GSM850_CH128 Rear
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: body 835 MHz
Medium parameters used: f = 824.2; σ = 0.978 mho/m; εr = 56.11; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: GSM850 824.2 Duty Cycle: 1：4
Probe: EX3DV4 – SN3617 ConvF(9.61,9.61,9.61)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.679 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.6 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.724 W/kg
SAR(1 g) = 0.561 W/kg; SAR(10 g) = 0.434 W/kg
Maximum value of SAR (measured) = 0.667 W/kg

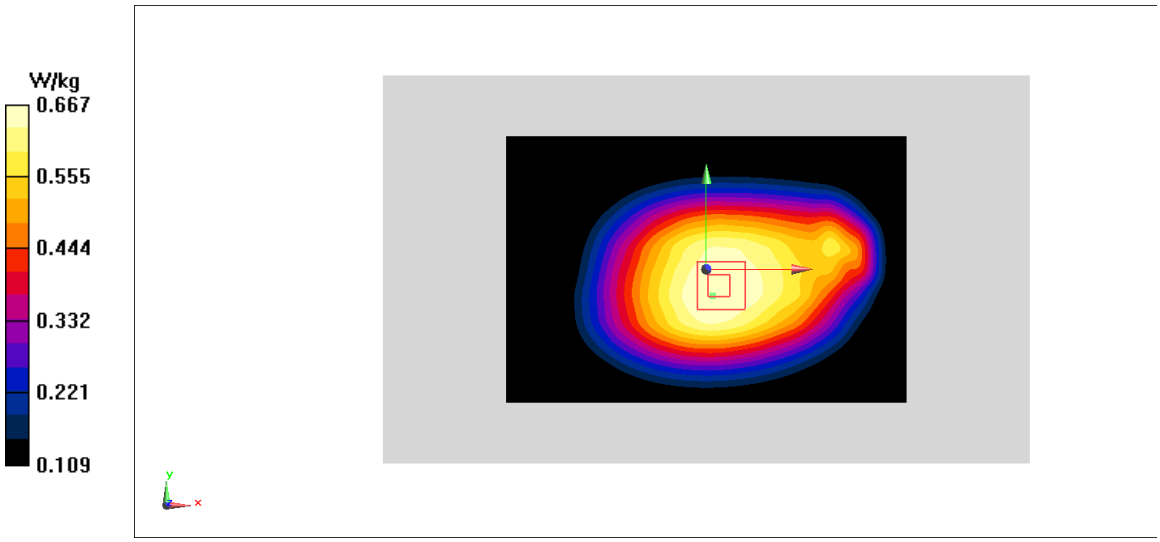


Fig A.2

PCS1900_CH661 Right Cheek
Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: head 1900 MHz
Medium parameters used: f = 1880; σ = 1.371 mho/m; εr = 39.57; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: PCS1900 1880 Duty Cycle: 1：8.3
Probe: EX3DV4 – SN3617 ConvF(8.14,8.14,8.14)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.744 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.61 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 0.892 W/kg
SAR(1 g) = 0.159 W/kg; SAR(10 g) = 0.097 W/kg
Maximum value of SAR (measured) = 0.757 W/kg

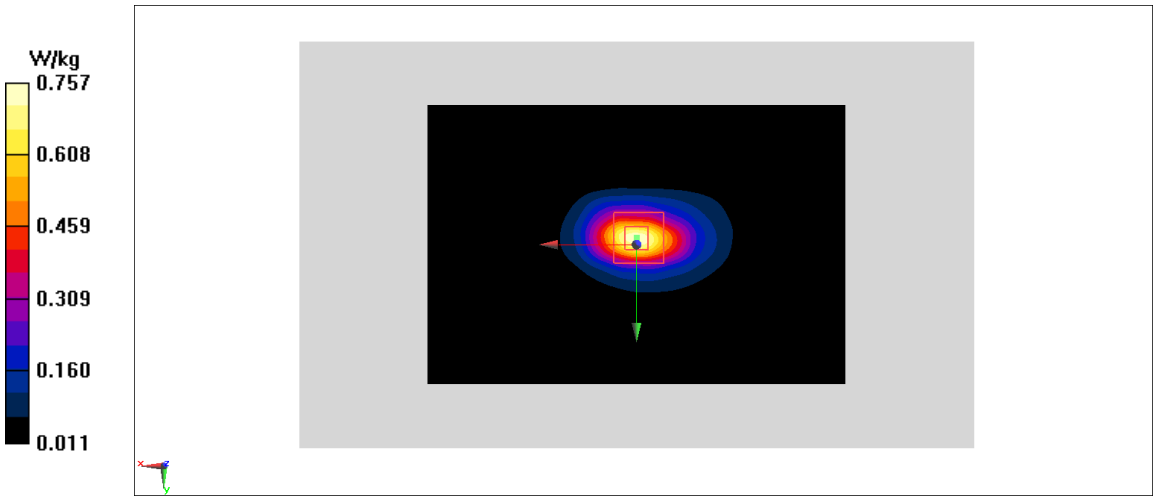


Fig A.3

PCS1900_CH661 Bottom
Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: body 1900 MHz
Medium parameters used: f = 1880; σ = 1.517 mho/m; εr = 53.21; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: PCS1900 1880 Duty Cycle: 1：4
Probe: EX3DV4 – SN3617 ConvF(7.78,7.78,7.78)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.32 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.621 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.54 W/kg
SAR(1 g) = 0.516 W/kg; SAR(10 g) = 0.271 W/kg
Maximum value of SAR (measured) = 1.33 W/kg

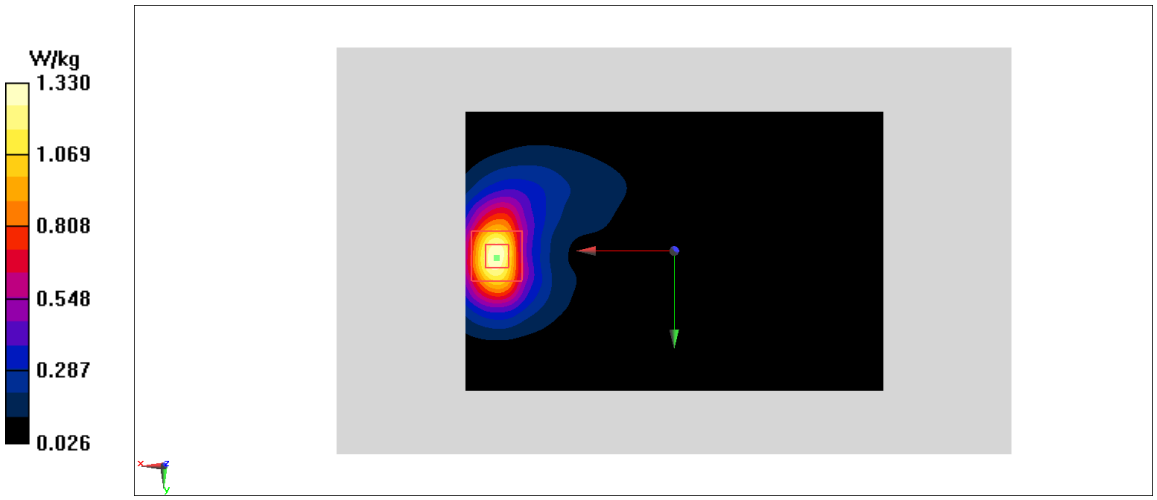


Fig A.4

PCS1900_CH512 Rear
Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: body 1900 MHz
Medium parameters used: f = 1850.2; σ = 1.488 mho/m; εr = 53.25; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: PCS1900 1850.2 Duty Cycle: 1：4
Probe: EX3DV4 – SN3617 ConvF(7.78,7.78,7.78)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.744 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.61 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.892 W/kg
SAR(1 g) = 0.925 W/kg; SAR(10 g) = 0.516 W/kg
Maximum value of SAR (measured) = 0.757 W/kg

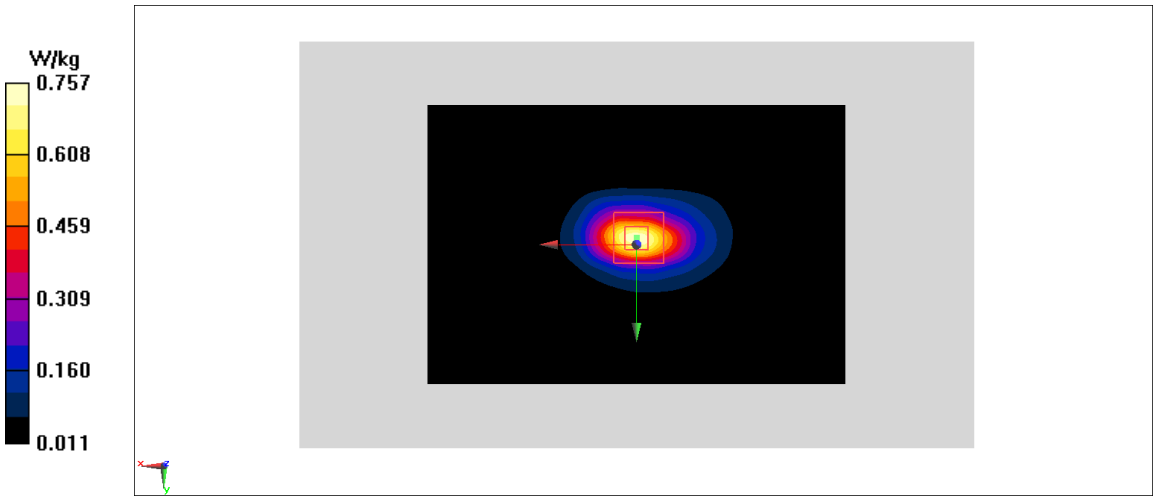


Fig A.5

WCDMA1900-BII_CH9538 Right Cheek
Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: head 1900 MHz
Medium parameters used: f = 1907.6; σ = 1.398 mho/m; εr = 39.54; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: WCDMA1900-BII 1907.6 Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(8.14,8.14,8.14)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.199 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.868 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.219 W/kg
SAR(1 g) = 0.139 W/kg; SAR(10 g) = 0.0858 W/kg
Maximum value of SAR (measured) = 0.19 W/kg

