Body Evaluation

Table 14.25: SAR Values (WLAN - Body) – 802.11b 11Mbps (Fast SAR)

Ambient Temperature: 23.0 °C				Liquid Temperature: 22.5 °C						
Frequency		Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.									
2462	11	Front	/	17.57	17.7	0.082	**0.08**	0.147	**0.15**	0.01
2462	11	Rear	/	17.57	17.7	0.110	**0.11**	0.158	**0.16**	0.02
2462	11	Right	/	17.57	17.7	0.104	**0.11**	0.19	**0.20**	0.04
2462	11	Top	/	17.57	17.7	0.056	**0.06**	0.108	**0.11**	0.03

Note1: The distance between the EUT and the phantom bottom is 10mm.

As shown above table, the initial test position for body is “Rear”. So the body SAR of WLAN is presented as below:

Table 14.26: SAR Values (WLAN - Body) – 802.11b 11Mbps (Full SAR)

Ambient Temperature: 23.0 °C				Liquid Temperature: 22.5 °C						
Frequency		Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
MHz	Ch.									
2462	11	Rear	Fig.12	17.57	17.7	0.11	**0.12**	0.16	**0.18**	0.18

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. A maximum transmission duty factor of 97.6% is achievable for WLAN in this project and the scaled reported SAR is presented as below.

Table 14.27: SAR Values (WLAN - Body) – 802.11b 1Mbps (Scaled Reported SAR)

Ambient Temperature: 22.5 °C		Liquid Temperature: 22.0 °C				
Frequency		Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g) (W/kg)	Scaled reported SAR (1g) (W/kg)
MHz	Ch.					
2462	11	Rear	97.6%	100%	**0.18**	**0.19**

SAR is not required for OFDM because the 802.11b adjusted SAR ≤ 1.2 W/kg.

15 SAR Measurement Variability

SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium.

The following procedures are applied to determine if repeated measurements are required.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Table 15.1: SAR Measurement Variability for GSM 850 Body With GPRS (1g)

Frequency		Test Position	Spacing (mm)	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
MHz	Ch.						
848.8	251	Rear	10	0.915	0.903	1.01	/

Table 15.2: SAR Measurement Variability for GSM 1900 Head with GPRS (1g)

Frequency		Side	Test Position	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
MHz	Ch.						
1850.2	512	Right	Touch	0.932	0.928	1.00	/

Table 15.3: SAR Measurement Variability for WCDMA 1700 Head (1g)

Frequency		Side	Test Position	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
MHz	Ch.						
1752.6	1513	Left	Touch	0.899	0.893	1.06	/

Table 15.4: SAR Measurement Variability for Body WCDMA 1700 (1g)

Frequency		Test Position	Spacing (mm)	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
MHz	Ch.						
1752.6	1513	Rear	10	1.09	1.07	1.00	/

Table 15.5: SAR Measurement Variability for WCDMA 1900 Head (1g)

Frequency		Side	Test Position	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
MHz	Ch.						
1907.6	9538	Right	Touch	0.852	0.827	1.03	/

Table 15.6: SAR Measurement Variability for WCDMA 1900 Body (1g)

Frequency		Test Position	Spacing (mm)	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
MHz	Ch.						
1907.6	9538	Rear	10	0.975	0.959	1.01	/

16 Measurement Uncertainty

16.1 Measurement Uncertainty for Normal 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
Measurement system										
1	Probe calibration	B	5.5	N	1	1	1	5.4	5.4	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	1	1	1.6	1.6	∞
3	hemisphere isotropy of the probe	B	2.8	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	0.85	0.85	∞
4	spatial resolution	B	0	R	$\sqrt{3}$	1	1	0	0	∞
5	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	6.4	6.4	∞
6	Linearity	B	4.7	R	$\sqrt{3}$	1	1	0.5	0.5	∞
7	Detection limit	B	1.0	N	1	1	1	1	1	∞
8	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.6	0.6	∞
9	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.0	0.0	∞
10	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.0	1.0	∞
11	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
12	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Probe positioned mech. restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
14	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
15	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
16	Probe modulation response	B	2.3	R	$\sqrt{3}$	1	1	1.21	1.21	∞
Test sample related										
17	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	5
18	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
19	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞

Phantom and set-up										
20	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
21	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
22	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1	0.28	9
23	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
24	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	0.31	0.25	9
25	Algorithm for corrceting SAR for deviations in permittivity and conductivity	B	1.9	N	1	1	1	1.9	1.9	∞
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						11.1	11.0	323
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						22.3	22.1	

16.2 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
Measurement system										
1	Probe calibration	B	10.8	N	1	1	5.4	5.4	1	∞
2	Isotropy	B	2.8	R	1	1	1.6	1.6	1	∞
3	hemisphere isotropy of the probe	B	2.8	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	0.85	0.85	∞
4	spatial resolution	B	0	R	$\sqrt{3}$	1	1	0	0	∞
5	Boundary effect	B	1.0	R	1	1	0.6	0.6	1	∞
6	Linearity	B	4.7	R	1	1	2.7	2.7	1	∞
7	Detection limit	B	1.0	R	1	1	0.6	0.6	1	∞
8	Readout electronics	B	0.3	R	1	1	0.3	0.3	1	∞
9	Response time	B	0.8	R	1	1	0.5	0.5	1	∞
10	Integration time	B	2.6	R	1	1	1.5	1.5	1	∞
11	RF ambient conditions-noise	B	0	R	1	1	0	0	1	∞
12	RF ambient conditions-reflection	B	0	R	1	1	0	0	1	∞
13	Probe positioned mech. Restrictions	B	0.4	R	1	1	0.2	0.2	1	∞
14	Probe positioning with respect to phantom shell	B	2.9	R	1	1	1.7	1.7	1	∞
15	Post-processing	B	1.0	R	1	1	0.6	0.6	1	∞
16	Fast SAR z-Approximation	B	7.0	R	1	1	4.0	4.0	1	∞

17	Probe modulation response	B	2.3	R	$\sqrt{3}$	1	1	1.21	1.21	∞
Test sample related										
18	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
19	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
20	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
21	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
22	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
23	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
24	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
25	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	211
26	Algorithm for corrceting SAR for deviations in permittivity and conductivity	B	1.9	N	1	1	1	1.9	1.9	∞
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						13.1	12.45	843
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						26.2	25.9	

17 MAIN TEST INSTRUMENTS

Table 17.1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	Agilent E5071C	MY46103759	December 17,2014	One year
02	Power meter	NRVD	101253	March 5,2015	One year
03	Power sensor	NRV-Z5	100333		
04	Signal Generator	E4438C	MY45095825	January 13, 2015	One year
05	Amplifier	VTL5400	0404	No Calibration Requested	
06	BTS	E5515C	GB47460133	September 4, 2014	One year
07	E-field Probe	SPEAG ES3DV3	3151	September 1, 2014	One year
08	DAE	SPEAG DAE4	786	November 20, 2014	One year
09	Dipole Validation Kit	SPEAG D900V2	1d054	November 5, 2014	One year
10	Dipole Validation Kit	SPEAG D1800V2	2d147	November 6, 2014	One year
11	Dipole Validation Kit	SPEAG D1900V2	5d088	November 5, 2014	One year
12	Dipole Validation Kit	SPEAG D2450V2	5d088	November 3, 2014	One year

END OF REPORT BODY

ANNEX A Graph Results

GSM 850 Head Right

Date/Time: 2015-7-6
Electronics: DAE4 Sn786
Medium: Head 900 MHz
Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.94 S/m; ε_r = 41.17; ρ = 1000 kg/m^3
Ambient Temperature:22.0^{o}C Liquid Temperature:21.5^{o}C
Communication System: GSM Frequency: 848.8 MHz Duty Cycle: 1:8.3
Probe: ES3DV3 - SN3151 ConvF(6.04, 6.04, 6.04);

Cheek High/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.454 W/kg

Cheek High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=10mm, dy=10mm, dz=5mm
Reference Value = 8.133 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.527 W/kg
SAR(1 g) = 0.416 W/kg; SAR(10 g) = 0.307 W/kg
Maximum value of SAR (measured) = 0.425 W/kg

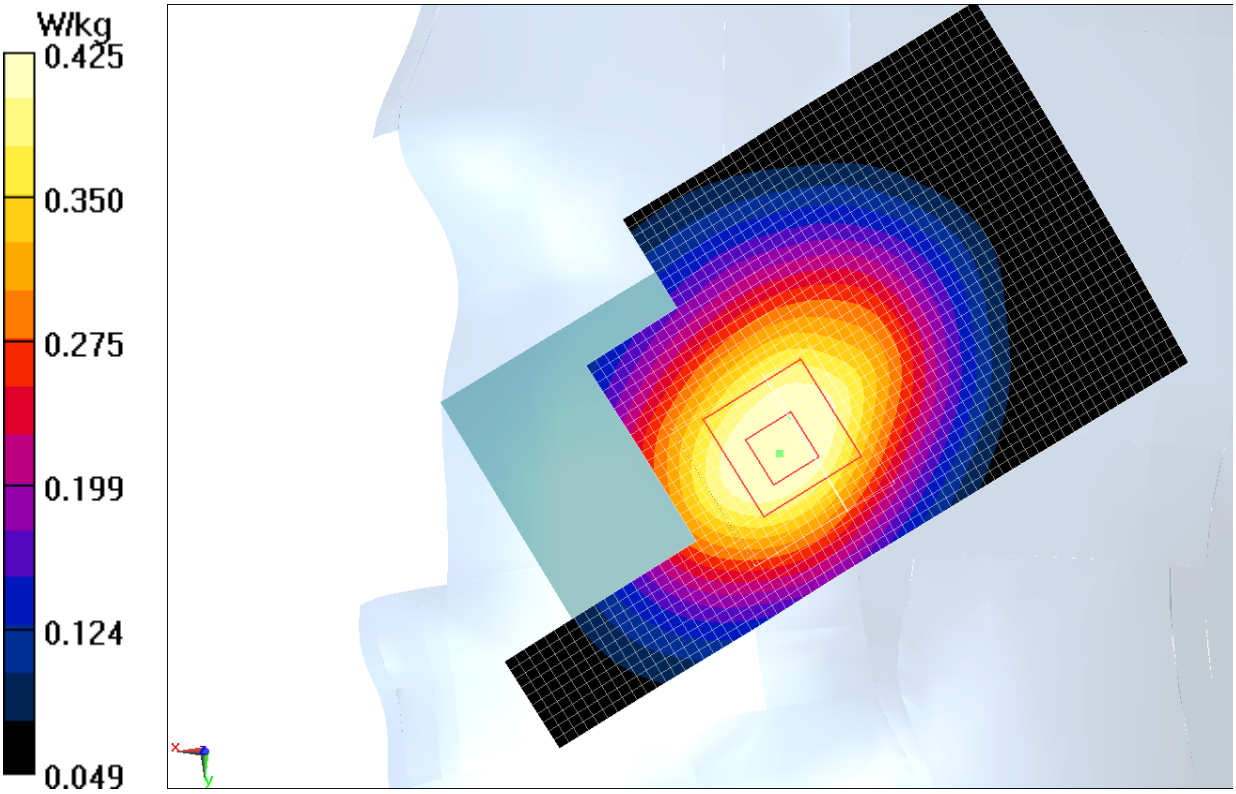


Fig.1 850MHz CH251

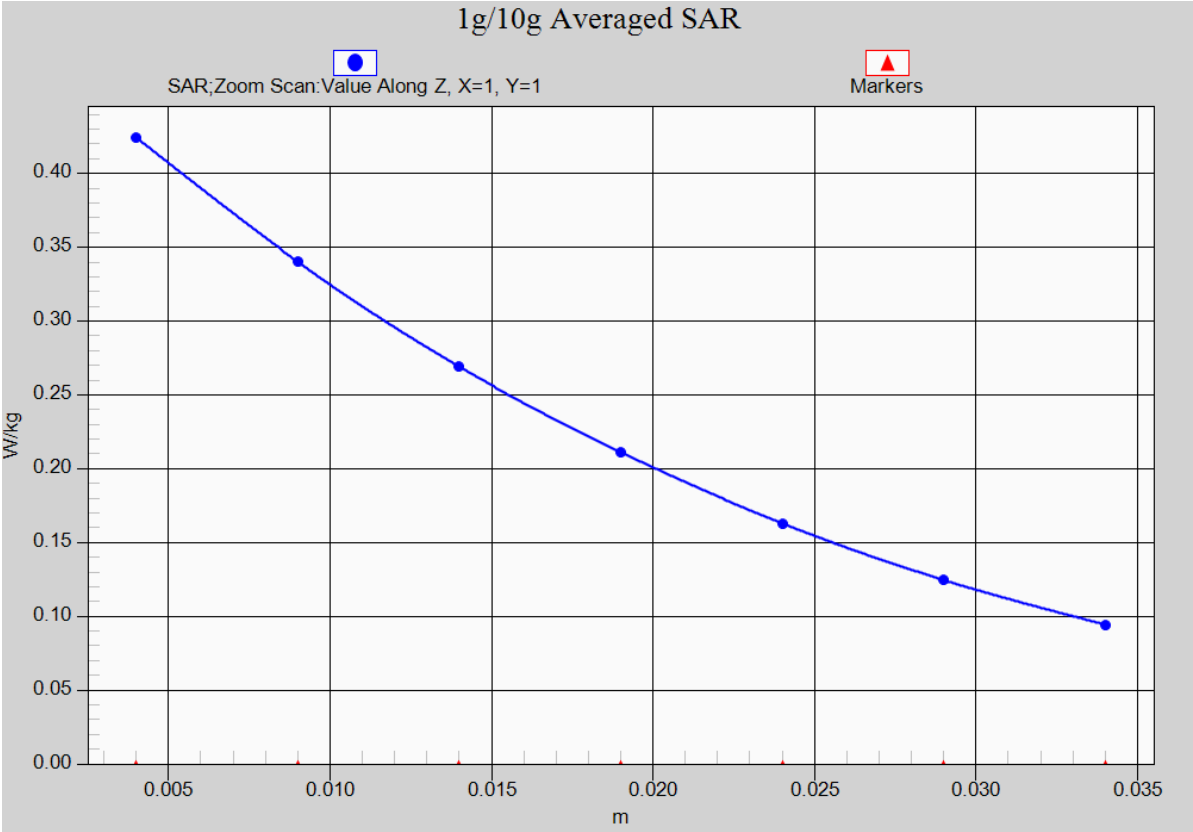


Fig. 1-1 Z-Scan at power reference point (850 MHz CH251)

GSM 850 Body Rear

Date/Time: 2015-7-10
Electronics: DAE4 Sn786
Medium: Body850 MHz
Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.984 S/m; ε_r = 53.419; ρ = 1000 kg/m^3
Ambient Temperature:22.0°C Liquid Temperature:21.5°C
Communication System: 4 slot GPRS Frequency: 848.8 MHz Duty Cycle: 1:2.08018
Probe: ES3DV3 - SN3151 ConvF(6.14, 6.14, 6.14);

Rear side High/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.931 W/kg

Rear side High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.149 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.19 W/kg
SAR(1 g) = 0.915 W/kg; SAR(10 g) = 0.663 W/kg
Maximum value of SAR (measured) = 0.923 W/kg

