements and surface detection, controls robot movements and handles safety operation. The PC operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with an expansion port which is reserved for future applications. Please note that this expansion port does not have a standardized pinout, and therefore only devices provided by SPEAG can be connected. Devices from any other supplier could seriously damage the measurement server.



Picture C.7 Server for DASY 4



Picture C.8 Server for DASY 5

#### C.4.4 Device Holder for Phantom

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5mm distance, a positioning uncertainty of  $\pm 0.5\text{mm}$  would produce a SAR uncertainty of  $\pm 20\%$ . Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-loss POM material having the following dielectric

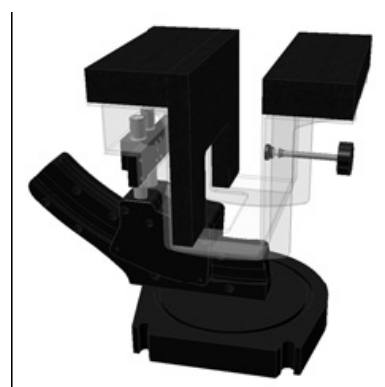
parameters: relative permittivity  $\epsilon = 3$  and loss tangent  $\delta = 0.02$ . The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

<Laptop Extension Kit>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin-SAM and ELI phantoms.



Picture C.9-1: Device Holder



Picture C.9-2: Laptop Extension Kit

#### C.4.5 Phantom

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to represent the 90<sup>th</sup> percentile of the population. The phantom enables the dissymmetric evaluation