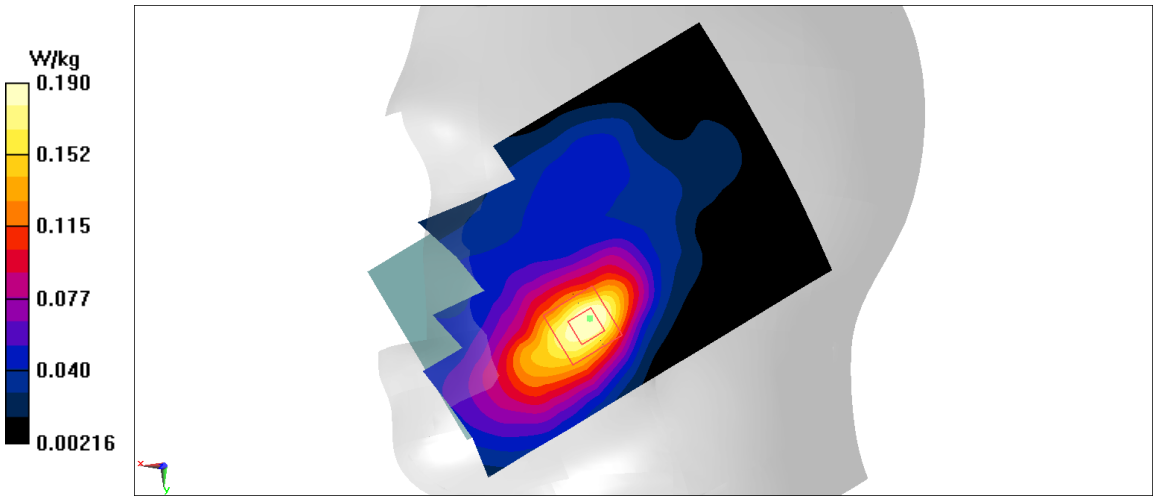


Fig A.6

WCDMA1900-BII_CH9262 Bottom
Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: body 1900 MHz
Medium parameters used: f = 1852.4; σ = 1.49 mho/m; εr = 53.25; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: WCDMA1900-BII 1852.4 Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(7.78,7.78,7.78)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.989 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.11 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.18 W/kg
SAR(1 g) = 0.664 W/kg; SAR(10 g) = 0.35 W/kg
Maximum value of SAR (measured) = 0.966 W/kg

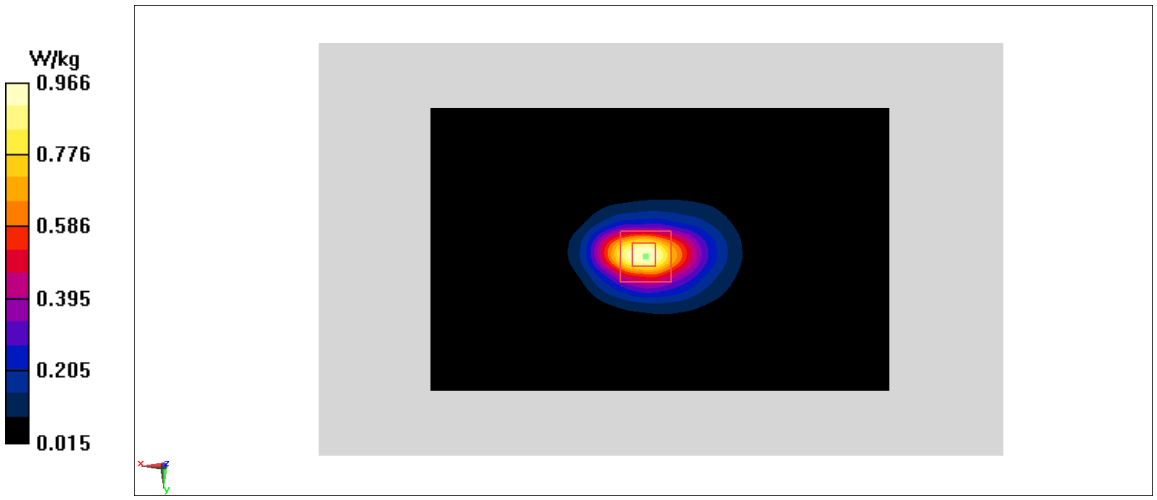


Fig A.7

WCDMA1900-BII_CH9262 Rear
Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: body 1900 MHz
Medium parameters used: f = 1852.4; σ = 1.49 mho/m; εr = 53.25; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA1900-BII 1852.4 Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(7.78,7.78,7.78)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.12 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.839 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 1.31 W/kg
SAR(1 g) = 0.757 W/kg; SAR(10 g) = 0.418 W/kg
Maximum value of SAR (measured) = 1.1 W/kg

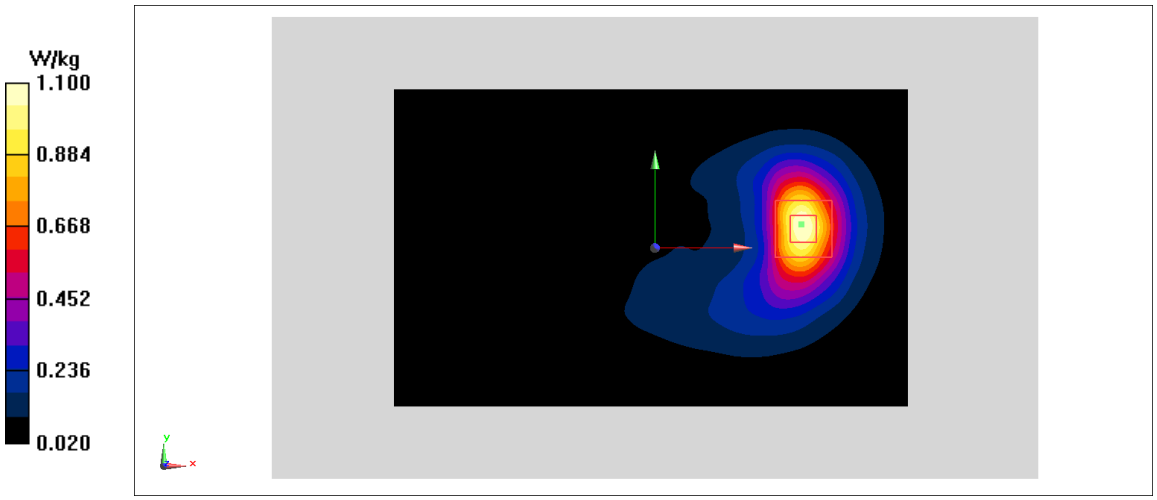


Fig A.8

WCDMA1700-BIV_CH1513 Right Cheek
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: head 1750 MHz
Medium parameters used: f = 1752.6; σ = 1.383 mho/m; εr = 40.68; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: WCDMA1700-BIV 1752.6 Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(8.38,8.38,8.38)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.17 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.085 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.191 W/kg
SAR(1 g) = 0.125 W/kg; SAR(10 g) = 0.0792 W/kg
Maximum value of SAR (measured) = 0.167 W/kg

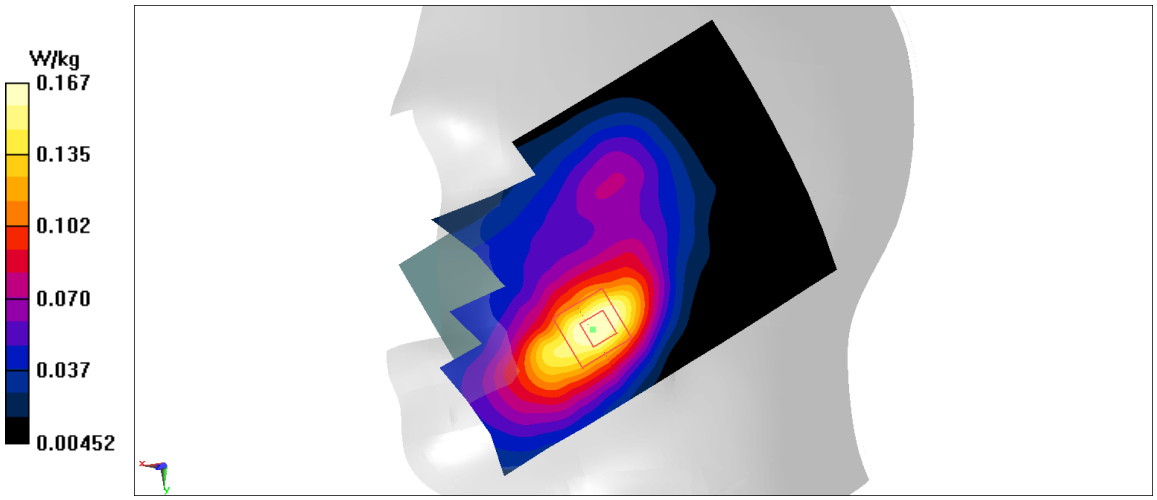


Fig A.9

WCDMA1700-BIV_CH1513 Bottom
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: body 1750 MHz
Medium parameters used: f = 1752.6; σ = 1.517 mho/m; εr = 53.22; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA1700-BIV 1752.6 Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(8.03,8.03,8.03)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.13 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.73 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.29 W/kg
SAR(1 g) = 0.714 W/kg; SAR(10 g) = 0.366 W/kg
Maximum value of SAR (measured) = 1.08 W/kg