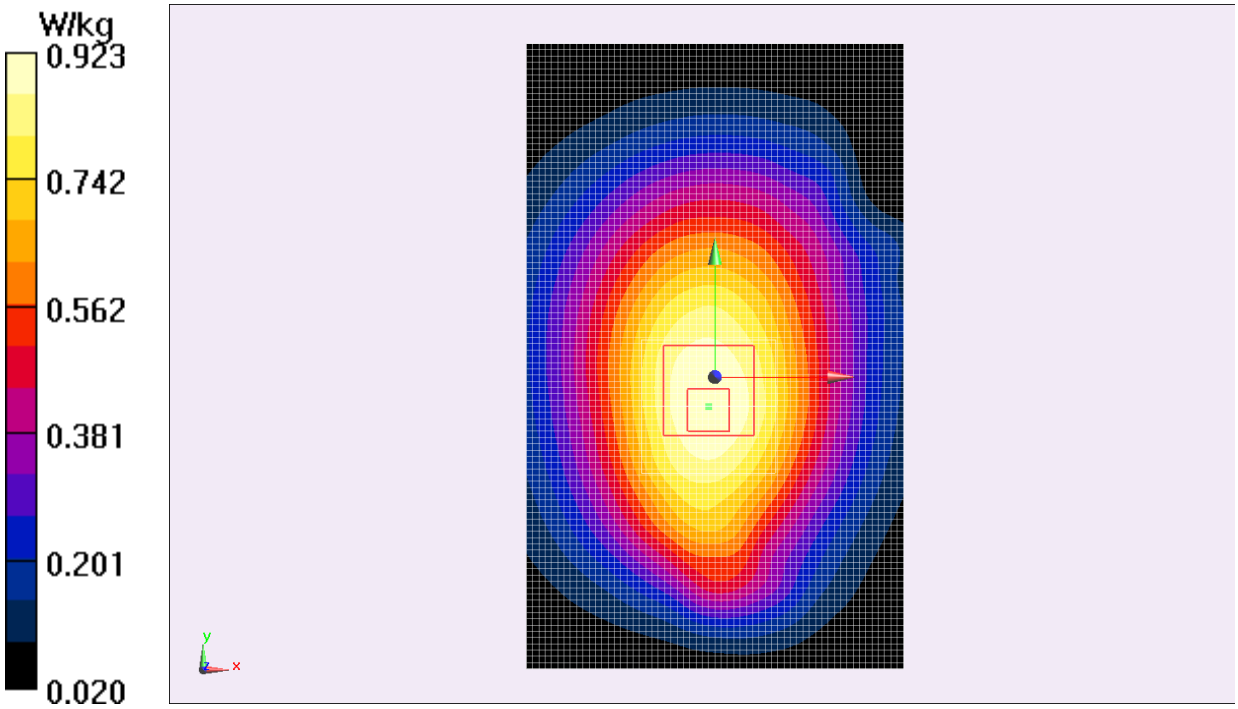


Fig.2 850 MHz CH251

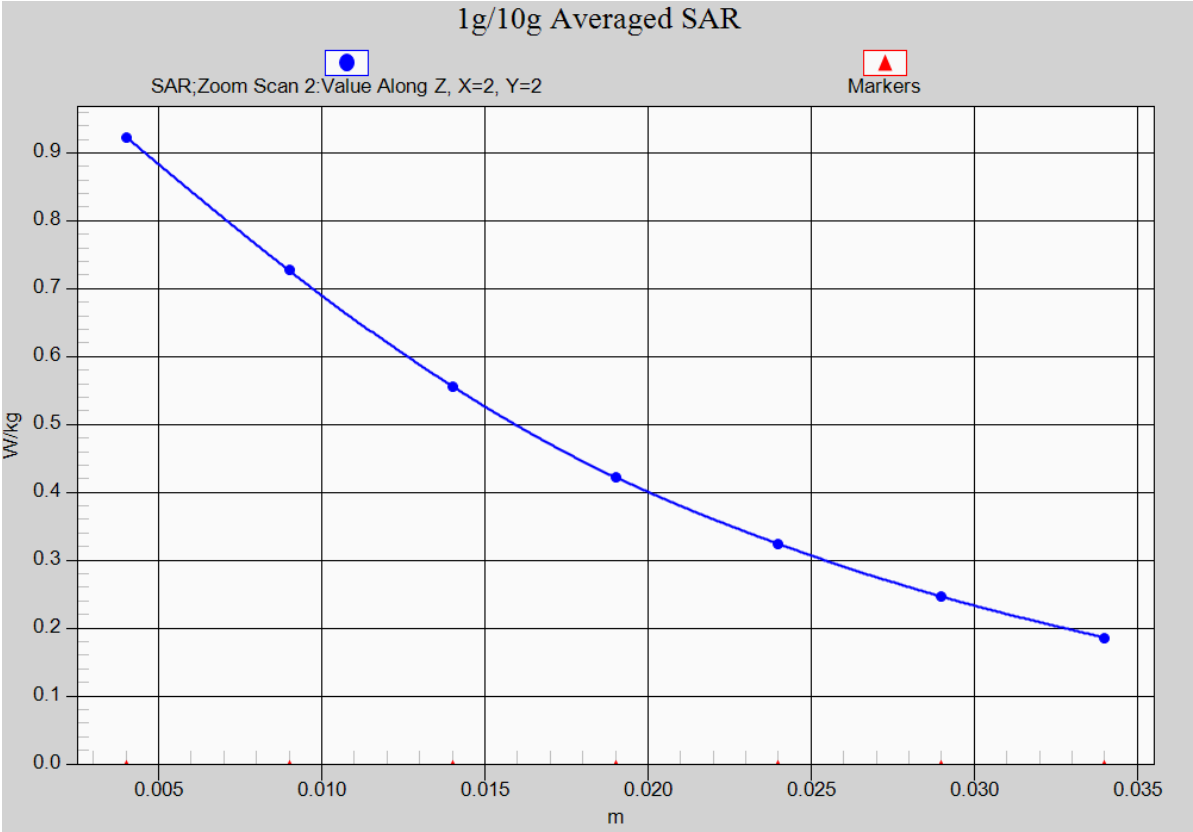


Fig. 2-1 Z-Scan at power reference point (850 MHz CH251)

GSM 1900 Head Right

Date/Time: 2015-7-6
Electronics: DAE4 Sn786
Medium: 1900 Head
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.395 S/m; ε_r = 40.569; ρ = 1000 kg/m^3
Ambient Temperature:22.0^{o}C Liquid Temperature:21.5^{o}C
Communication System: GSM Frequency: 1850.2 MHz Duty Cycle: 1:8.3
Probe: ES3DV3 - SN3151 ConvF(5.16, 5.16, 5.16);

Cheek Low/Area Scan (51x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.23 W/kg

Cheek Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.257 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.48 W/kg
SAR(1 g) = 0.932 W/kg; SAR(10 g) = 0.479 W/kg
Maximum value of SAR (measured) = 1.26 W/kg

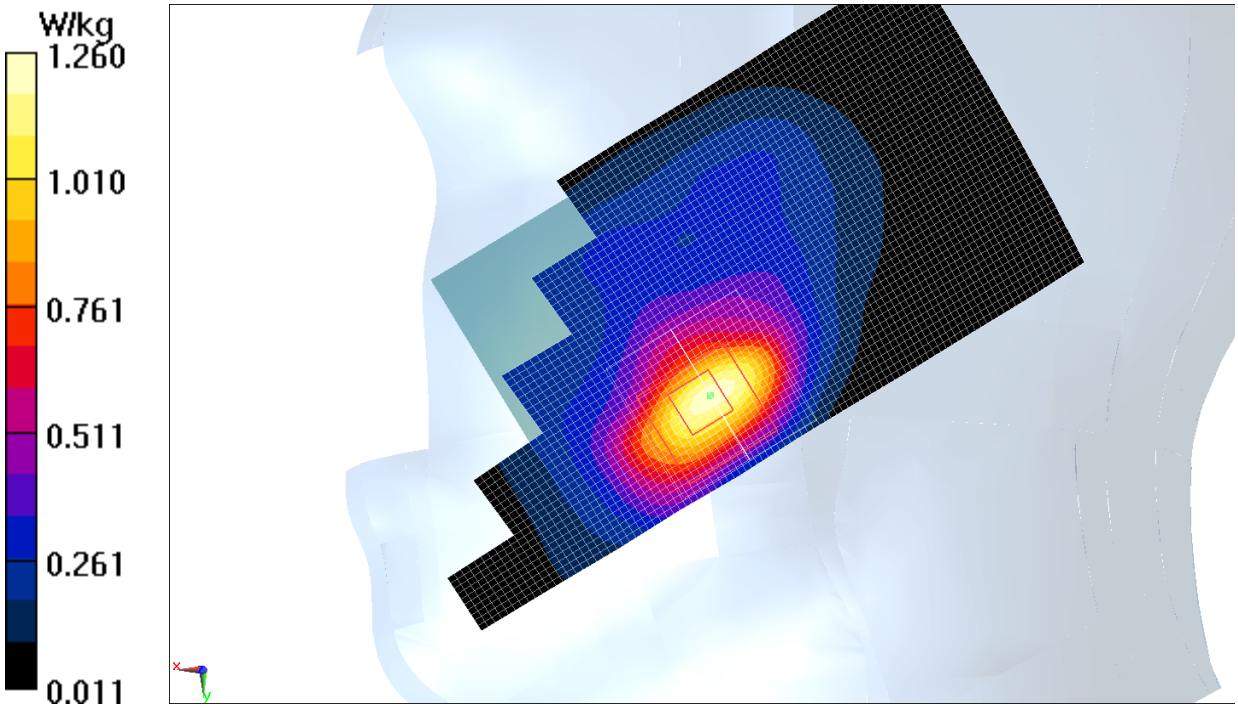


Fig.3 1900 MHz CH512

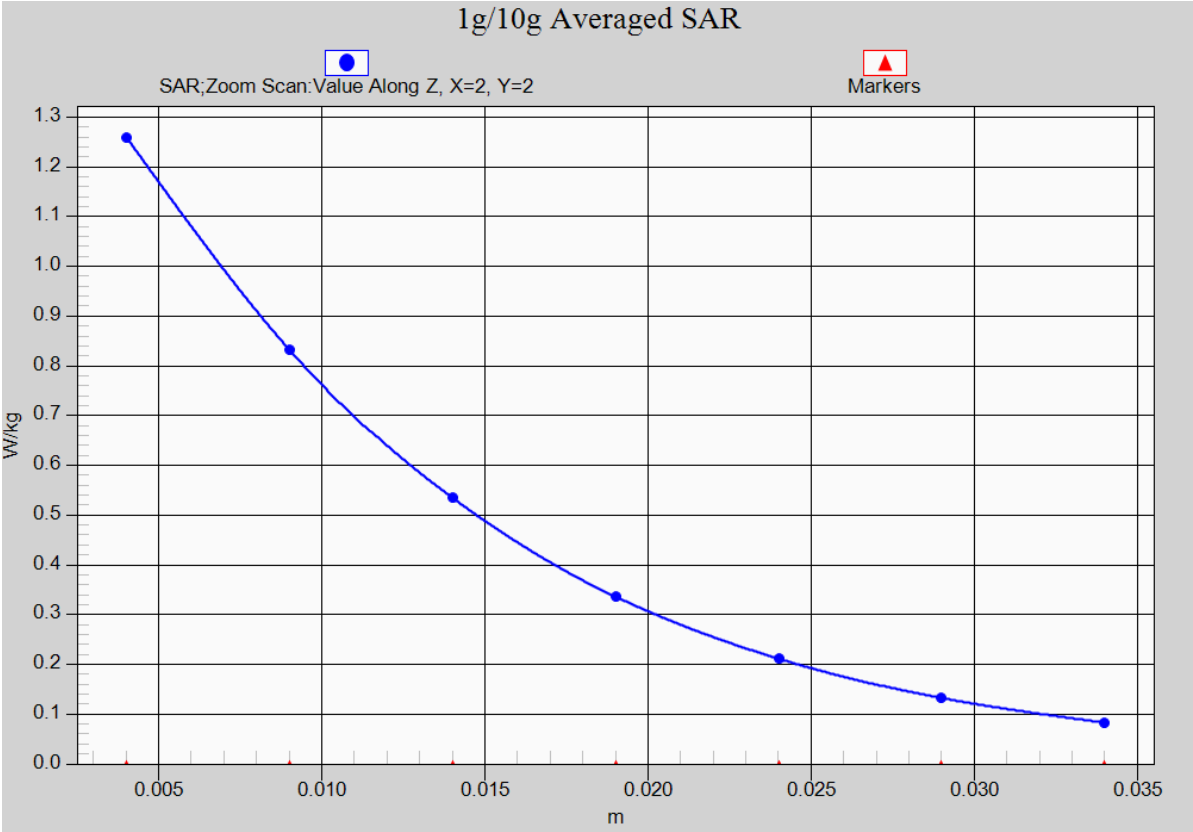


Fig. 3-1 Z-Scan at power reference point (1900 MHz CH512)

GSM 1900 Body Rear

Date/Time: 2015-7-10
Electronics: DAE4 Sn786
Medium: Body 1800
Medium parameters used: f = 1910 MHz; σ = 1.62 S/m; ε_r = 53.019; ρ = 1000 kg/m^3
Ambient Temperature:22.0°C Liquid Temperature:21.5°C
Communication System: 4 slot GPRS Frequency: 1909.8 MHz Duty Cycle: 1:2
Probe: ES3DV3 - SN3151 ConvF(4.77, 4.77, 4.77);

Rear side Low/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.744 W/kg

Rear side Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.211 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.646 W/kg; SAR(10 g) = 0.394 W/kg
Maximum value of SAR (measured) = 0.703 W/kg

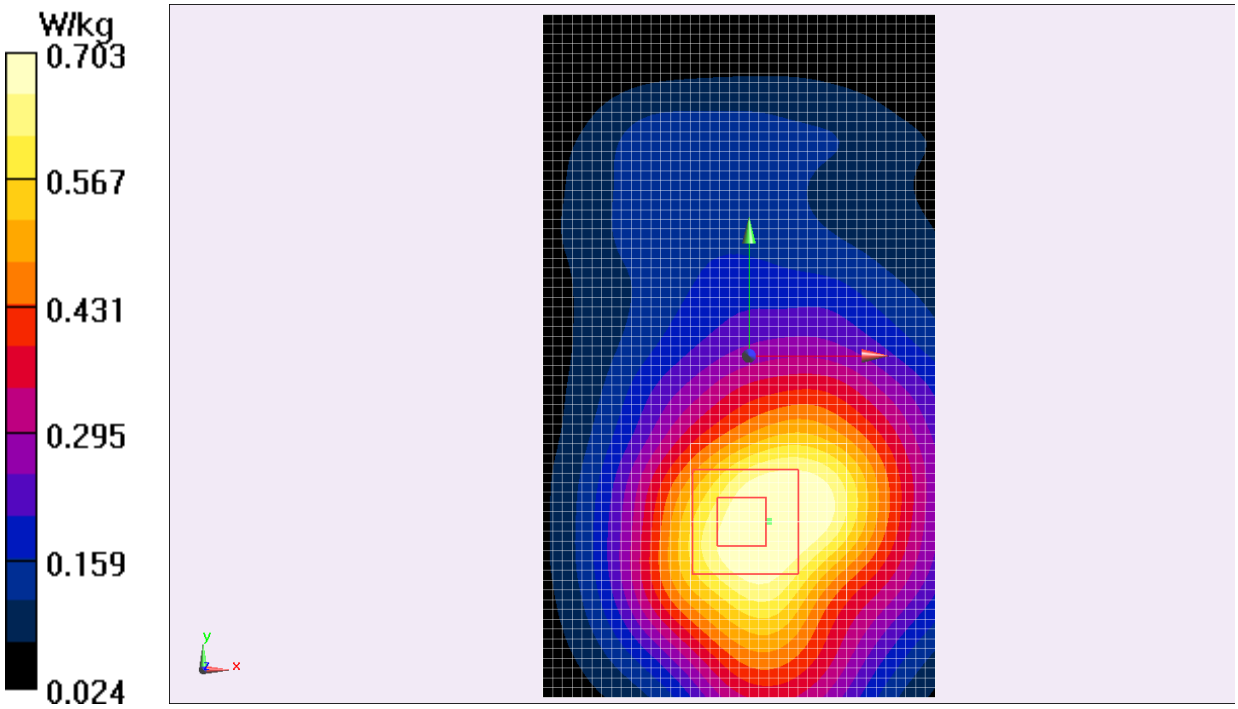


Fig.4 1900 MHz CH512

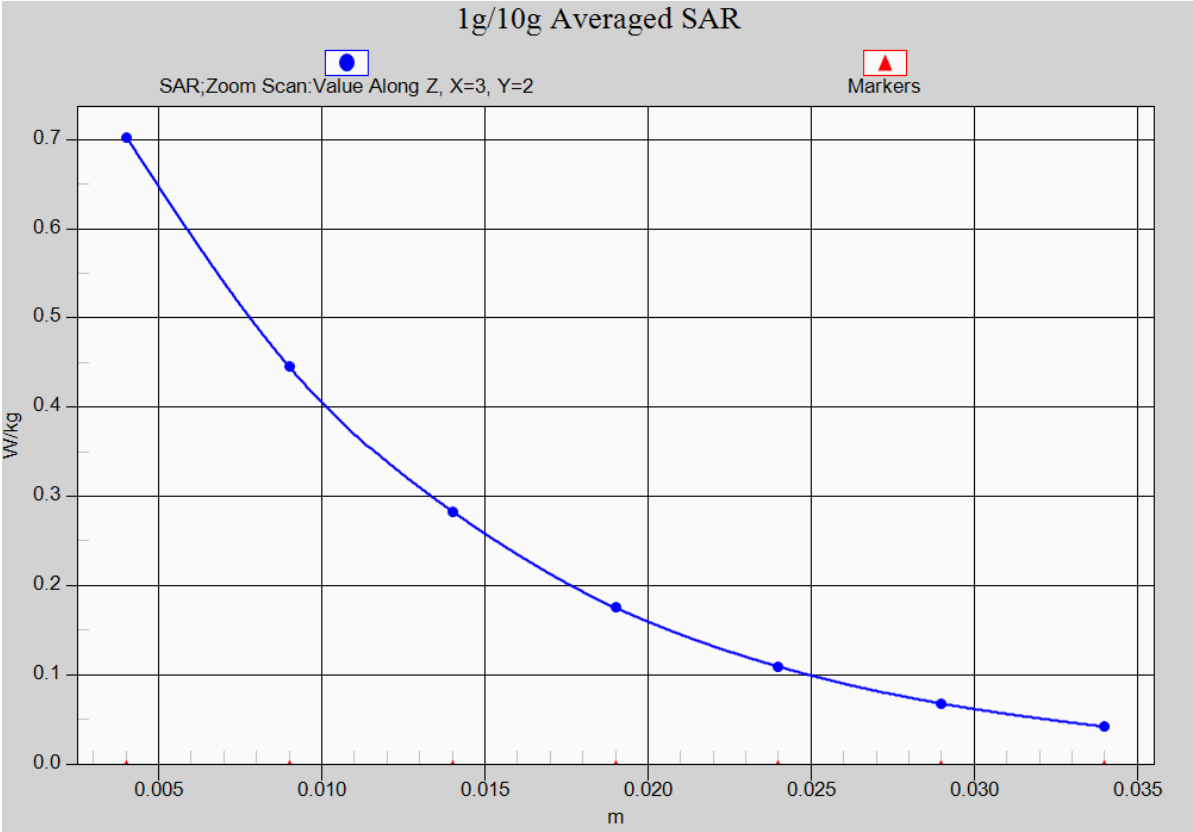


Fig.4-1 Z-Scan at power reference point (1900 MHz CH512)

WCDMA 850 Head Right

Date/Time: 2015-7-6
Electronics: DAE4 Sn786
Medium: Head 900 MHz
Medium parameters used (interpolated): f = 846.6 MHz; σ = 0.938 S/m; ε_r = 41.195; ρ = 1000 kg/m^3
Ambient Temperature:22.0°C Liquid Temperature:21.5°C
Communication System: WCDMA Frequency: 846.6 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(6.04, 6.04, 6.04);

Cheek High/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.702 W/kg

Cheek High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.320 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.814 W/kg
SAR(1 g) = 0.637 W/kg; SAR(10 g) = 0.470 W/kg
Maximum value of SAR (measured) = 0.660 W/kg

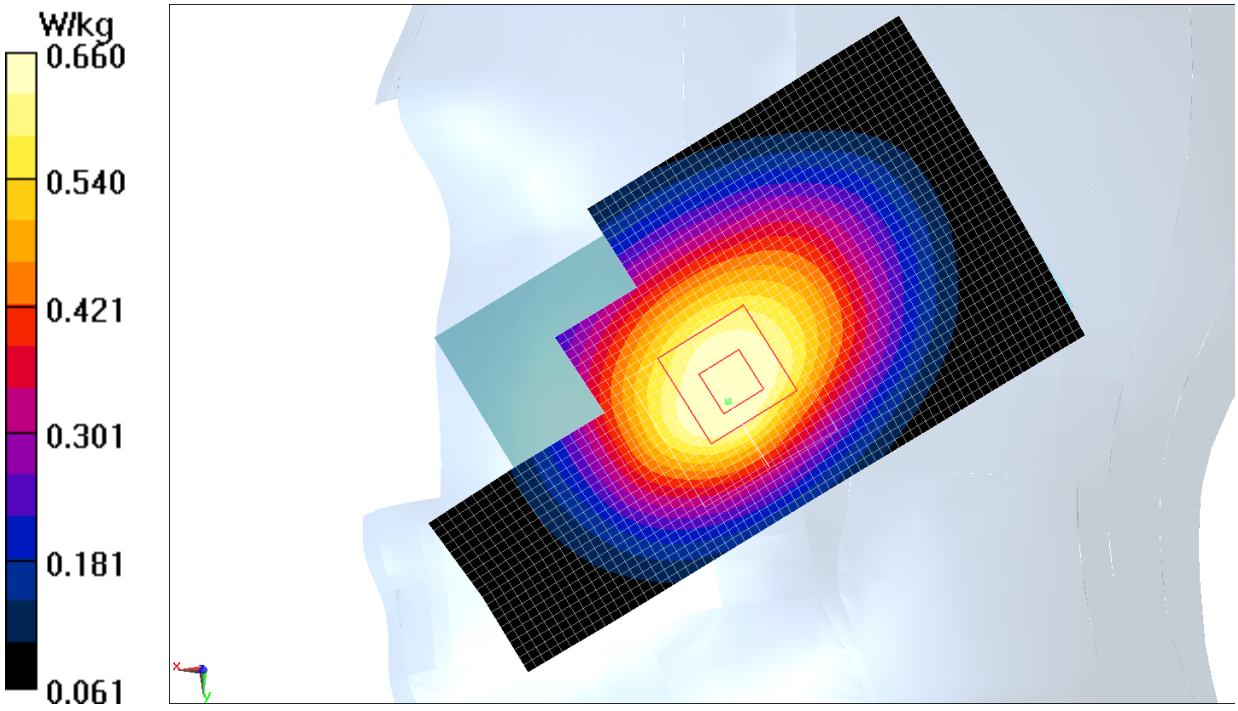


Fig.5 WCDMA 850 CH

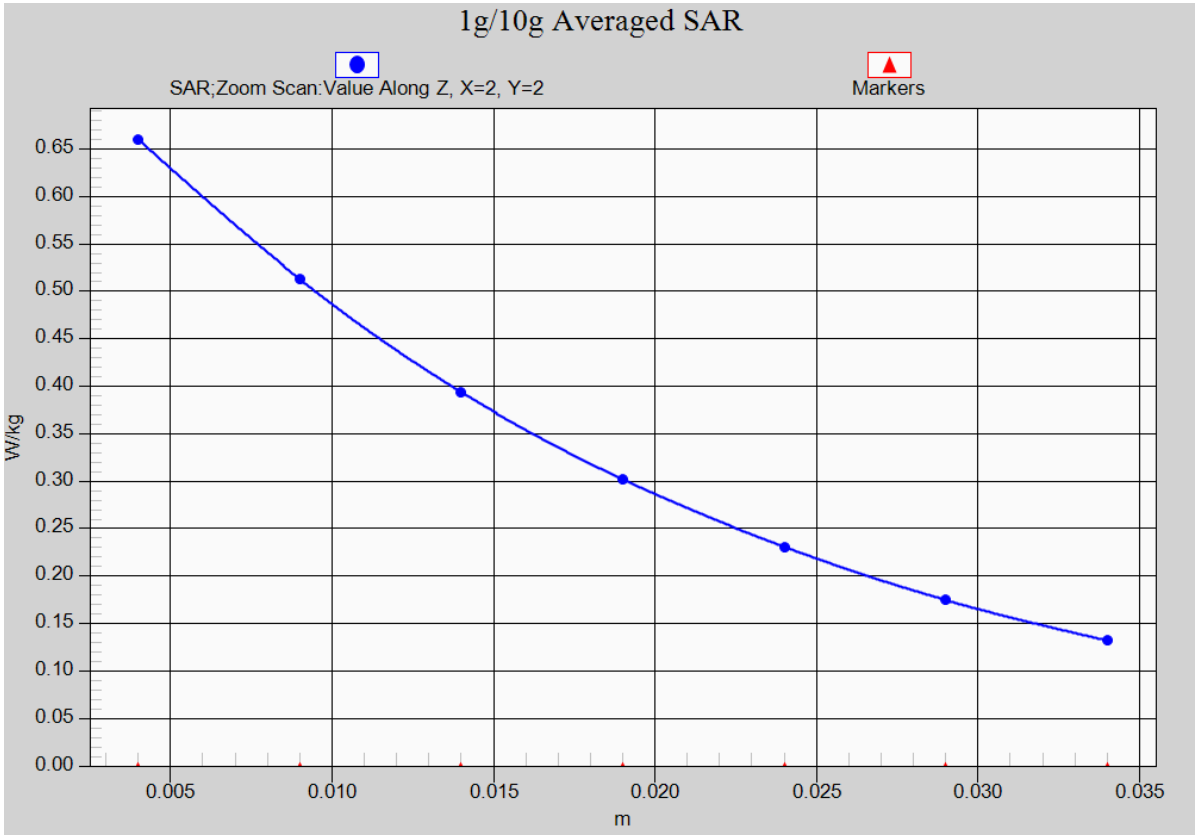


Fig. 5-1 Z-Scan at power reference point (WCDMA 850 CH)

WCDMA 850 Body Rear

Date/Time: 2015-7-10
Electronics: DAE4 Sn786
Medium: Body850 MHz
Medium parameters used (interpolated): f = 846.6 MHz; σ = 0.982 S/m; ε_r = 53.433; ρ = 1000 kg/m^3
Ambient Temperature:22.0°C Liquid Temperature:21.5°C
Communication System: WCDMA Frequency: 846.6 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(6.14, 6.14, 6.14);

Rear side High/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.710 W/kg

Rear side High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.239 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.26 W/kg
SAR(1 g) = 0.794 W/kg; SAR(10 g) = 0.537 W/kg
Maximum value of SAR (measured) = 0.679 W/kg

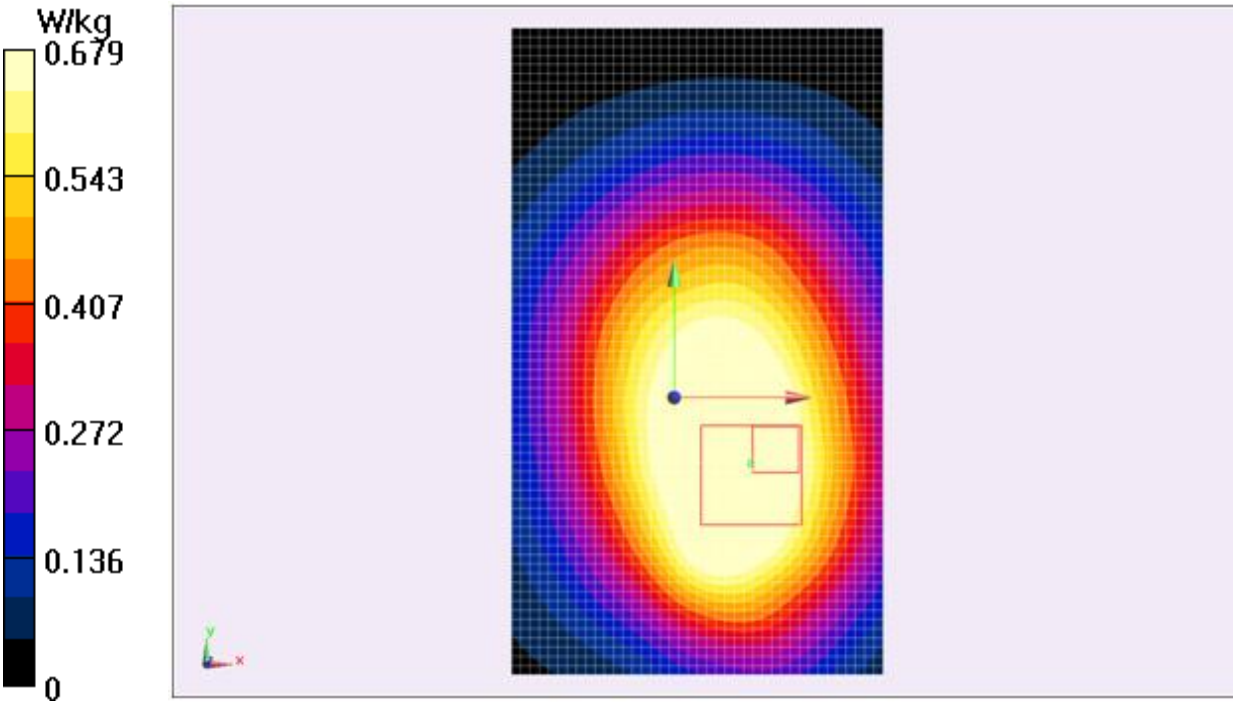


Fig.5 WCDMA 850 CH4233

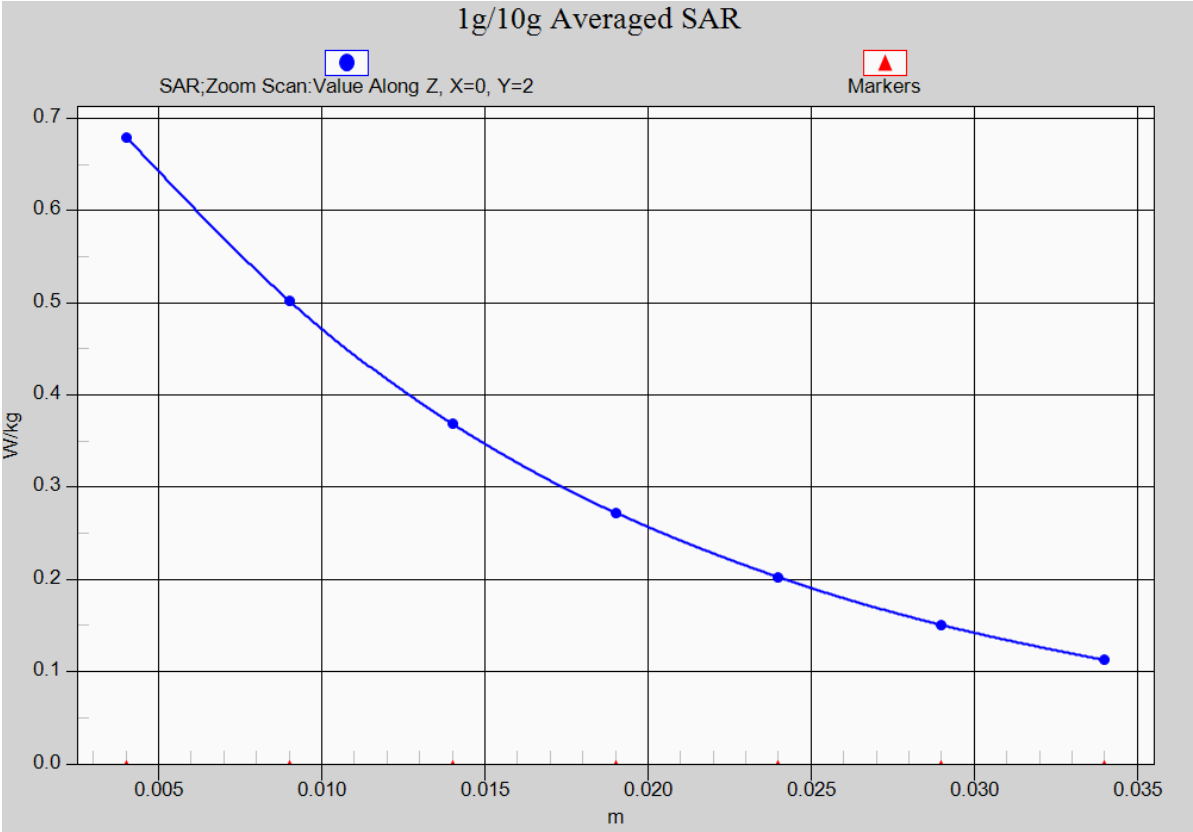


Fig. 5-1 Z-Scan at power reference point (WCDMA 850 CH4233)