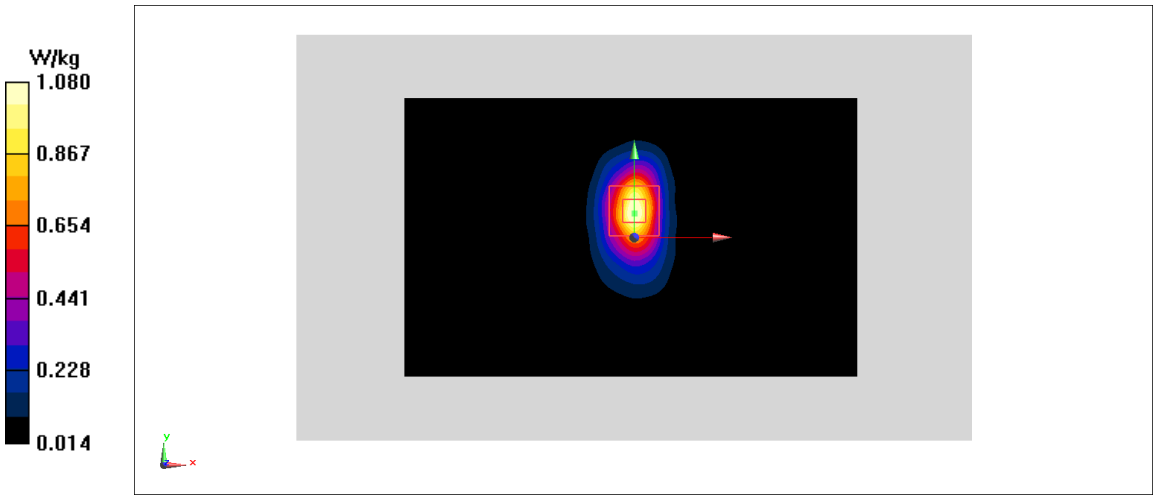


Fig A.10

WCDMA1700-BIV_CH1513 Rear
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: body 1750 MHz
Medium parameters used: f = 1752.6; σ = 1.517 mho/m; εr = 53.22; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: WCDMA1700-BIV 1752.6 Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(8.03,8.03,8.03)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.08 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.298 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 1.24 W/kg
SAR(1 g) = 0.723 W/kg; SAR(10 g) = 0.402 W/kg
Maximum value of SAR (measured) = 1.05 W/kg

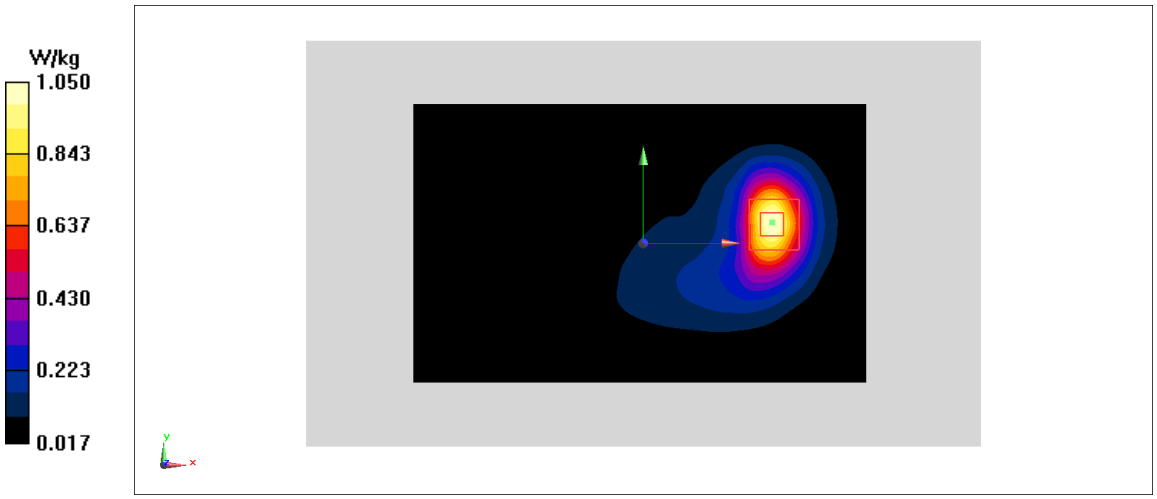


Fig A.11

WCDMA850-BV_CH4183 Left Cheek
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: head 835 MHz
Medium parameters used: f = 836.6; σ = 0.903 mho/m; εr = 41.6; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA850-BV 836.6 Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(9.75,9.75,9.75)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.508 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.113 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.546 W/kg
SAR(1 g) = 0.426 W/kg; SAR(10 g) = 0.328 W/kg
Maximum value of SAR (measured) = 0.509 W/kg

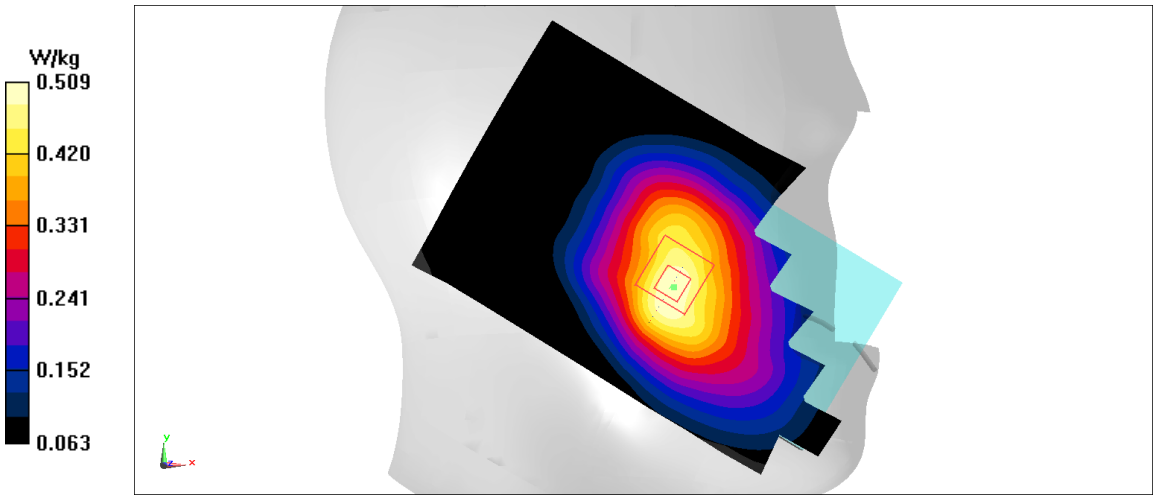


Fig A.12

WCDMA850-BV_CH4132 Rear
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: body 835 MHz
Medium parameters used: f = 826.4; σ = 0.979 mho/m; εr = 56.11; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WCDMA850-BV 826.4 Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(9.61,9.61,9.61)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.717 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.3 V/m; Power Drift = 0 dB
Peak SAR (extrapolated) = 0.777 W/kg
SAR(1 g) = 0.597 W/kg; SAR(10 g) = 0.462 W/kg
Maximum value of SAR (measured) = 0.714 W/kg

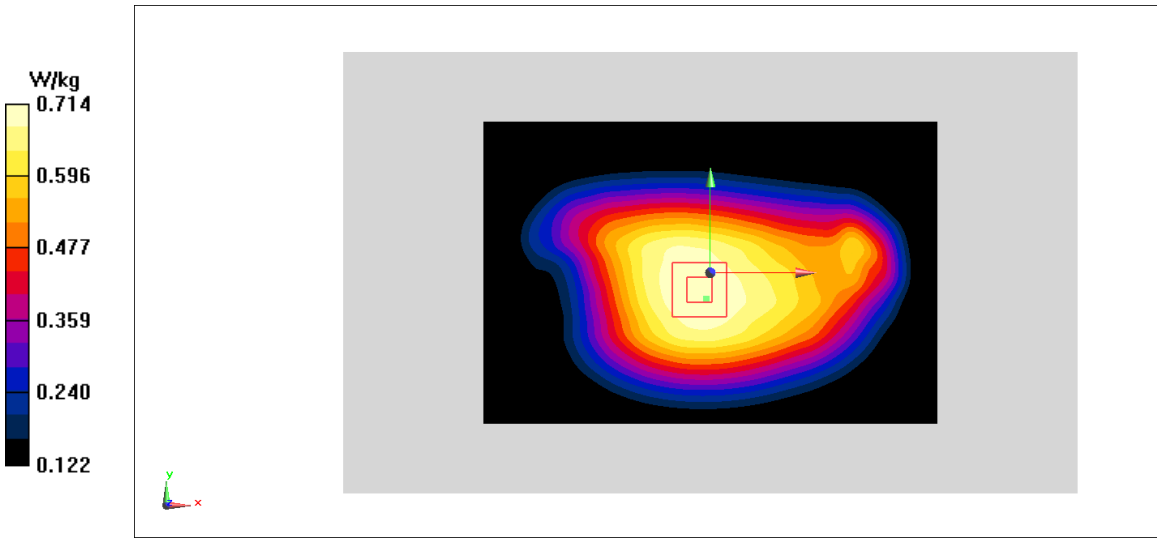


Fig A.13

LTE1900-FDD2_CH19100 Right Cheek
Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: head 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.39 mho/m; εr = 39.55; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: LTE1900-FDD2 1900 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(8.14,8.14,8.14)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.293 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.331 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.316 W/kg
SAR(1 g) = 0.199 W/kg; SAR(10 g) = 0.119 W/kg
Maximum value of SAR (measured) = 0.273 W/kg

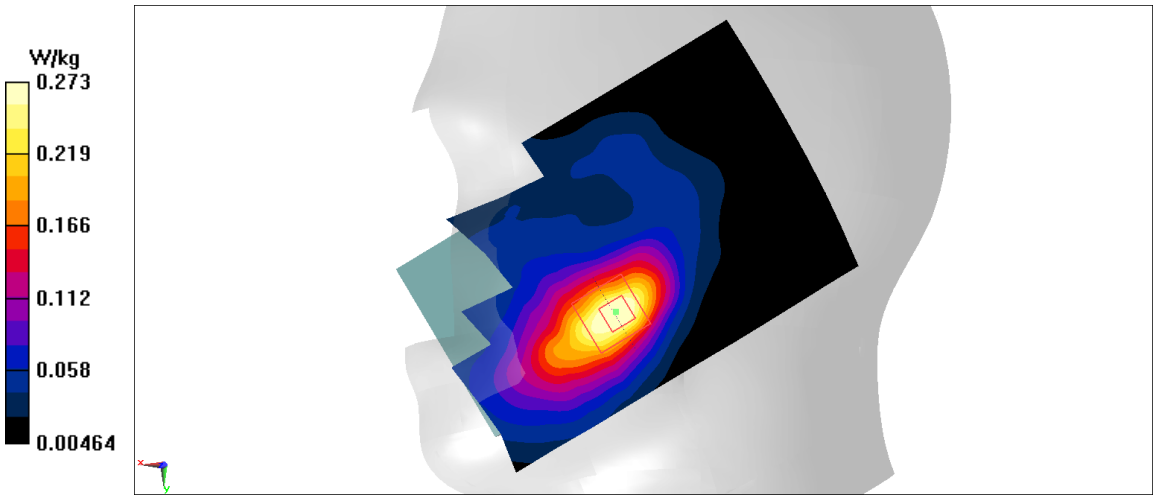


Fig A.14

LTE1900-FDD2_CH18700 Bottom
Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: body 1900 MHz
Medium parameters used: f = 1860 MHz; σ = 1.498 mho/m; εr = 53.24; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: LTE1900-FDD2 1860 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(7.78,7.78,7.78)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.39 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 28.15 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.47 W/kg
SAR(1 g) = 0.815 W/kg; SAR(10 g) = 0.423 W/kg
Maximum value of SAR (measured) = 1.2 W/kg

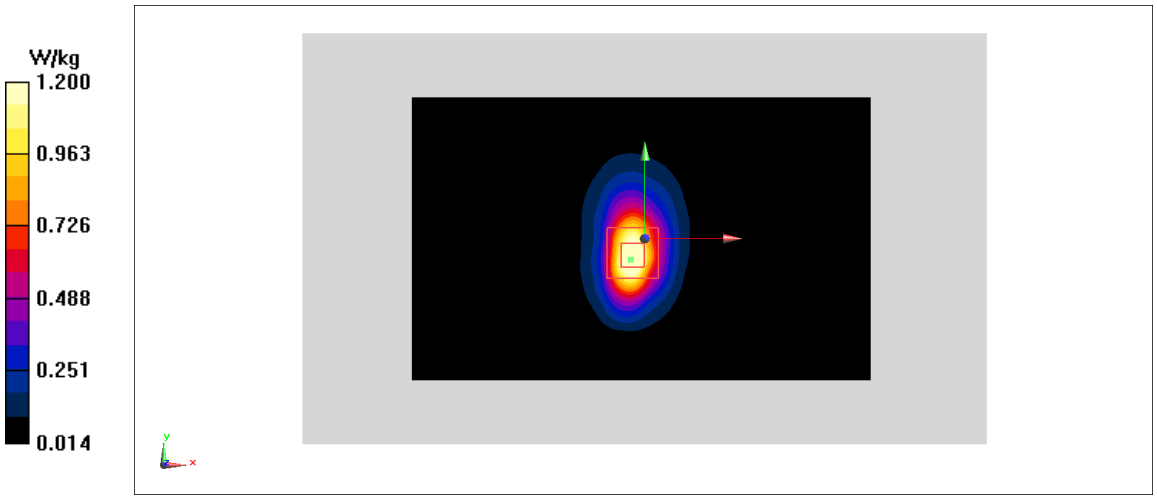


Fig A.15

LTE1900-FDD2_CH19100 Rear
Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: body 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.536 mho/m; εr = 53.19; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: LTE1900-FDD2 1900 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(7.78,7.78,7.78)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.818 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.403 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.974 W/kg
SAR(1 g) = 0.565 W/kg; SAR(10 g) = 0.314 W/kg
Maximum value of SAR (measured) = 0.817 W/kg

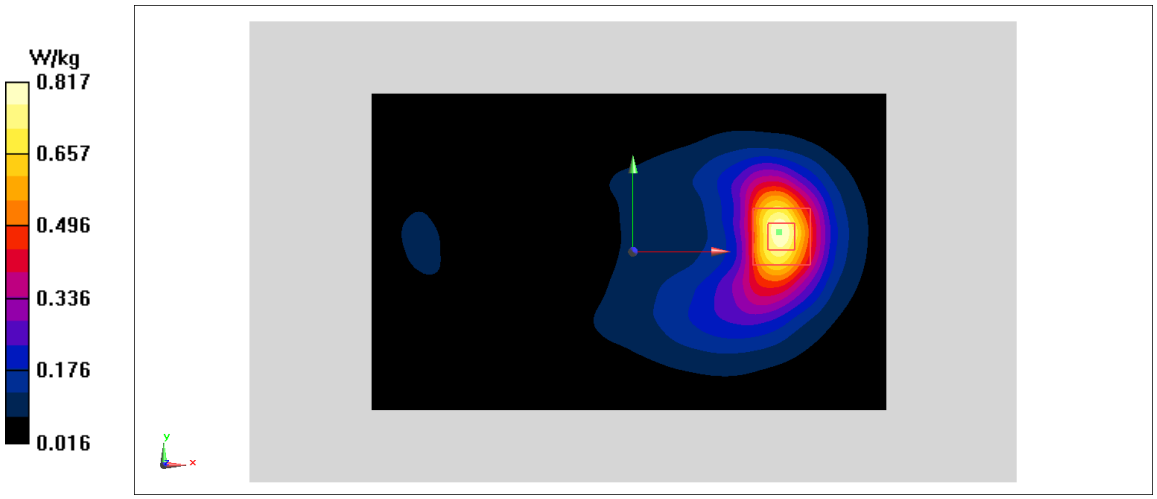


Fig A.16

LTE1700-FDD4_CH20050 Right Cheek
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: head 1750 MHz
Medium parameters used: f = 1720 MHz; σ = 1.352 mho/m; εr = 40.72; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: LTE1700-FDD4 1720 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(8.38,8.38,8.38)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.169 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.596 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.192 W/kg
SAR(1 g) = 0.128 W/kg; SAR(10 g) = 0.0831 W/kg
Maximum value of SAR (measured) = 0.168 W/kg

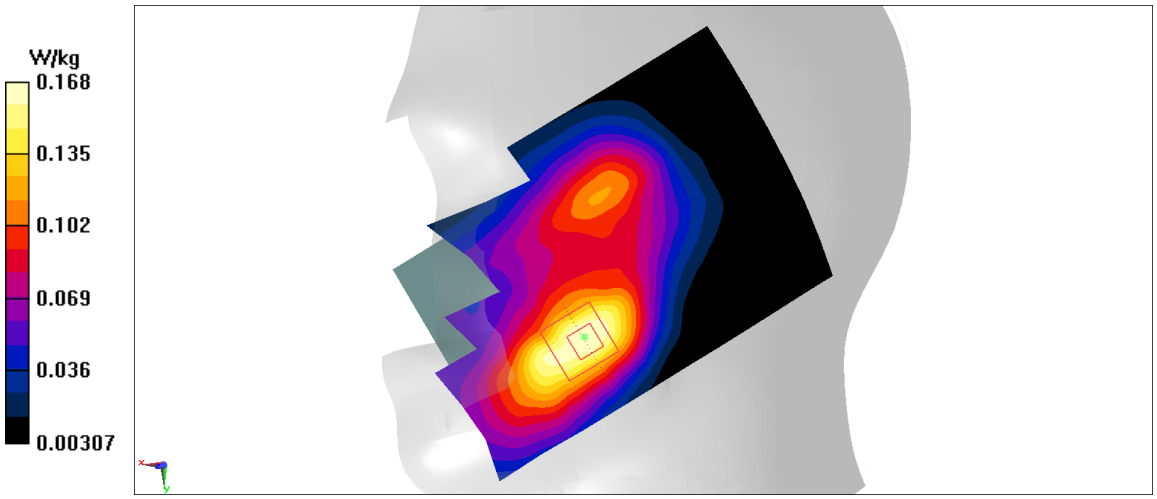


Fig A.17

LTE1700-FDD4_CH20300 REar
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: body 1750 MHz
Medium parameters used: f = 1745 MHz; σ = 1.509 mho/m; εr = 53.23; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: LTE1700-FDD4 1745 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(8.03,8.03,8.03)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.818 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.481 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.587 W/kg; SAR(10 g) = 0.333 W/kg
Maximum value of SAR (measured) = 0.844 W/kg