WCDMA 1700 Head Left

Date/Time: 2015-7-7
Electronics: DAE4 Sn786
Medium: 1900 Head
Medium parameters used (interpolated): f = 1732.6 MHz; σ = 1.289 S/m; ε_r = 41.089; ρ = 1000 kg/m^3
Ambient Temperature:22.0°C Liquid Temperature:21.5°C
Communication System: WCDMA Frequency: 1732.6 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(5.44, 5.44, 5.44);

Cheek Middle/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.15 W/kg

Cheek Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.561 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.26 W/kg
SAR(1 g) = 0.841 W/kg; SAR(10 g) = 0.525 W/kg
Maximum value of SAR (measured) = 0.876 W/kg

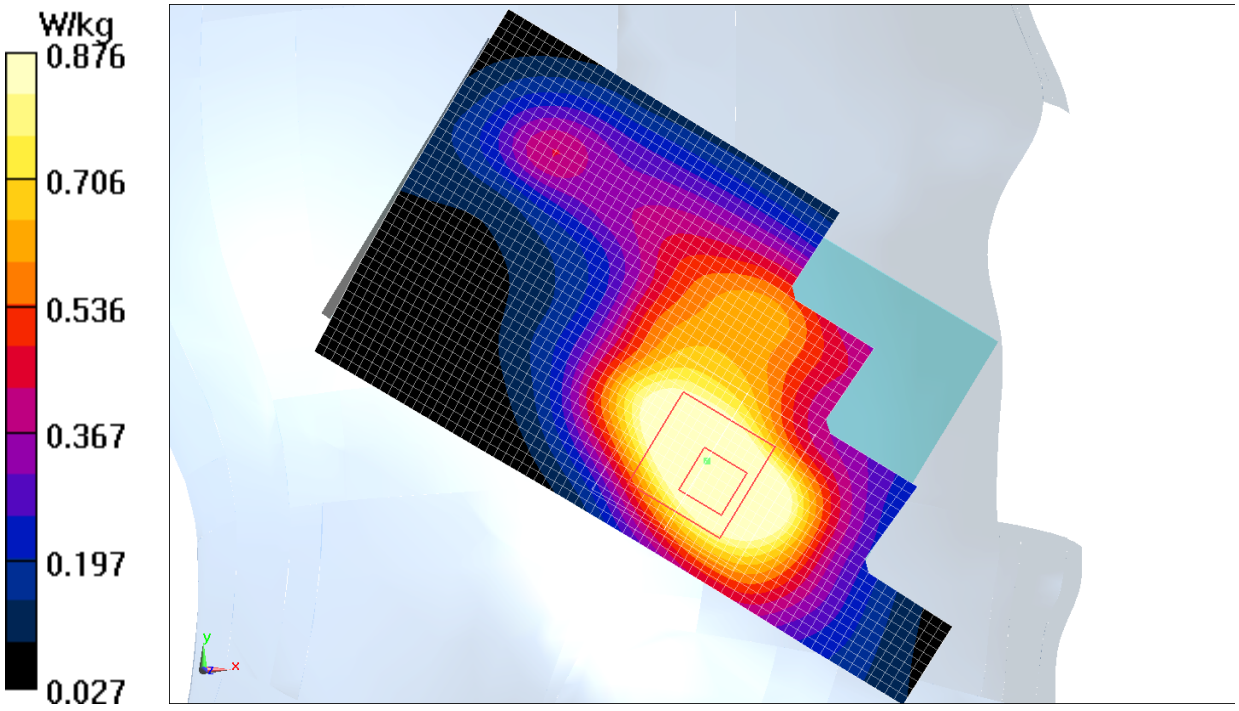


Fig.7 WCDMA 1700 CH1413

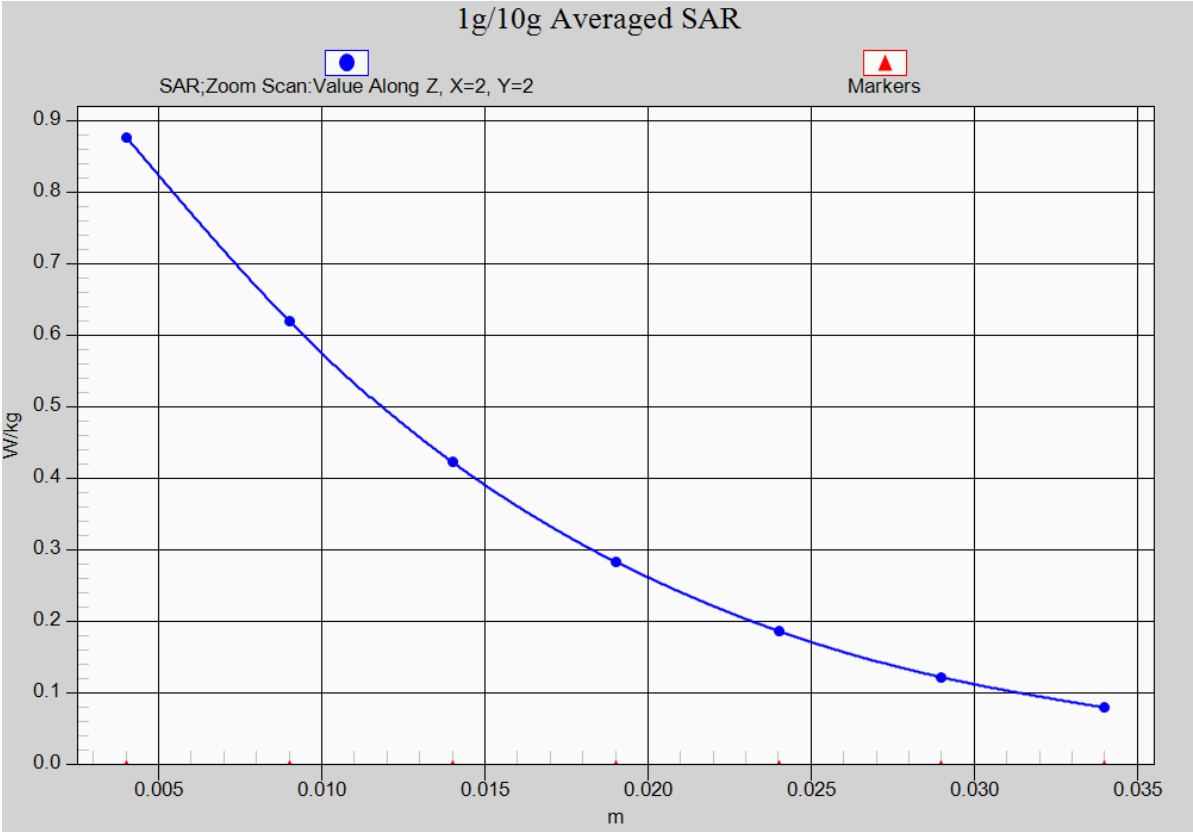


Fig. 7-1 Z-Scan at power reference point (WCDMA 1700 CH1413)

WCDMA 1700 Body Rear

Date/Time: 2015-7-10
Electronics: DAE4 Sn786
Medium: Body 1800
Medium parameters used (interpolated): f = 1752.6 MHz; σ = 1.473 S/m; ε_r = 53.468; ρ = 1000 kg/m^3
Ambient Temperature:22.0°C Liquid Temperature:21.5°C
Communication System: WCDMA Frequency: 1752.6 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(5.03, 5.03, 5.03);

Rear side High/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.03 W/kg

Rear side High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.726 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.53 W/kg
SAR(1 g) = 1.09 W/kg; SAR(10 g) = 0.680 W/kg
Maximum value of SAR (measured) = 1.26 W/kg

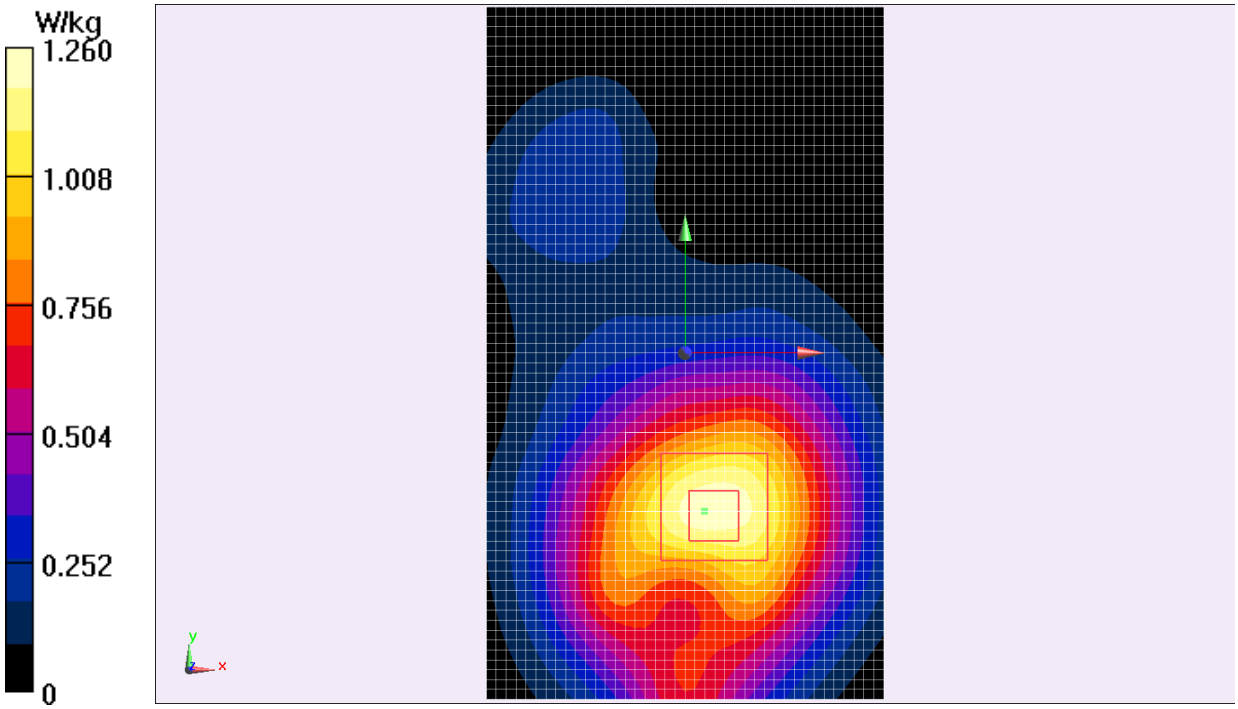


Fig.8 WCDMA 1700 CH1513

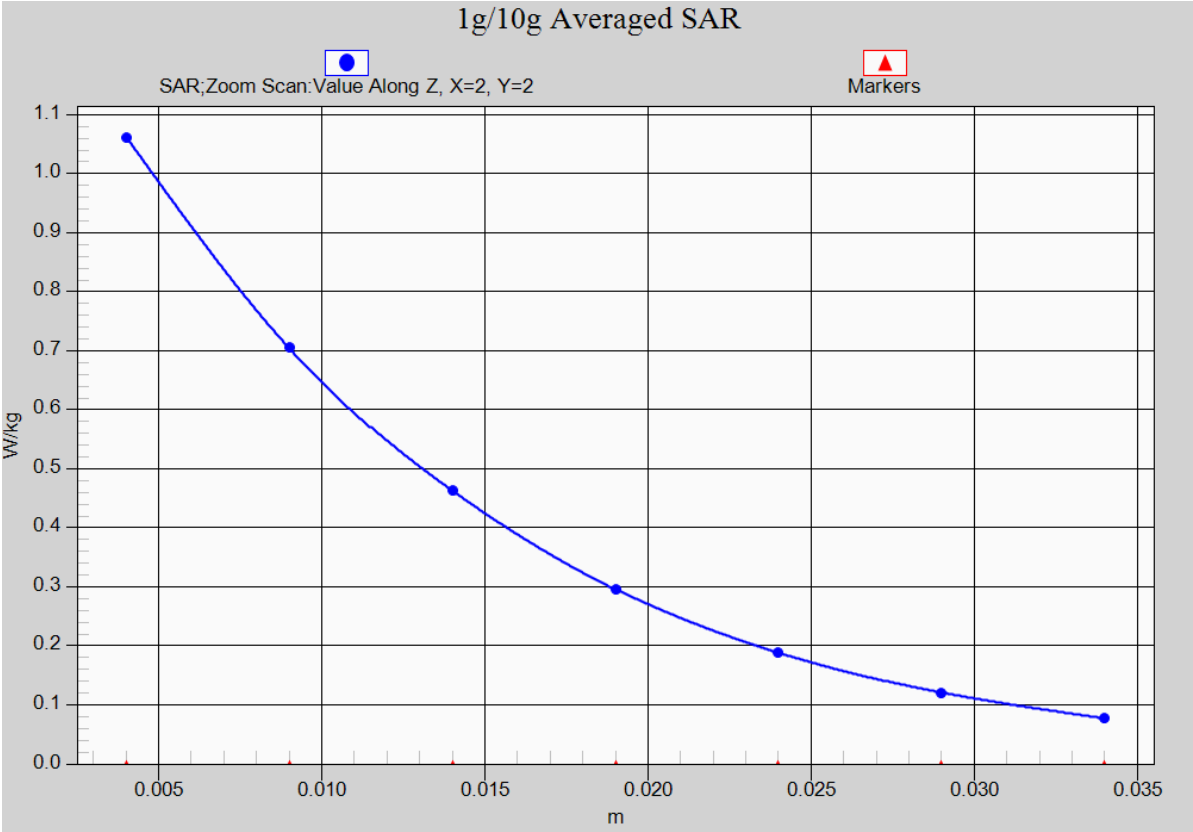


Fig. 8-1 Z-Scan at power reference point (WCDMA1700 CH1513)

WCDMA 1900 Head Right

Date/Time: 2015-7-6
Electronics: DAE4 Sn786
Medium: 1900 Head
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.397 S/m; ε_r = 40.561; ρ = 1000 kg/m^3
Ambient Temperature:22.0°C Liquid Temperature:21.5°C
Communication System: WCDMA Frequency: 1852.4 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(5.16, 5.16, 5.16);

Cheek High/Area Scan (51x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.13 W/kg