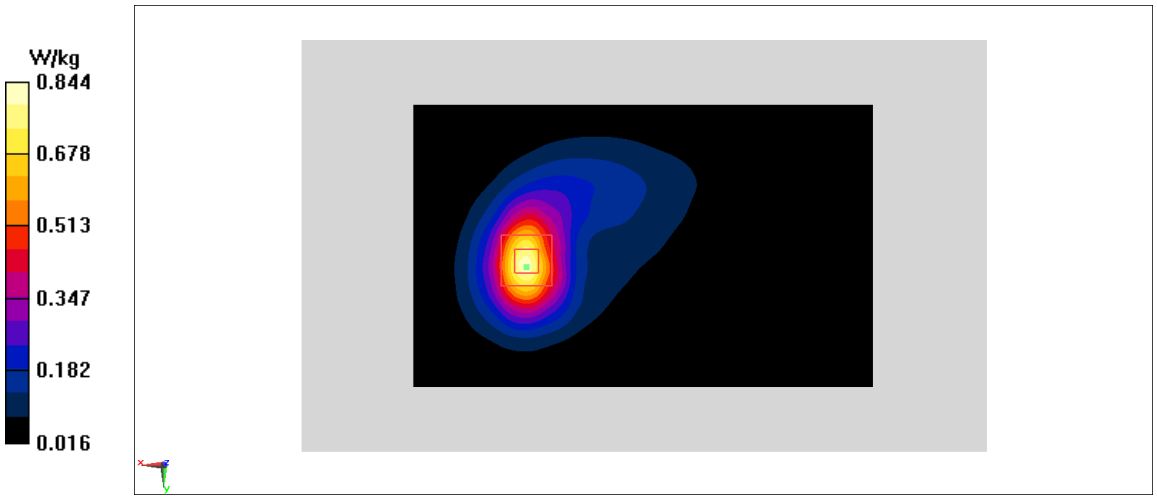


Fig A.18

LTE1700-FDD4_CH20300 Rear
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: body 1750 MHz
Medium parameters used: f = 1745 MHz; σ = 1.509 mho/m; εr = 53.23; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: LTE1700-FDD4 1745 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(8.03,8.03,8.03)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.896 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.689 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.609 W/kg; SAR(10 g) = 0.319 W/kg
Maximum value of SAR (measured) = 0.903 W/kg

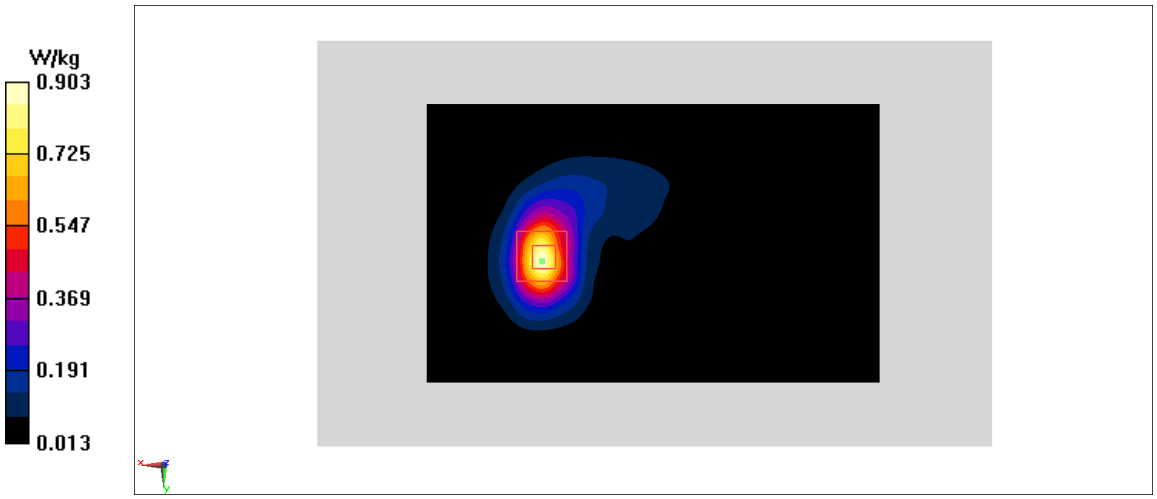


Fig A.19

LTE850-FDD5_CH20450 Left Cheek
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: head 835 MHz
Medium parameters used: f = 829 MHz; σ = 0.895 mho/m; εr = 41.61; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: LTE850-FDD5 829 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(9.75,9.75,9.75)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.392 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.979 V/m; Power Drift = -0.1 dB
Peak SAR (extrapolated) = 0.432 W/kg
SAR(1 g) = 0.33 W/kg; SAR(10 g) = 0.25 W/kg
Maximum value of SAR (measured) = 0.398 W/kg

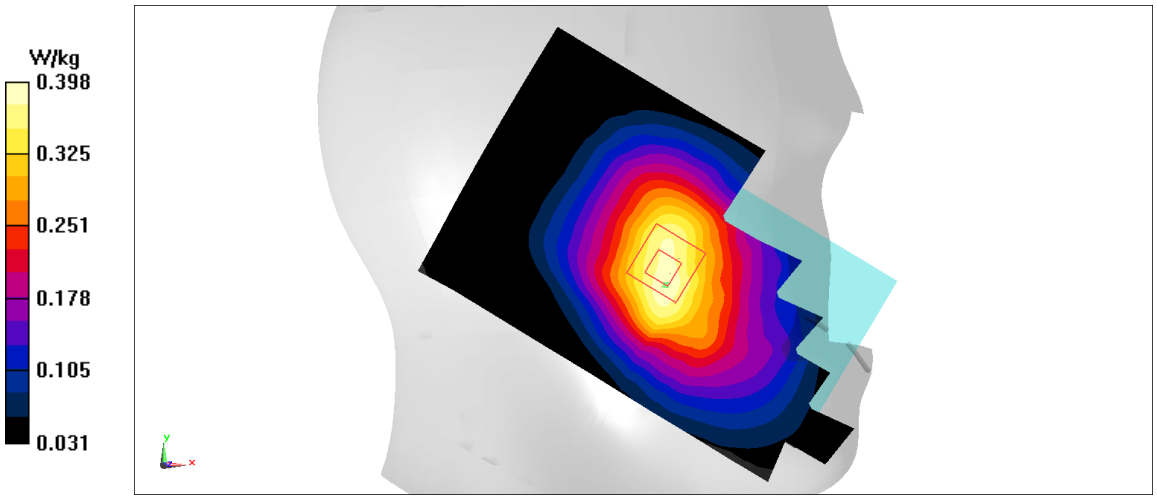


Fig A.20

LTE850-FDD5_CH20450 Rear
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: body 835 MHz
Medium parameters used: f = 829 MHz; σ = 0.982 mho/m; εr = 56.11; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: LTE850-FDD5 829 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(9.61,9.61,9.61)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.573 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.34 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.634 W/kg
SAR(1 g) = 0.467 W/kg; SAR(10 g) = 0.356 W/kg
Maximum value of SAR (measured) = 0.574 W/kg

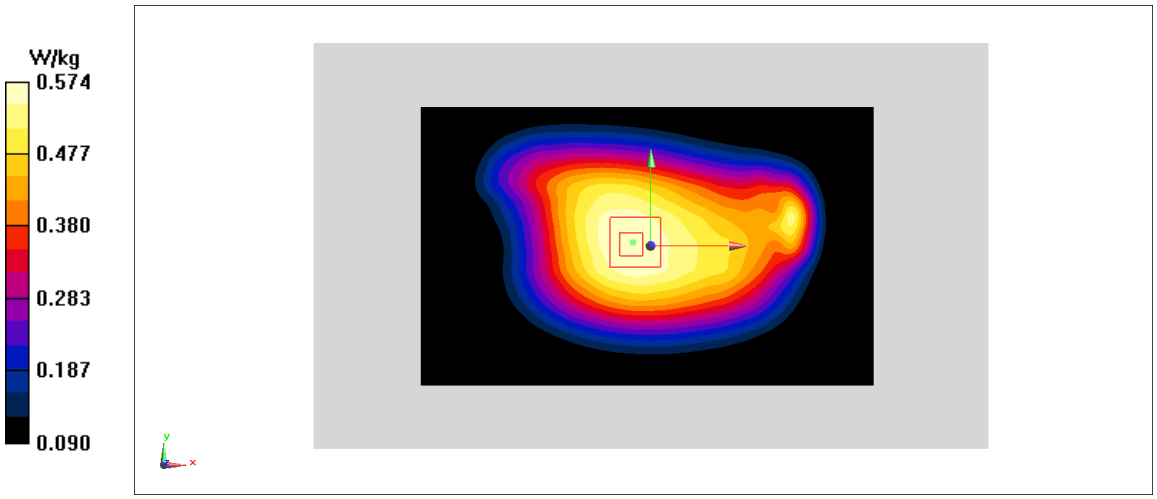


Fig A.21

LTE700-FDD12_CH23060 Left Cheek
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: head 750 MHz
Medium parameters used: f = 704 MHz; σ = 0.854 mho/m; εr = 41.76; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: LTE700-FDD12 704 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(10.03,10.03,10.03)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.318 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.96 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.344 W/kg
SAR(1 g) = 0.26 W/kg; SAR(10 g) = 0.198 W/kg
Maximum value of SAR (measured) = 0.315 W/kg