Cheek High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.145 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 2.17 W/kg
SAR(1 g) = 0.852 W/kg; SAR(10 g) = 0.430 W/kg
Maximum value of SAR (measured) = 0.894 W/kg

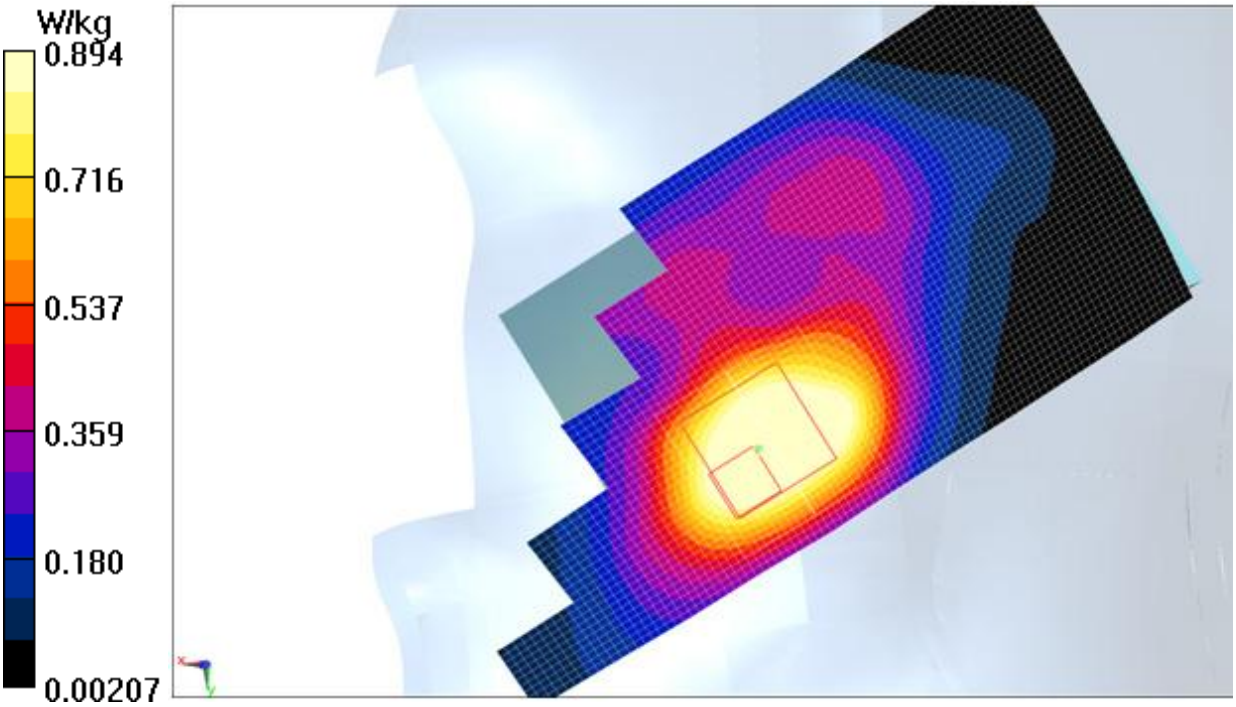


Fig.9 WCDMA1900 CH9538

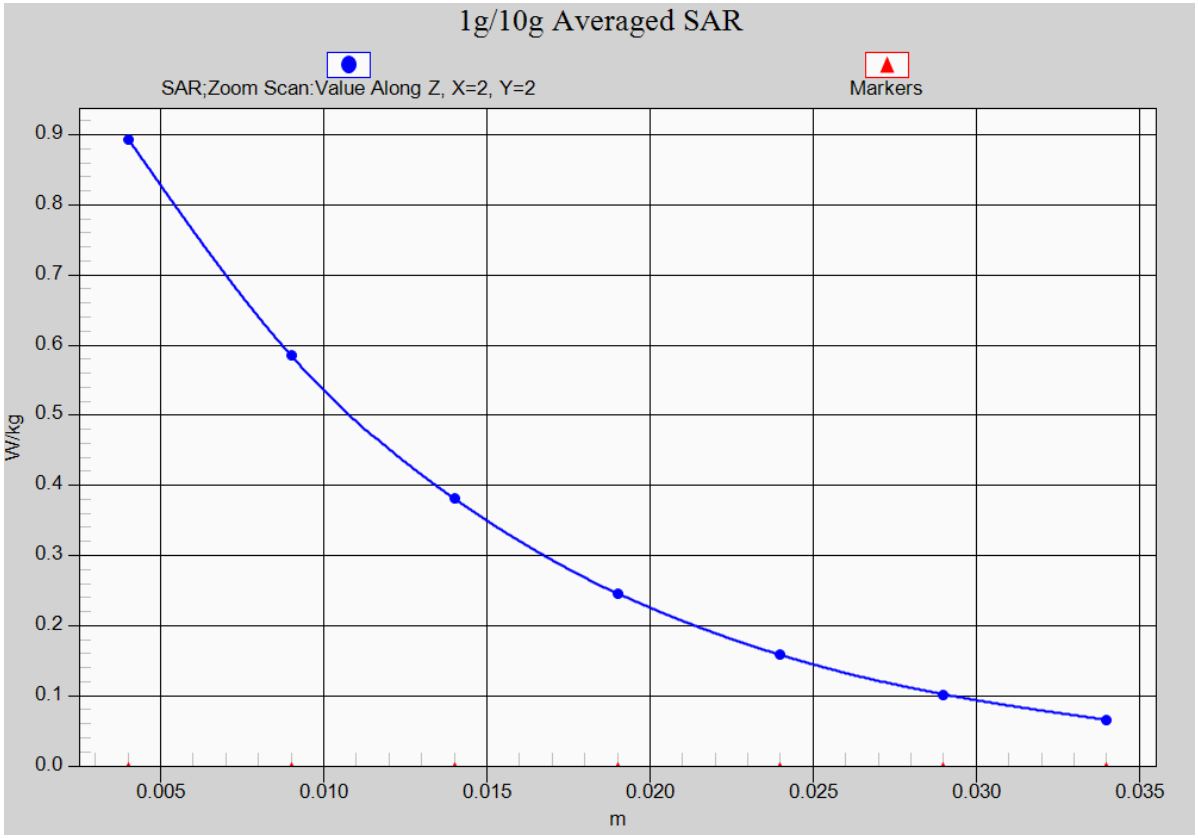


Fig. 9-1 Z-Scan at power reference point (WCDMA1900 CH9538)

WCDMA 1900 Body Rear

Date/Time: 2015-7-10
Electronics: DAE4 Sn786
Medium: 1900 Body
Medium parameters used: f = 1880 MHz; σ = 1.522 S/m; ε_r = 50.841; ρ = 1000 kg/m^3
Ambient Temperature:22.0°C Liquid Temperature:21.5°C
Communication System: WCDMA Frequency: 1880 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(4.77, 4.77, 4.77);

Rear side High/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.885 W/kg

Rear side High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.418 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.41 W/kg
SAR(1 g) = 0.975 W/kg; SAR(10 g) = 0.545 W/kg
Maximum value of SAR (measured) = 0.946 W/kg

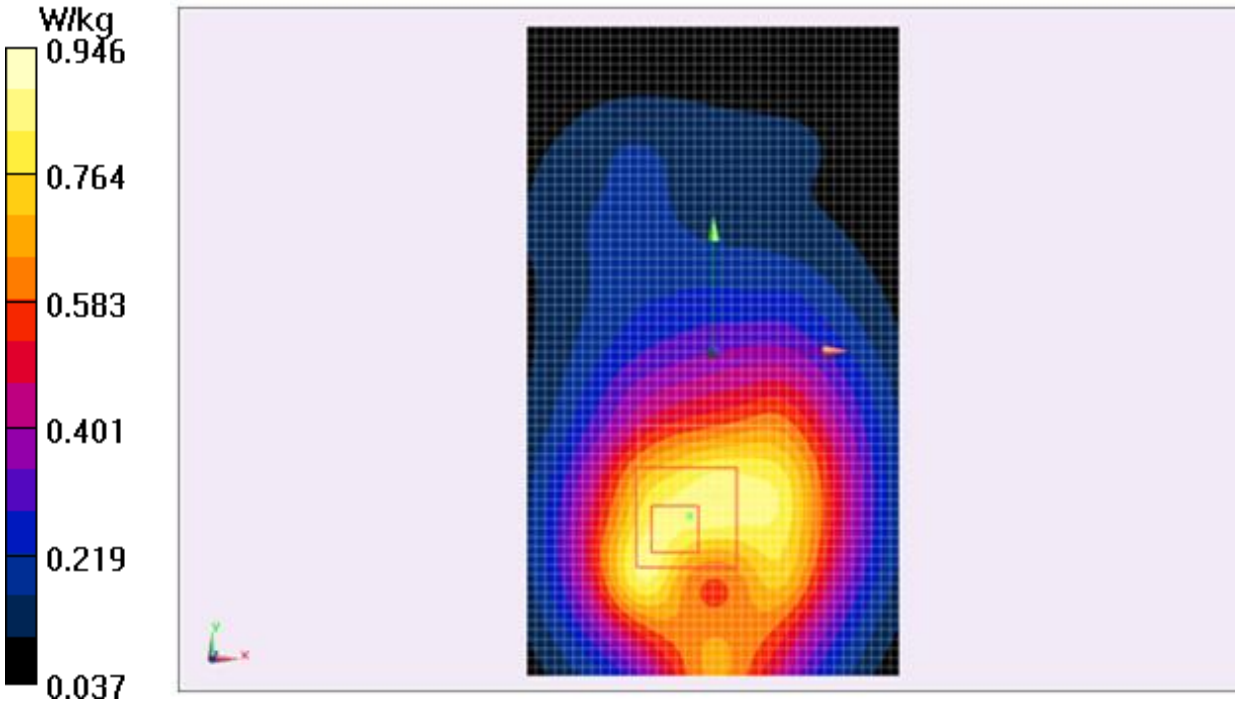


Fig.10 WCDMA1900 CH9538

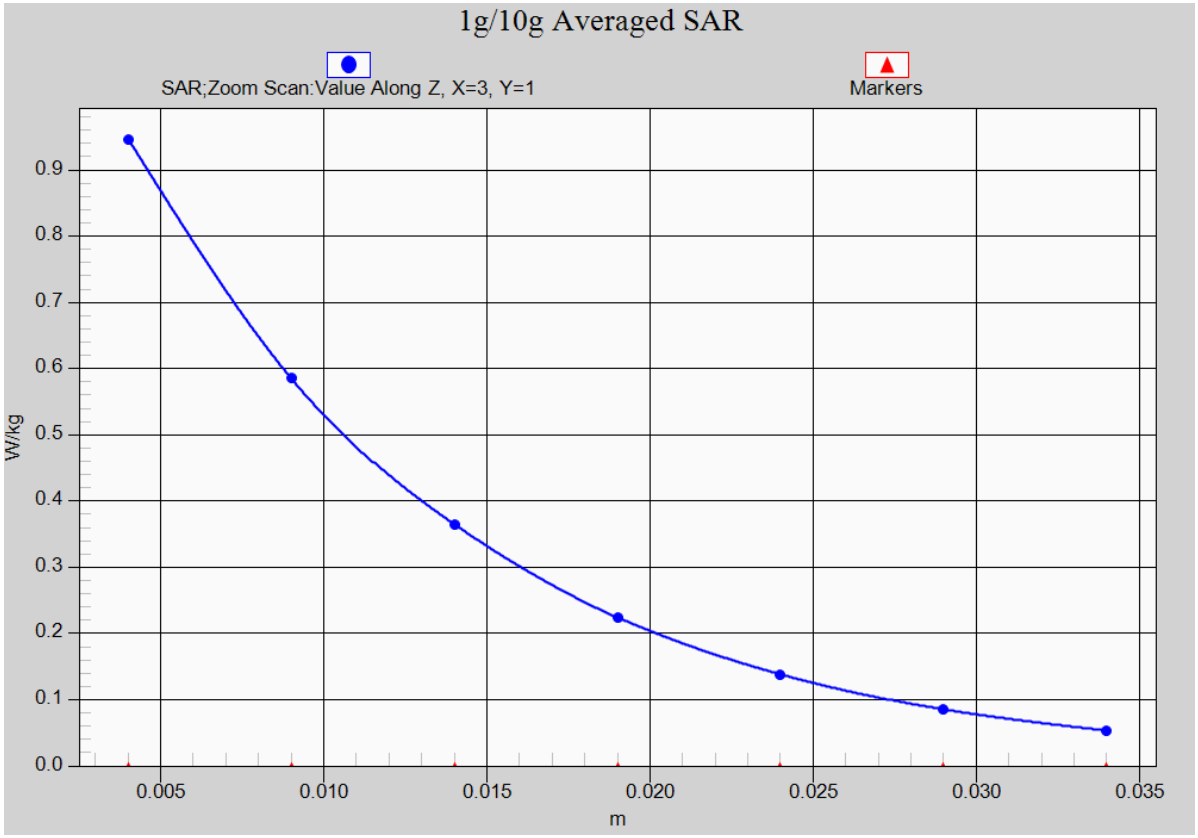


Fig. 10-1 Z-Scan at power reference point (WCDMA1900 CH9538)

Wifi 802.11b Head Left

Date/Time: 2015-7-11
Electronics: DAE4 Sn786
Medium: Head 2450
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.863 S/m; ε_r = 39.377; ρ = 1000 kg/m^3
Ambient Temperature:22.0°C Liquid Temperature:21.5°C
Communication System: WiFi Frequency: 2437 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(4.71, 4.71, 4.71);

Cheek High/Area Scan (51x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.397 W/kg

Cheek High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.040 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.692 W/kg
SAR(1 g) = 0.324 W/kg; SAR(10 g) = 0.173 W/kg
Maximum value of SAR (measured) = 0.333 W/kg