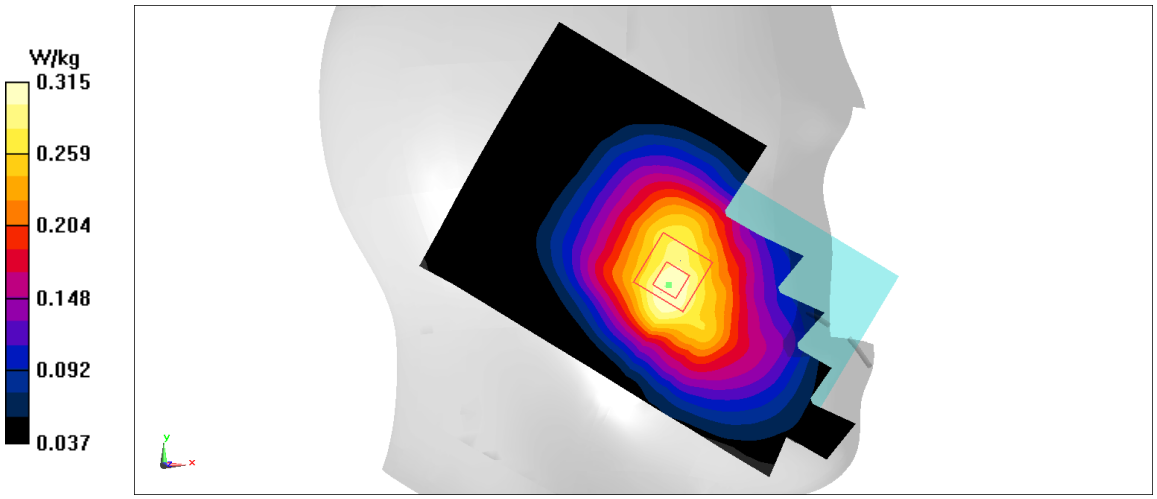


Fig A.22

LTE700-FDD12_CH23060 Rear
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: body 750 MHz
Medium parameters used: f = 704 MHz; σ = 0.907 mho/m; εr = 55.41; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: LTE700-FDD12 704 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(9.85,9.85,9.85)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.58 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.32 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.642 W/kg
SAR(1 g) = 0.471 W/kg; SAR(10 g) = 0.359 W/kg
Maximum value of SAR (measured) = 0.577 W/kg

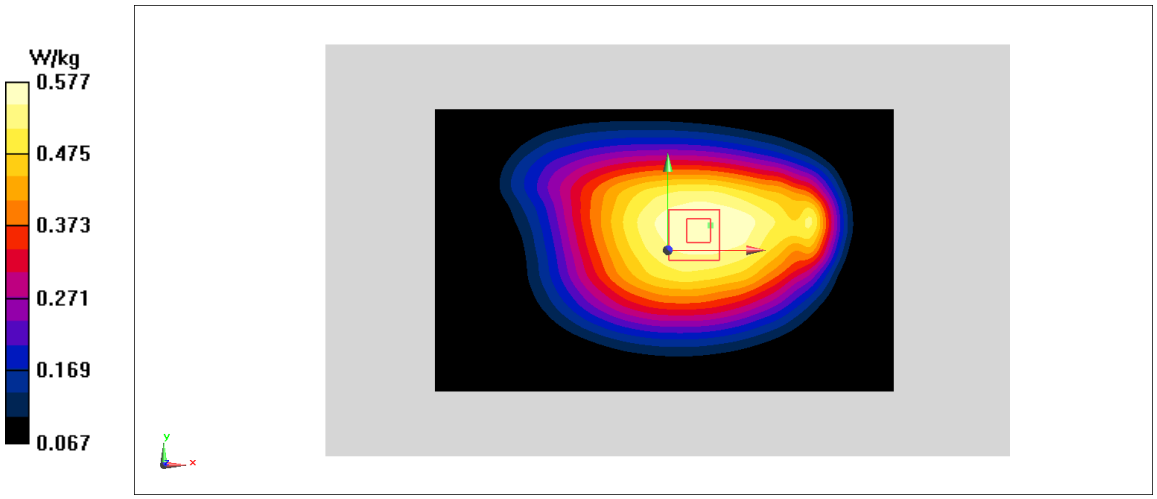


Fig A.23

LTE700-FDD14_CH2330 Left Cheek
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: head 750 MHz
Medium parameters used: f = -1307 MHz; σ = -1.056 mho/m; εr = 44.17; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: LTE700-FDD14 -1307 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(10.03,10.03,10.03)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.389 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.621 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.425 W/kg
SAR(1 g) = 0.322 W/kg; SAR(10 g) = 0.246 W/kg
Maximum value of SAR (measured) = 0.389 W/kg

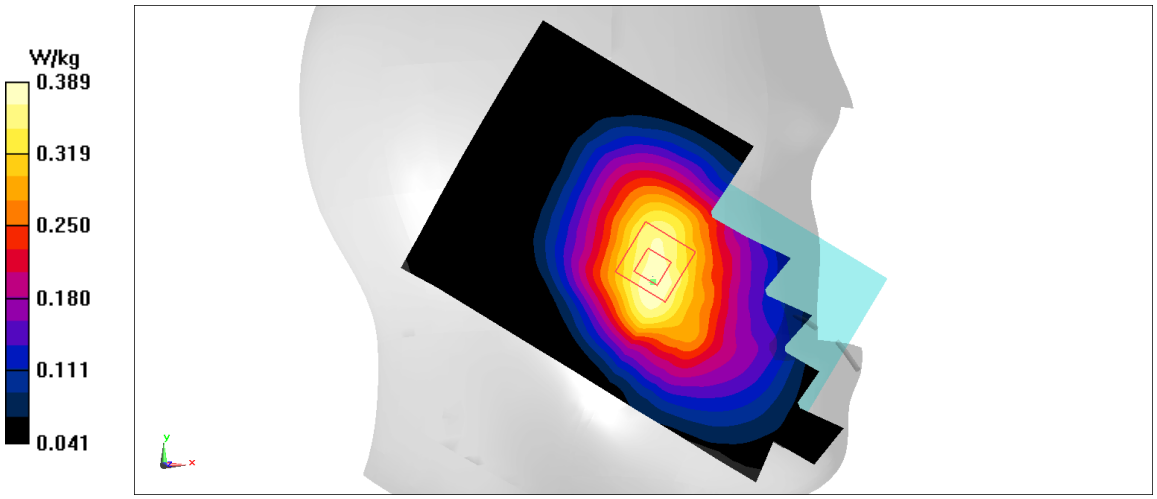


Fig A.24

LTE700-FDD14_CH2330 Rear
Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: body 750 MHz
Medium parameters used: f = -1307 MHz; σ = -1.003 mho/m; εr = 57.82; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: LTE700-FDD14 -1307 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(9.85,9.85,9.85)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.708 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 27.58 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.789 W/kg
SAR(1 g) = 0.589 W/kg; SAR(10 g) = 0.447 W/kg
Maximum value of SAR (measured) = 0.715 W/kg

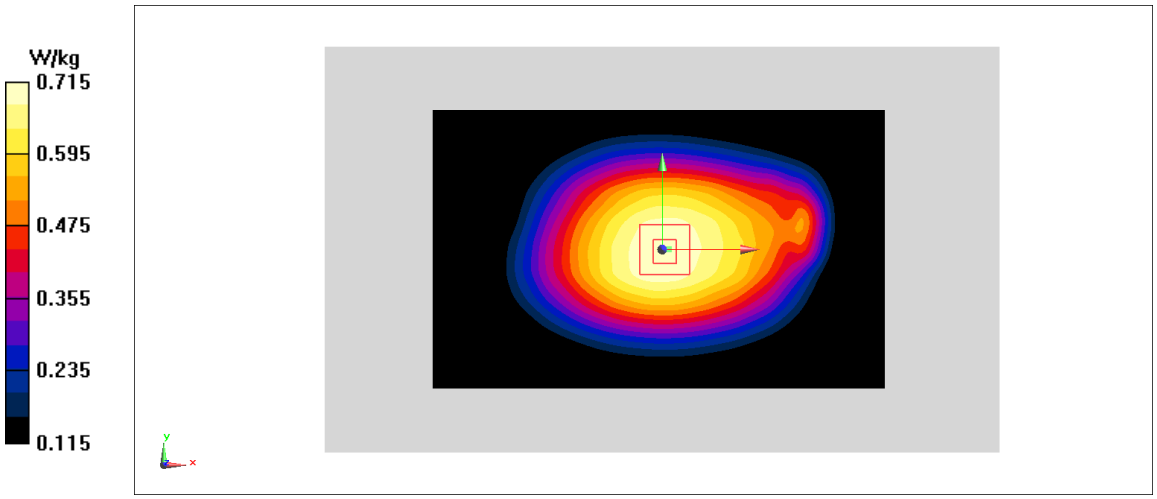


Fig A.25

LTE2300-FDD30_CH27710 Left Cheek
Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: head 2300 MHz
Medium parameters used: f = 2310 MHz; σ = 1.664 mho/m; εr = 39.34; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: LTE2300-FDD30 2310 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(7.74,7.74,7.74)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.289 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.419 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.383 W/kg
SAR(1 g) = 0.216 W/kg; SAR(10 g) = 0.119 W/kg
Maximum value of SAR (measured) = 0.3 W/kg