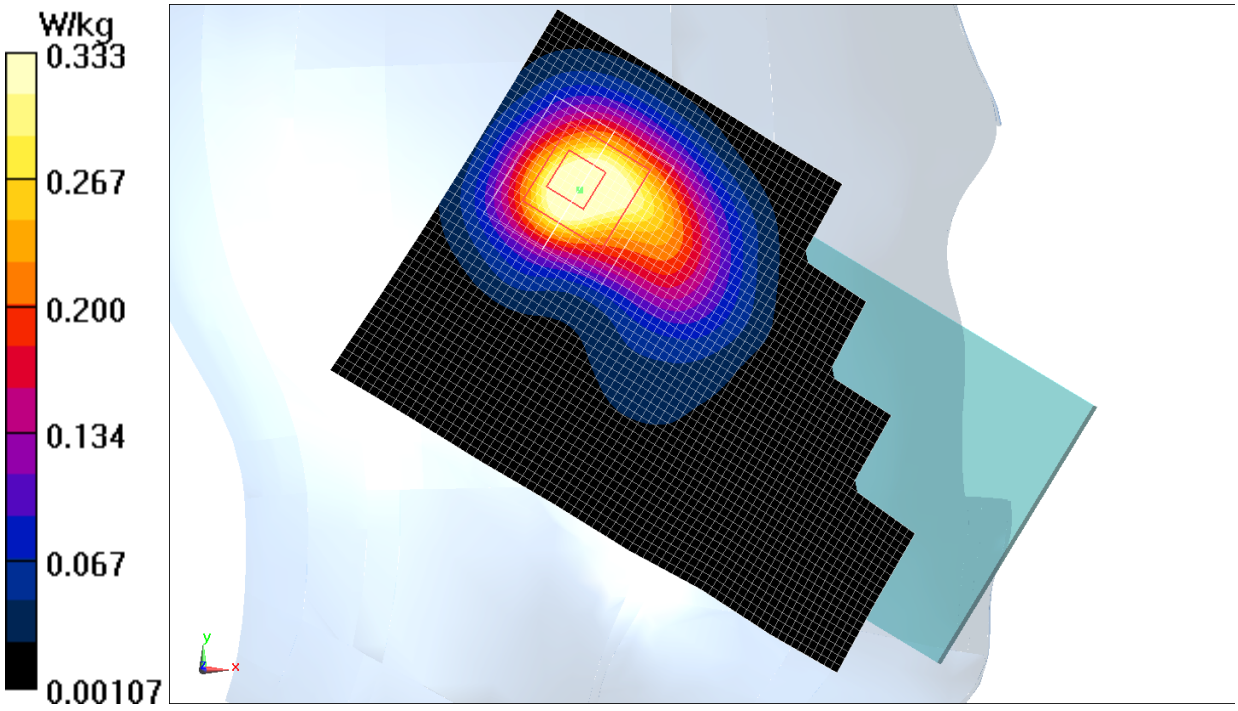


Fig.11 2450 MHz CH11

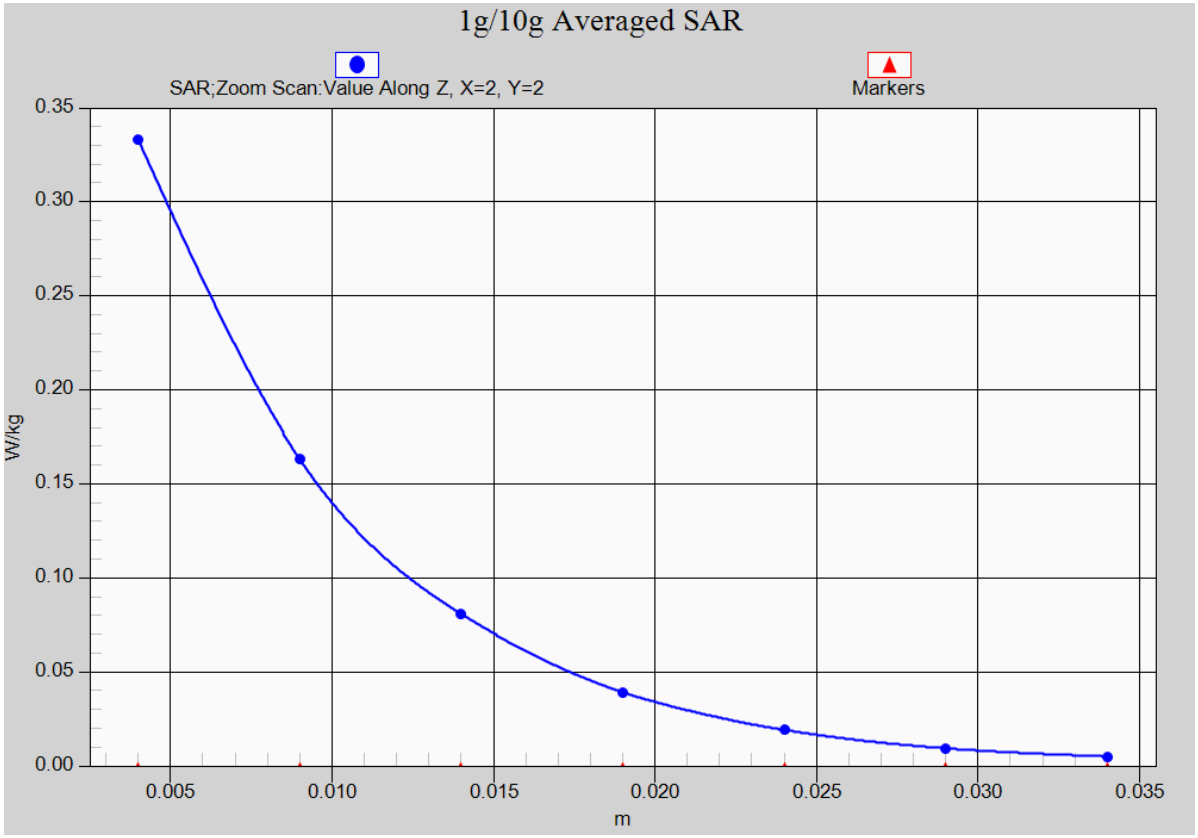


Fig. 11-1 Z-Scan at power reference point (2450 MHz CH11)

Wifi 802.11b Body Rear
Date/Time: 2015-7-8
Electronics: DAE4 Sn786
Medium: Body 2450
Medium parameters used: f = 2462 MHz; σ = 1.993 S/m; ε_r = 51.249; ρ = 1000 kg/m^3
Ambient Temperature:22.0°C Liquid Temperature:21.5°C
Communication System: WiFi Frequency: 2462 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(4.42, 4.42, 4.42);

Rear side High/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.221 W/kg

Rear side High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.846 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.362 W/kg
SAR(1 g) = 0.198 W/kg; SAR(10 g) = 0.110 W/kg
Maximum value of SAR (measured) = 0.216 W/kg

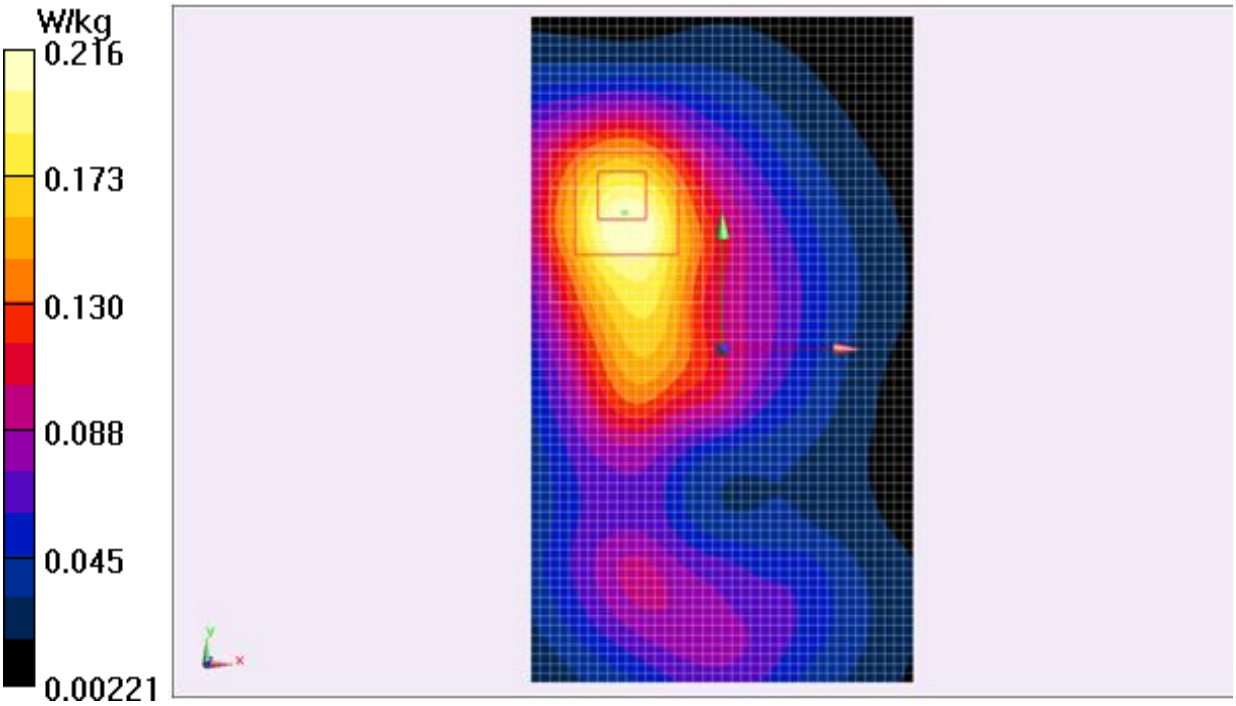


Fig.12 2450 MHz CH11

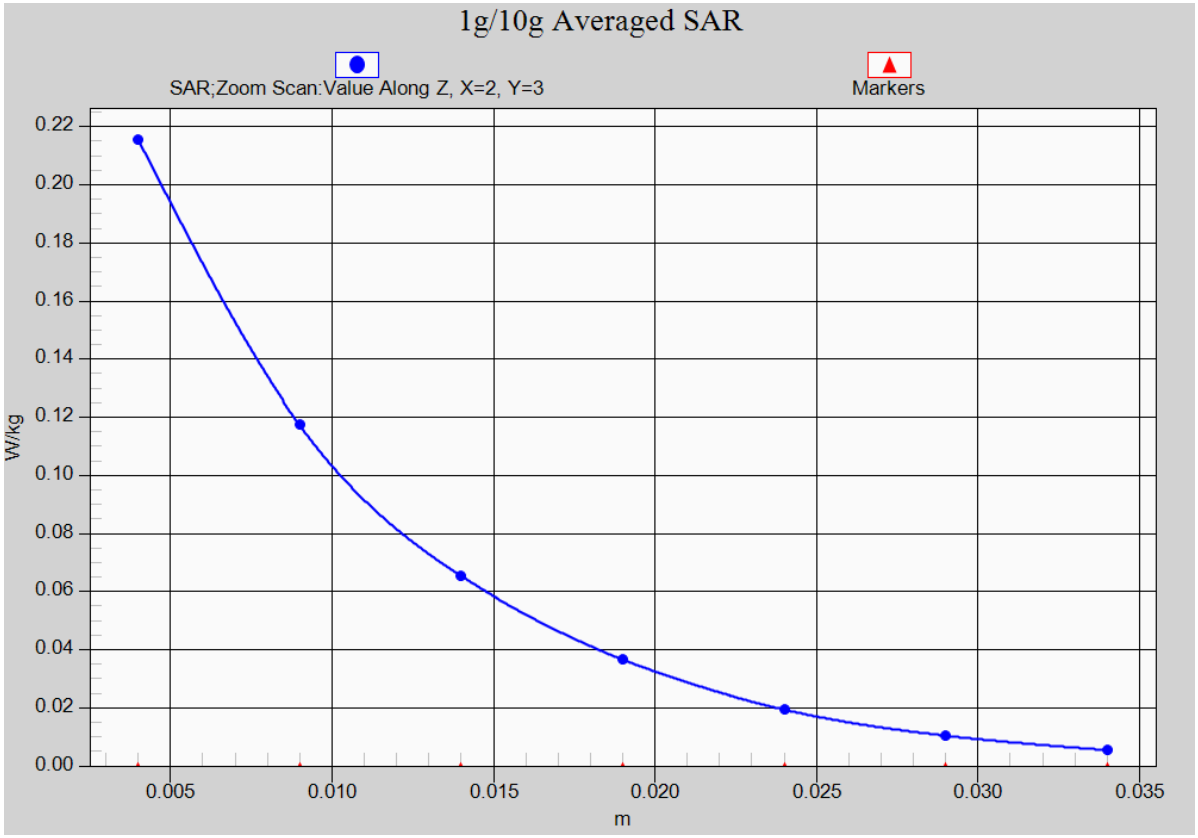


Fig. 12-1 Z-Scan at power reference point (2450 MHz CH11)

ANNEX B System Verification Results

835MHz

Date/Time: 2015-7-6
Electronics: DAE4 Sn786
Medium: Head 900 MHz
Medium parameters used (interpolated): f = 835 MHz; σ = 0.928 S/m; ε_r = 41.364; ρ = 1000 kg/m^3
Ambient Temperature:23.3^{o}C Liquid Temperature:22.8^{o}C
Communication System: CW_TMC Frequency: 835 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(6.04, 6.04, 6.04);

GSM835 Head/Area Scan (61x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Fast SAR: SAR(1 g) = 2.47 W/kg; SAR(10 g) = 1.56 W/kg
Maximum value of SAR (interpolated) = 2.68 W/kg

GSM835 Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.127 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 3.88 W/kg
SAR(1 g) = 2.48 W/kg; SAR(10 g) = 1.58 W/kg
Maximum value of SAR (measured) = 2.68 W/kg

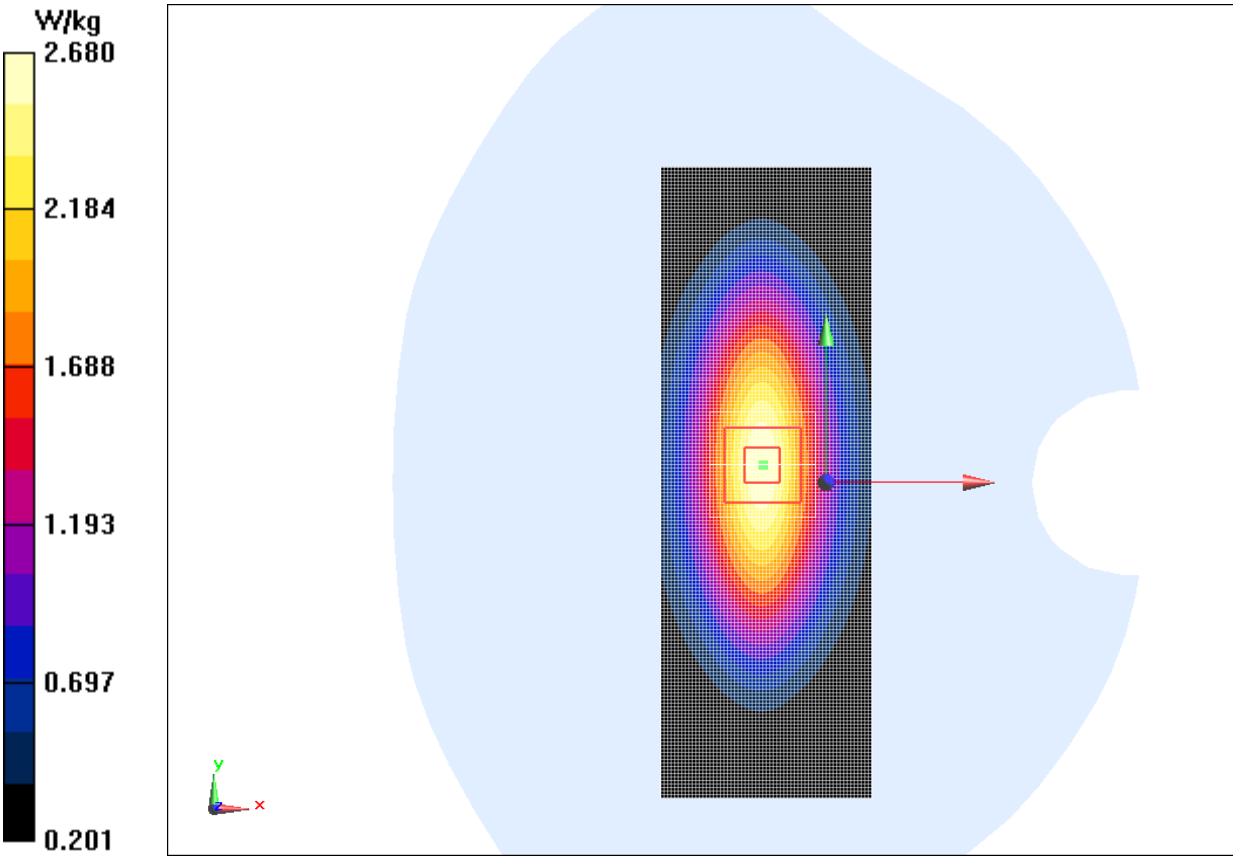


Fig.B.1 validation 835MHz 250mW

835MHz
Date/Time: 2015-7-10
Electronics: DAE4 Sn786
Medium: Body 900 MHz
Medium parameters used (interpolated): f = 835 MHz; σ = 0.933 S/m; ε_r = 53.231; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature:22.5°C
Communication System: CW_TMC Frequency: 835 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(6.14, 6.14, 6.14);

Configuration/ GSM835 Body/Area Scan (61x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Fast SAR: SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.48 W/kg
Maximum value of SAR (interpolated) = 2.57 W/kg

Configuration/ GSM835 Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.375 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 3.54 W/kg
SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.59 W/kg
Maximum value of SAR (measured) = 2.62 W/kg

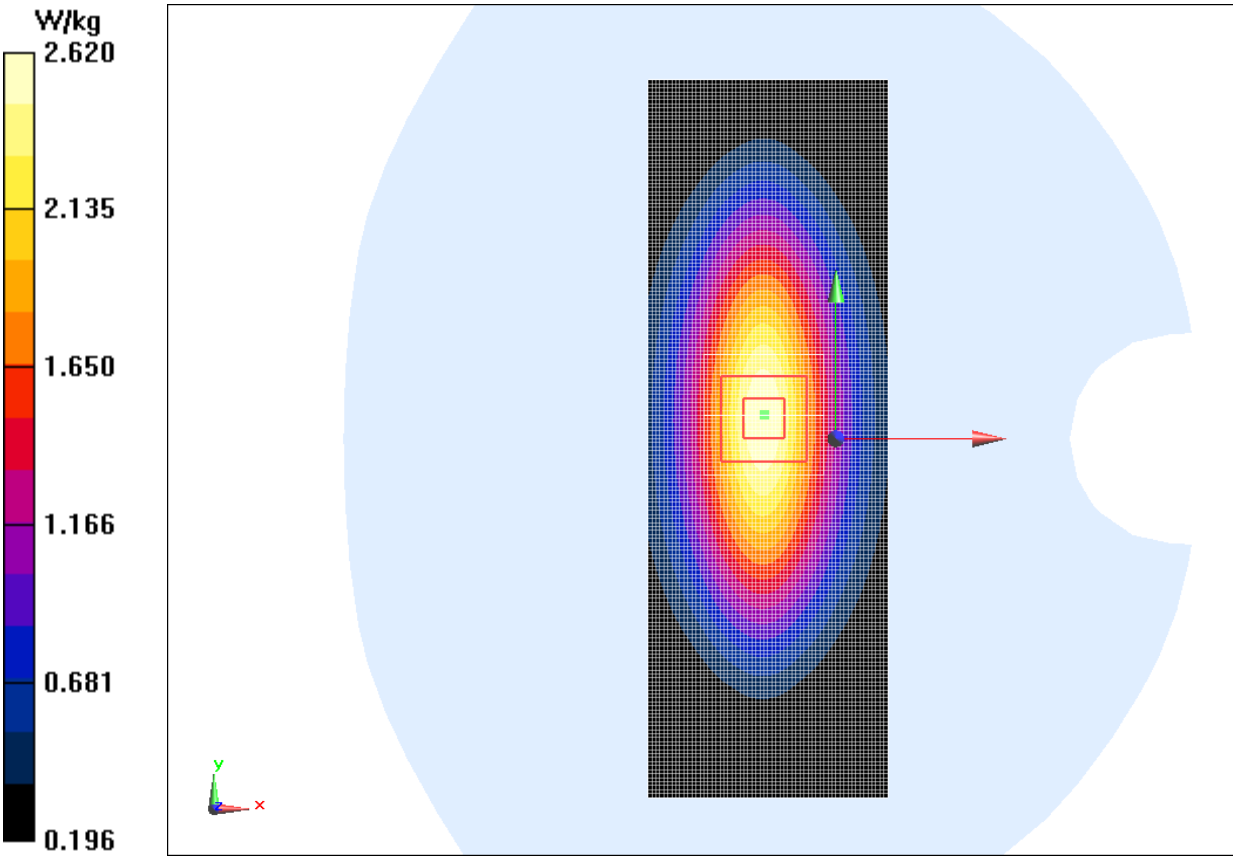


Fig.B.2 validation 835MHz 250mW

1800MHz
Date/Time: 2015-7-7
Electronics: DAE4 Sn786
Medium: Head 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.41 S/m; ε_r = 40.652; ρ = 1000 kg/m^3
Ambient Temperature:23.5°C Liquid Temperature:23.0°C
Communication System: CW_TMC Frequency: 1800 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(5.44, 5.44, 5.44);

GSM1800 Head/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Fast SAR: SAR(1 g) = 9.38 W/kg; SAR(10 g) = 4.91 W/kg
Maximum value of SAR (interpolated) = 11.5 W/kg

GSM1800 Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.632 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 9.42 W/kg; SAR(10 g) = 5.06 W/kg
Maximum value of SAR (measured) = 10.6 W/kg

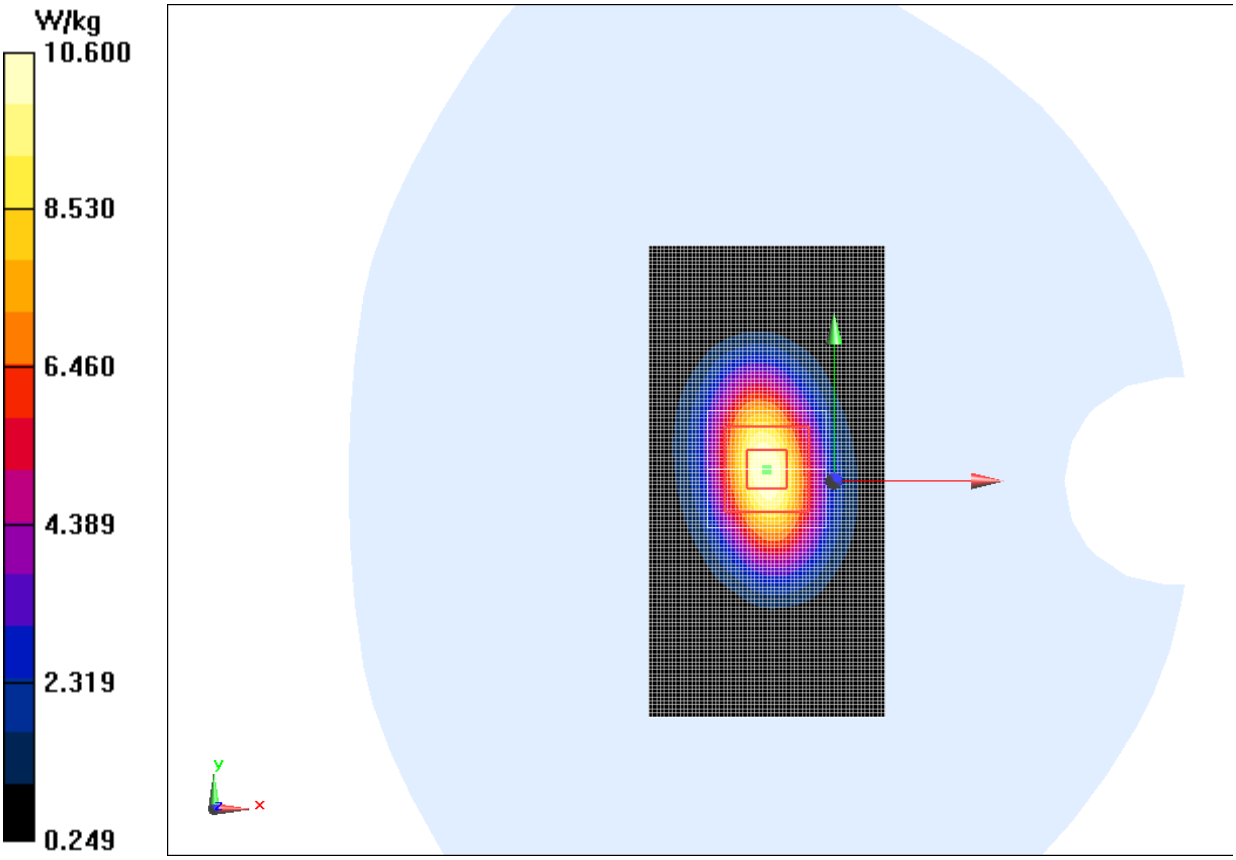


Fig.B.3 validation 1900MHz 250mW

1800MHz
Date/Time: 2015-7-10
Electronics: DAE4 Sn786
Medium: Body 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.494 S/m; ε_r = 52.172; ρ = 1000 kg/m^3
Ambient Temperature:23.2°C Liquid Temperature:22.5°C
Communication System: CW_TMC Frequency: 1800 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(5.03, 5.03, 5.03);

GSM1800 Body/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Fast SAR: SAR(1 g) = 9.89W/kg; SAR(10 g) = 5.13W/kg
Maximum value of SAR (interpolated) = 11.7 W/kg

GSM1800 Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.133 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 19.2 W/kg
SAR(1 g) = 9.92 W/kg; SAR(10 g) = 5.21 W/kg
Maximum value of SAR (measured) = 10.9 W/kg

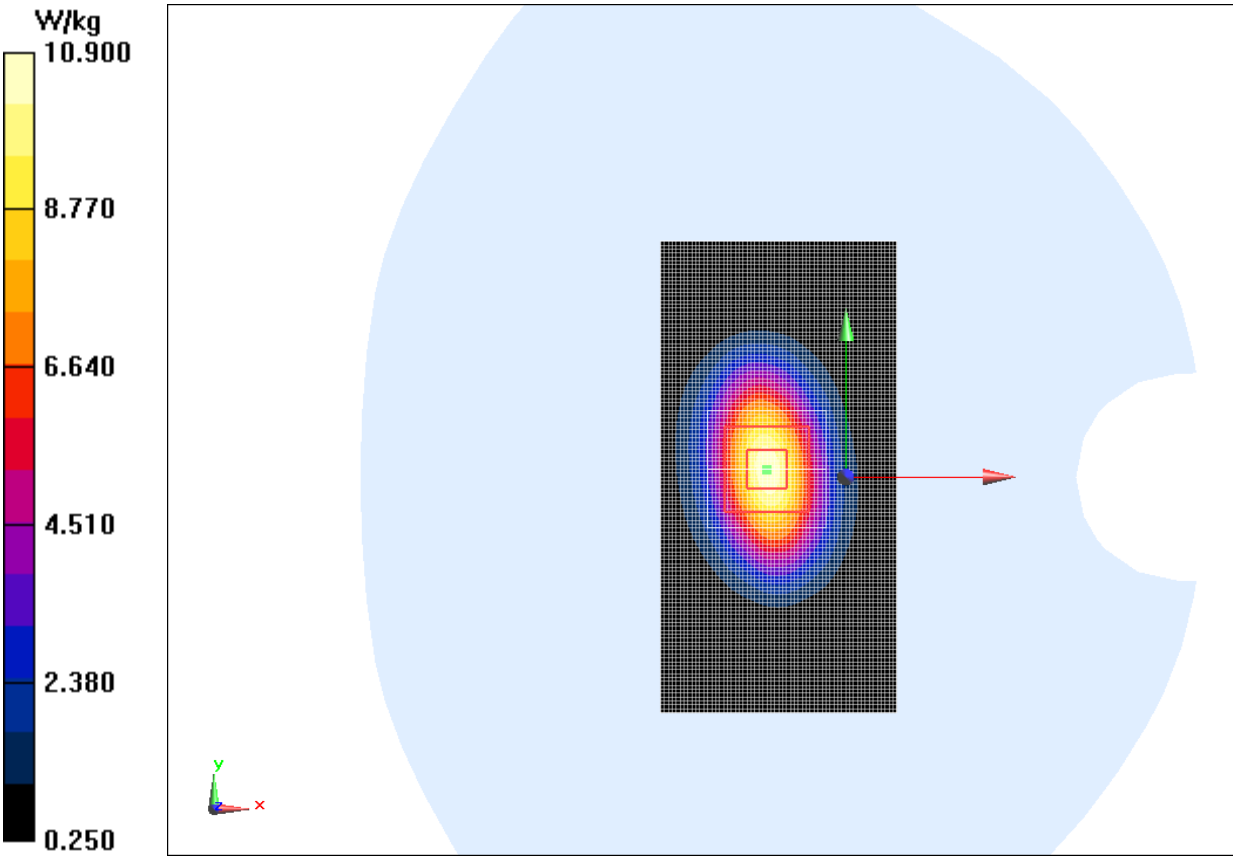


Fig.B.4 validation 1900MHz 250mW

1900MHz
Date/Time: 2015-7-6
Electronics: DAE4 Sn786
Medium: 1900 Head
Medium parameters used: f = 1900 MHz; σ = 1.409 S/m; ε_r = 40.368; ρ = 1000 kg/m^3
Ambient Temperature:23.5°C Liquid Temperature:23.0°C
Communication System: CW_TMC Frequency: 1900 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(5.16, 5.16, 5.16);

GSM1900 Head/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Fast SAR: SAR(1 g) = 10.0 W/kg; SAR(10 g) = 5.09 W/kg
Maximum value of SAR (interpolated) = 10.5 W/kg

GSM1900 Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 85.703 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.28 W/kg
Maximum value of SAR (measured) = 11.5 W/kg

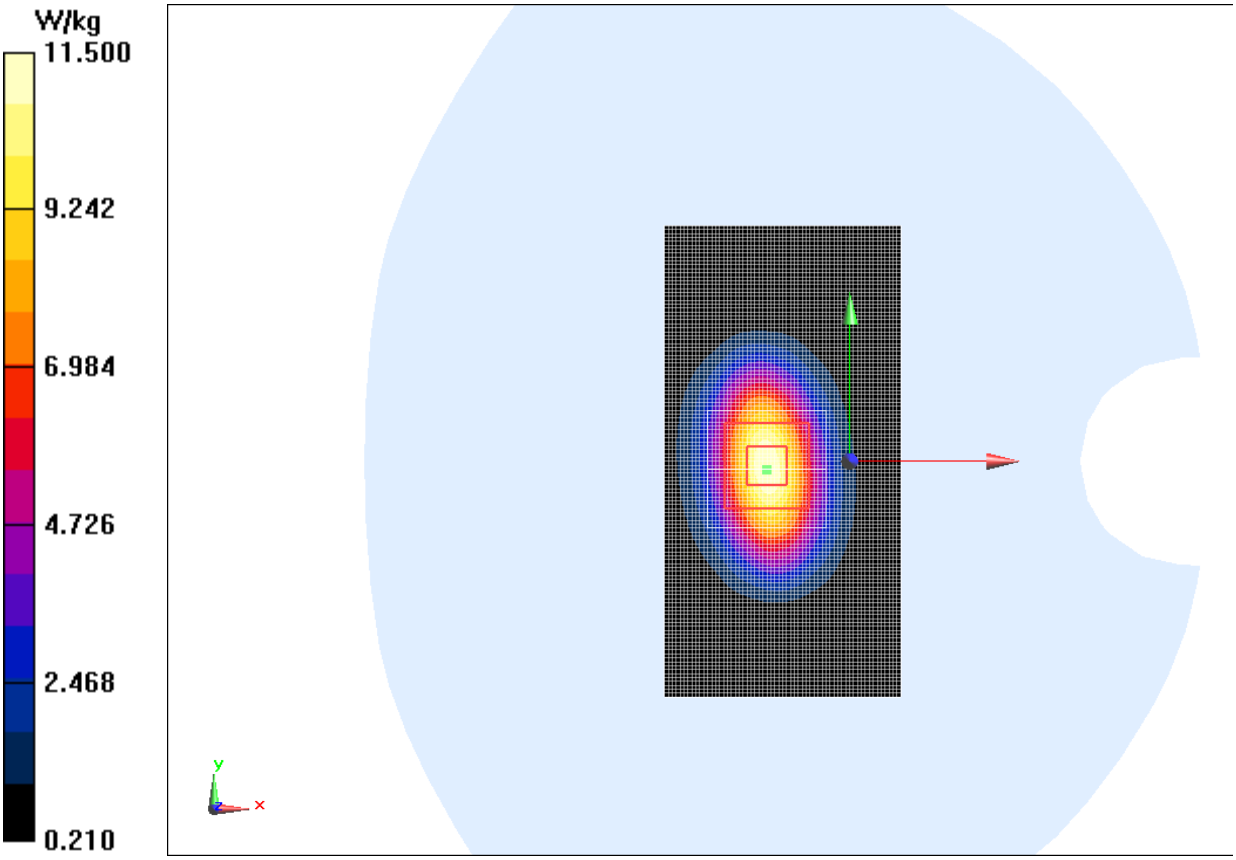


Fig.B.3 validation 1900MHz 250mW

1900MHz
Date/Time: 2015-7-10
Electronics: DAE4 Sn786
Medium: 1900 Head
Medium parameters used: f = 1900 MHz; σ = 1.556 S/m; ε_r = 51.187; ρ = 1000 kg/m^3
Ambient Temperature:23.0°C Liquid Temperature:22.5°C
Communication System: CW_TMC Frequency: 1900 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(4.77, 4.77, 4.77);