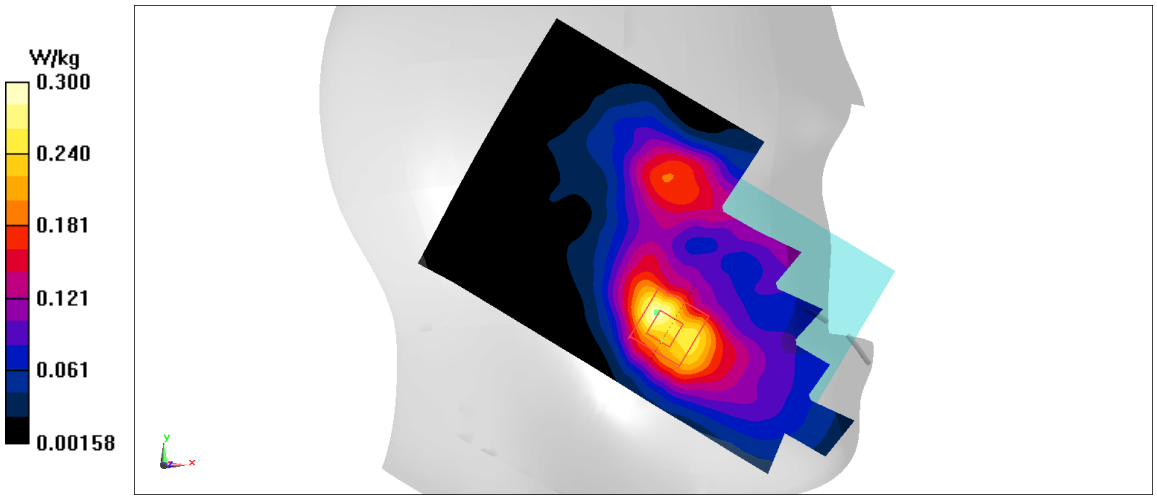


Fig A.26

LTE2300-FDD30_CH27710 Rear
Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: body 2300 MHz
Medium parameters used: f = 2310 MHz; σ = 1.834 mho/m; εr = 53.55; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: LTE2300-FDD30 2310 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(7.84,7.84,7.84)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.26 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.232 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.69 W/kg
SAR(1 g) = 0.901 W/kg; SAR(10 g) = 0.454 W/kg
Maximum value of SAR (measured) = 1.38 W/kg

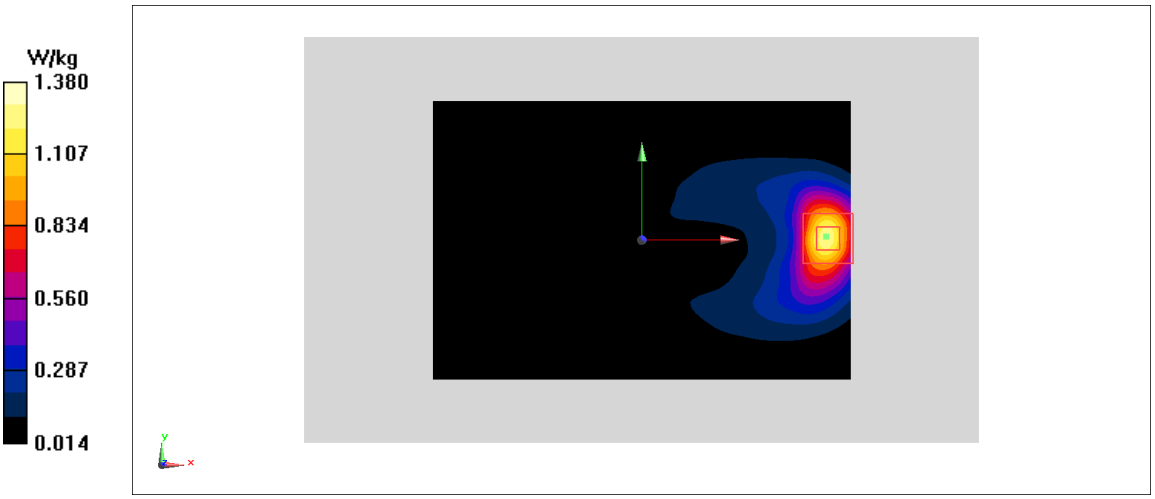


Fig A.27

LTE2300-FDD30_CH27710 Rear
Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: body 2300 MHz
Medium parameters used: f = 2310 MHz; σ = 1.834 mho/m; εr = 53.55; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: LTE2300-FDD30 2310 MHz Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(7.84,7.84,7.84)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.934 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.505 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.619 W/kg; SAR(10 g) = 0.324 W/kg
Maximum value of SAR (measured) = 0.935 W/kg

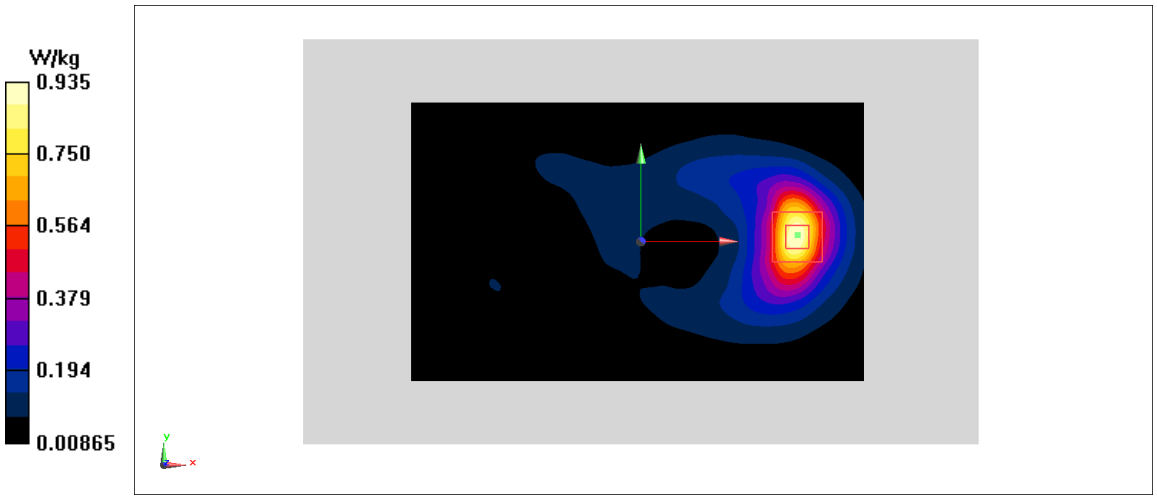


Fig A.28

WLAN2450_CH6 Left Cheek
Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: head 2450 MHz
Medium parameters used: f = 2437; σ = 1.793 mho/m; εr = 39.78; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC, Liquid Temperature: 22.3ºC
Communication System: WLAN2450 2437 Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(7.62,7.62,7.62)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.39 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.54 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 1.76 W/kg
SAR(1 g) = 0.843 W/kg; SAR(10 g) = 0.422 W/kg
Maximum value of SAR (measured) = 1.3 W/kg

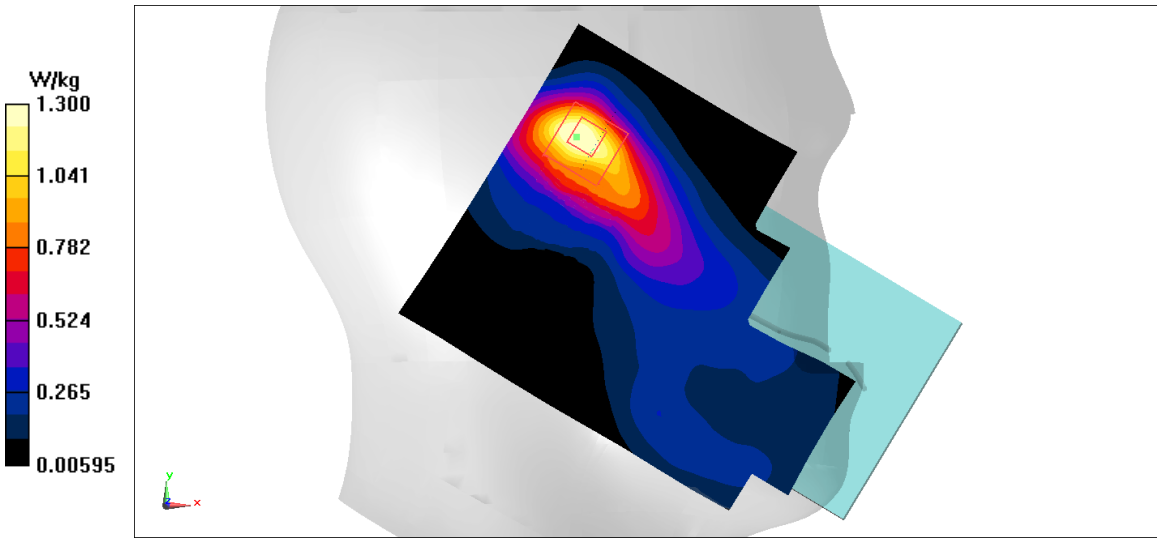


Fig A.29

WLAN2450_CH6 Rear
Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: body 2450 MHz
Medium parameters used: f = 2437; σ = 1.918 mho/m; εr = 51.82; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C
Communication System: WLAN2450 2437 Duty Cycle: 1：1
Probe: EX3DV4 – SN3617 ConvF(7.79,7.79,7.79)

Area Scan (81x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.411 W/kg

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

Reference Value = 8.730 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.499 W/kg
SAR(1 g) = 0.247 W/kg; SAR(10 g) = 0.131 W/kg
Maximum value of SAR (measured) = 0.266 W/kg