GSM1900 Body/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Fast SAR: SAR(1 g) = 9.82 W/kg; SAR(10 g) = 5.06 W/kg
Maximum value of SAR (interpolated) = 10.9 W/kg

GSM1900 Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.341 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 19.5 W/kg
SAR(1 g) = 9.91 W/kg; SAR(10 g) = 5.19 W/kg
Maximum value of SAR (measured) = 11.1 W/kg

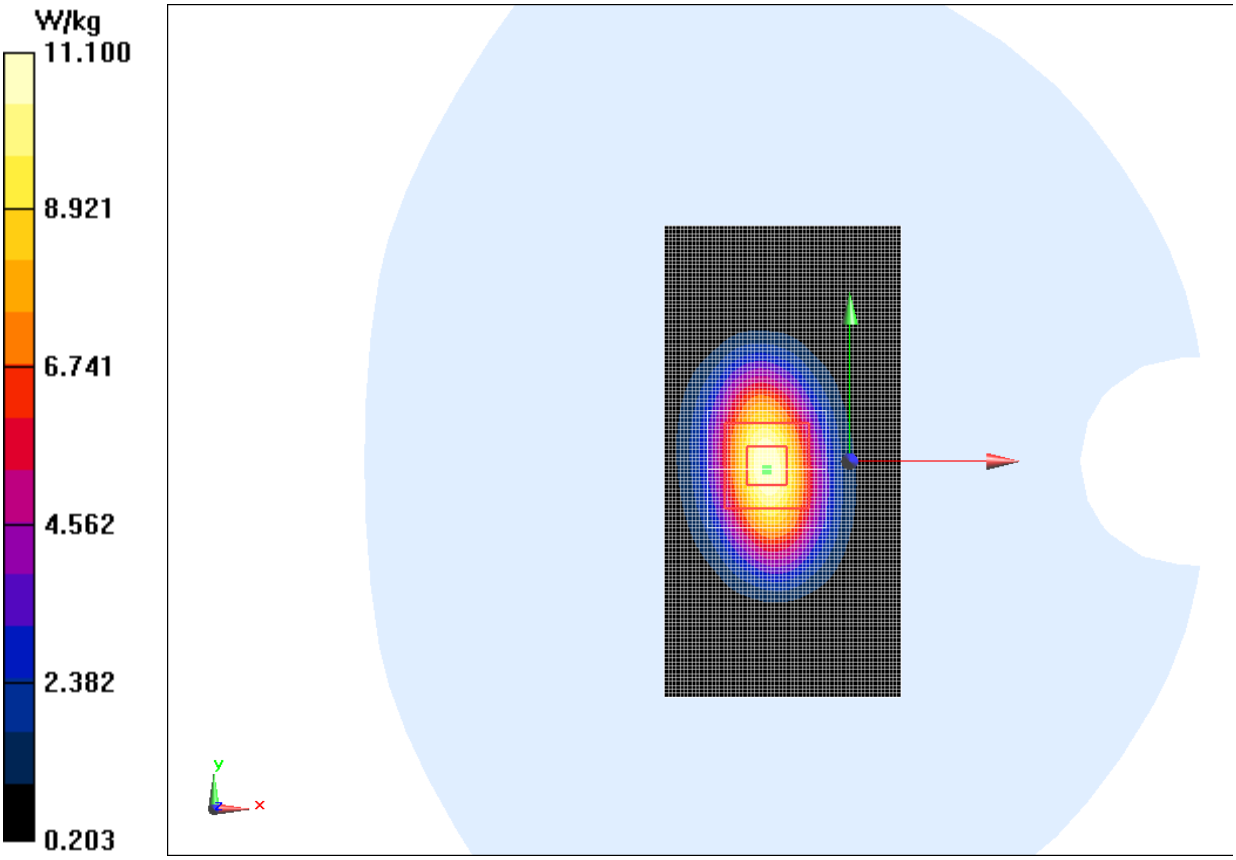


Fig.B.4 validation 1900MHz 250mW

2450MHz
Date/Time: 2015-7-11
Electronics: DAE4 Sn786
Medium: Head 2450
Medium parameters used: f = 2450 MHz; σ = 1.874 S/m; ε_r = 37.816; ρ = 1000 kg/m^3
Ambient Temperature:22.6°C Liquid Temperature:22.1°C
Communication System: CW_TMC Frequency: 2450 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(4.71, 4.71, 4.71);

Wifi 2450 Head/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Fast SAR: SAR(1 g) = 13.1 W/kg; SAR(10 g) = 5.98 W/kg
Maximum value of SAR (interpolated) = 15.4 W/kg

Wifi 2450 Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.057 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 28.2 W/kg
SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.06 W/kg
Maximum value of SAR (measured) = 15.0 W/kg

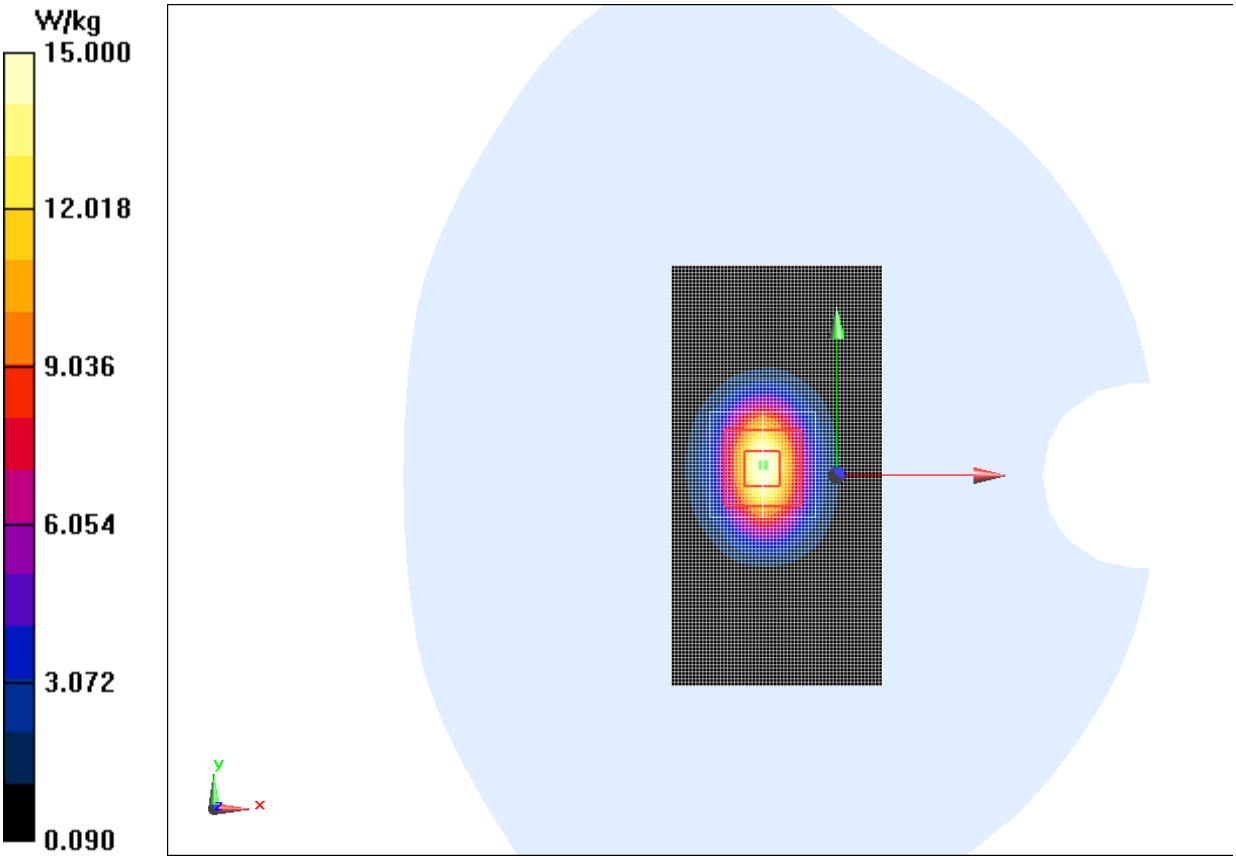


Fig.B.5 validation 2450MHz 250mW

2450MHz
Date/Time: 2015-7-8
Electronics: DAE4 Sn786
Medium: Head 2450
Medium parameters used: f = 2450 MHz; σ = 1.976 S/m; ε_r = 51.275; ρ = 1000 kg/m^3
Ambient Temperature:22.6°C Liquid Temperature:22.1°C
Communication System: CW_TMC Frequency: 2450 MHz Duty Cycle: 1:1
Probe: ES3DV3 - SN3151 ConvF(4.42, 4.42, 4.42);

Wifi 2450 Body/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Fast SAR: SAR(1 g) = 12.89 W/kg; SAR(10 g) = 5.85 W/kg
Maximum value of SAR (interpolated) = 15.7 W/kg

Wifi 2450 Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.365 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 28.2 W/kg
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.05 W/kg
Maximum value of SAR (measured) = 15.0 W/kg

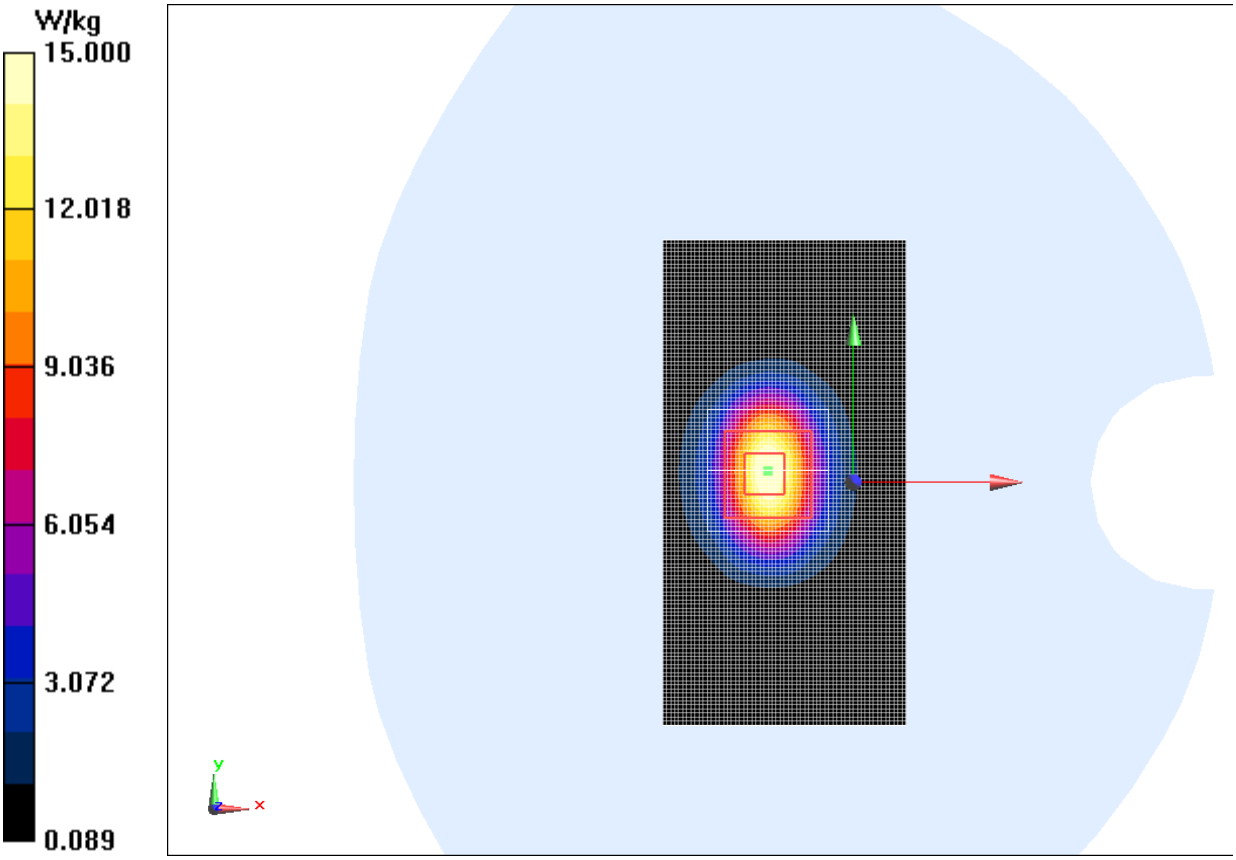


Fig.B.6 validation 2450MHz 250mW

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.

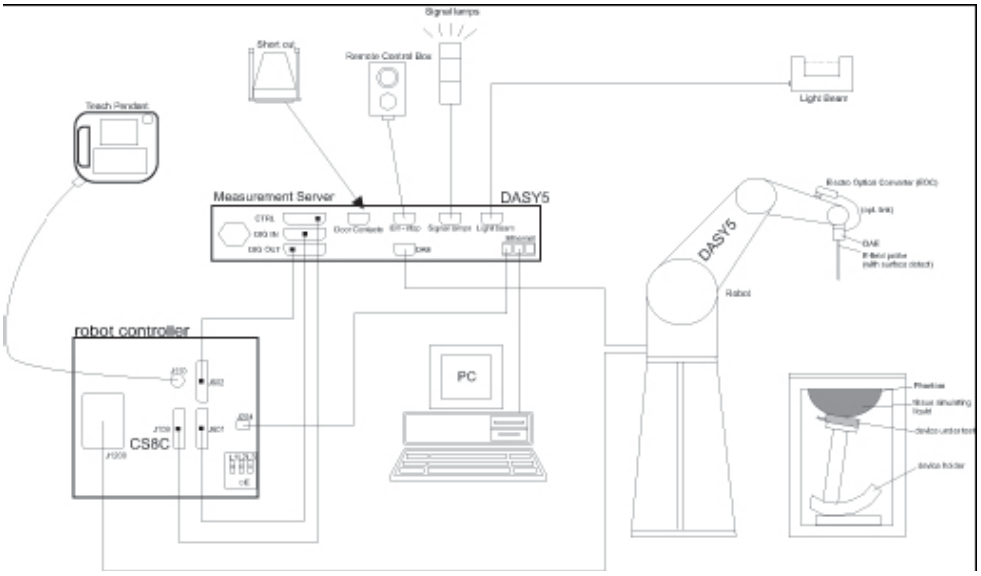
Table B.1 Comparison between area scan and zoom scan for system verification

Band	Position	Area scan (1g)	Zoom scan (1g)	Drift (%)
835	Head	2.46	2.47	-0.40
835	Body	2.40	2.41	-0.41
1800	Head	9.39	9.41	-0.21
1800	Body	9.59	9.65	-0.62
1900	Head	10.1	10.2	-0.98
1900	Body	9.81	9.89	-0.81
2450	Head	13.1	13.2	-0.76
2450	Body	12.89	13	-0.85

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.