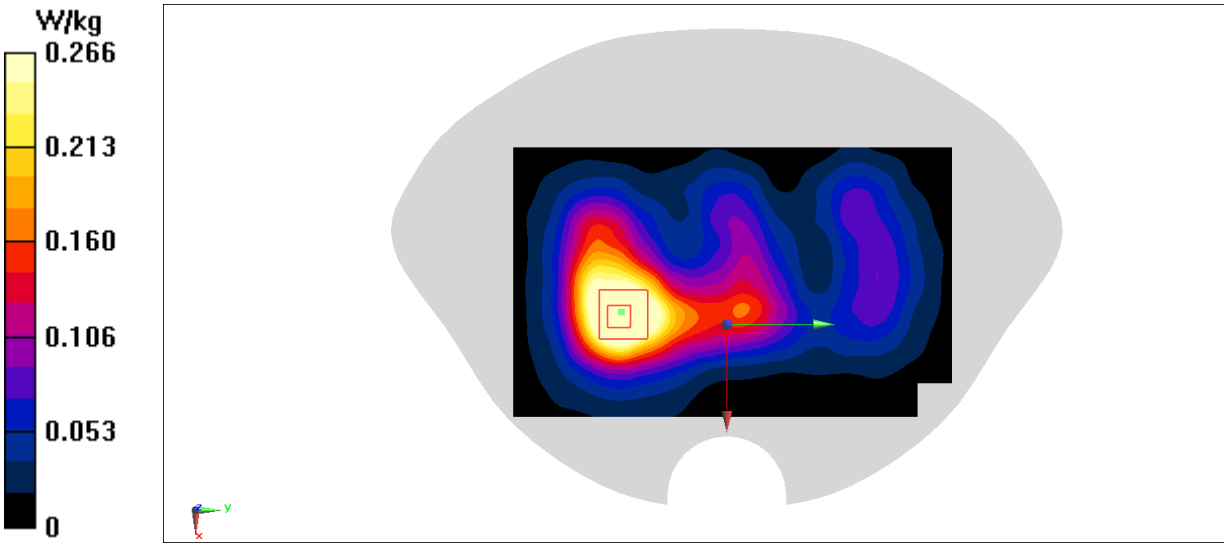


Fig A.30

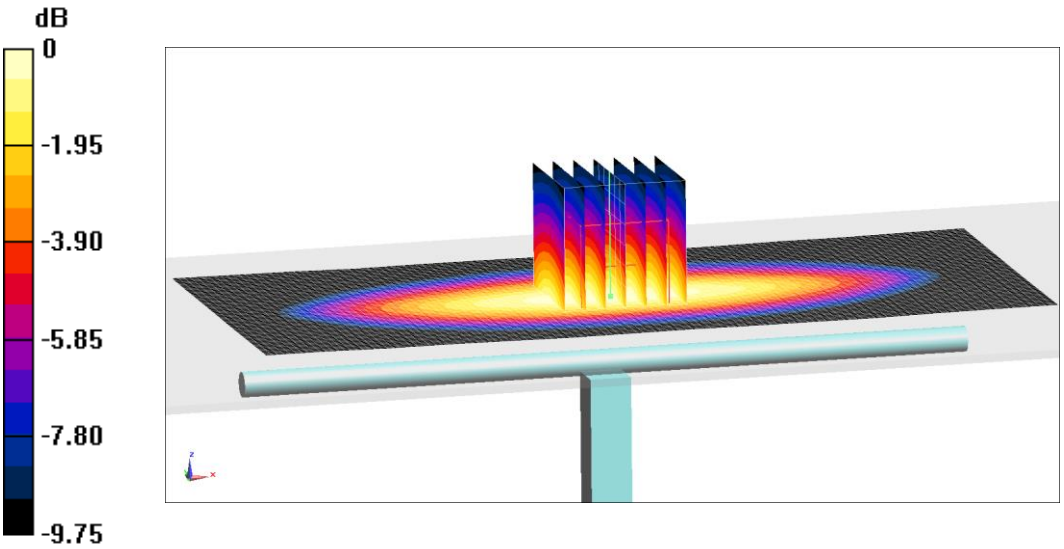
J.5 ANNEX SYSTEM VALIDATION RESULTS

750 MHz

Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: Head 750 MHz
Medium parameters used: f = 750 MHz; σ =0.898 mho/m; ε_r = 41.7; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 750 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3617 ConvF(10.03,10.03,10.03)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 60.78 V/m; Power Drift = 0.03
Fast SAR: SAR(1 g) = 2.11 W/kg; SAR(10 g) = 1.42 W/kg
Maximum value of SAR (interpolated) = 2.78 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =60.78 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.16 W/kg
SAR(1 g) = 2.14 W/kg; SAR(10 g) = 1.38 W/kg
Maximum value of SAR (measured) = 2.83 W/kg



0 dB = 2.83 W/kg = 4.52 dB W/kg

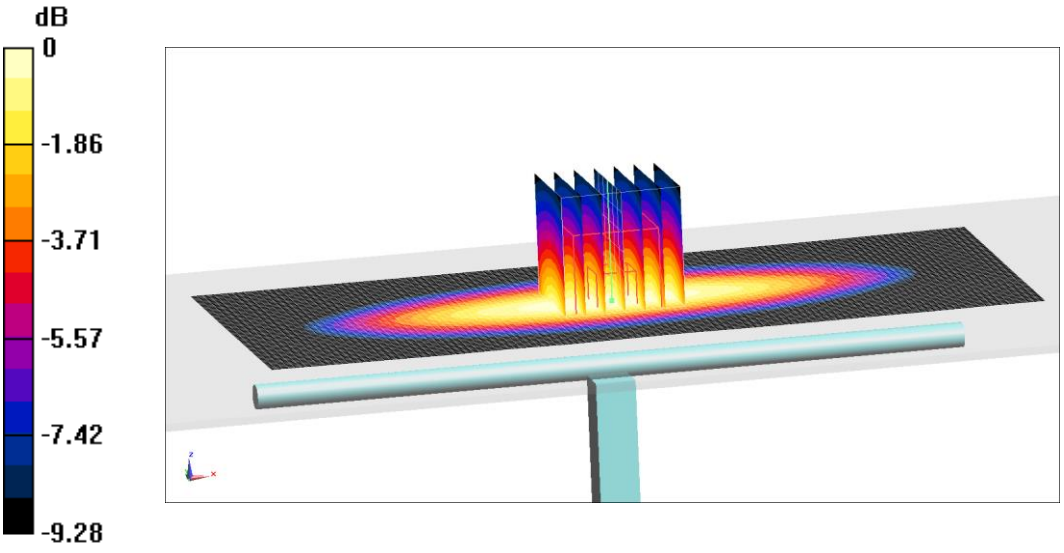
Fig.B.1 validation 750 MHz 250mW

750 MHz

Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: Body 750 MHz
Medium parameters used: f = 750 MHz; σ =0.951 mho/m; ε_r = 55.35; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 750 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3617 ConvF(9.85,9.85,9.85)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 54.9 V/m; Power Drift = -0.03
Fast SAR: SAR(1 g) = 2.13 W/kg; SAR(10 g) = 1.41 W/kg
Maximum value of SAR (interpolated) = 2.98 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =54.9 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.14 W/kg
SAR(1 g) = 2.18 W/kg; SAR(10 g) = 1.4 W/kg
Maximum value of SAR (measured) = 2.82 W/kg



0 dB = 2.82 W/kg = 4.5 dB W/kg

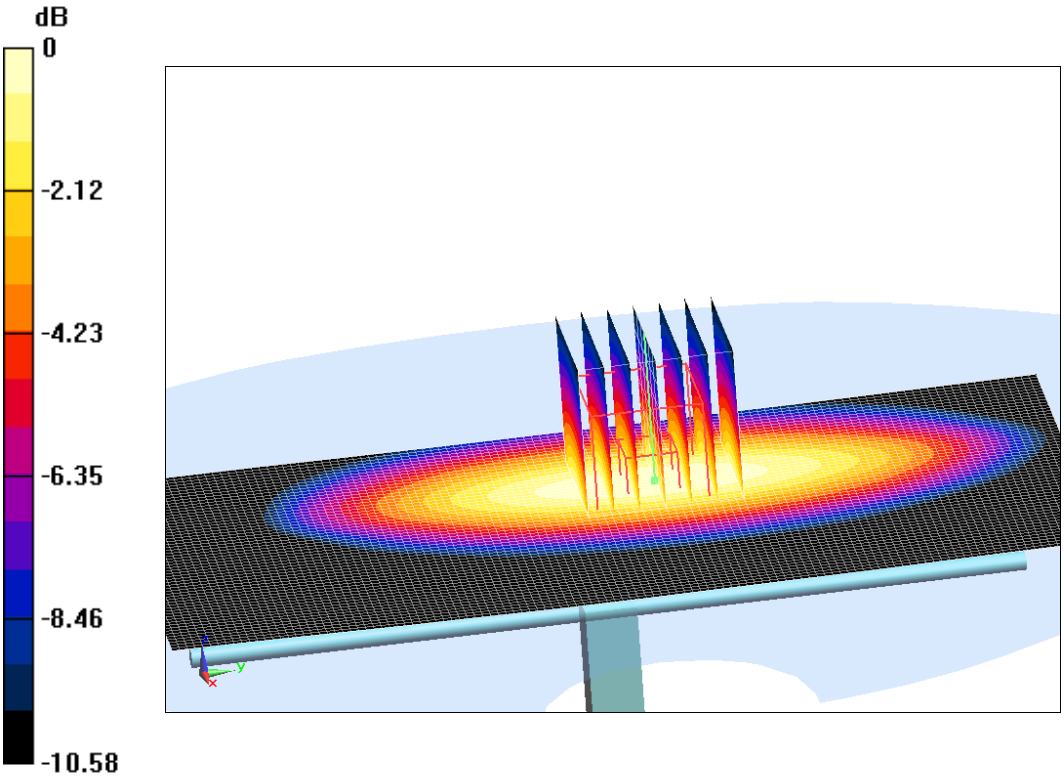
Fig.B.2 validation 750 MHz 250mW

835 MHz

Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: Head 835 MHz
Medium parameters used: f = 835 MHz; σ =0.901 mho/m; ε_r = 41.6; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 835 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3617 ConvF(9.75,9.75,9.75)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 63.88 V/m; Power Drift = 0.04
Fast SAR: SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.56 W/kg
Maximum value of SAR (interpolated) = 3.16 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =63.88 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 3.62 W/kg
SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.57 W/kg
Maximum value of SAR (measured) = 3.26 W/kg



0 dB = 3.26 W/kg = 5.13 dB W/kg

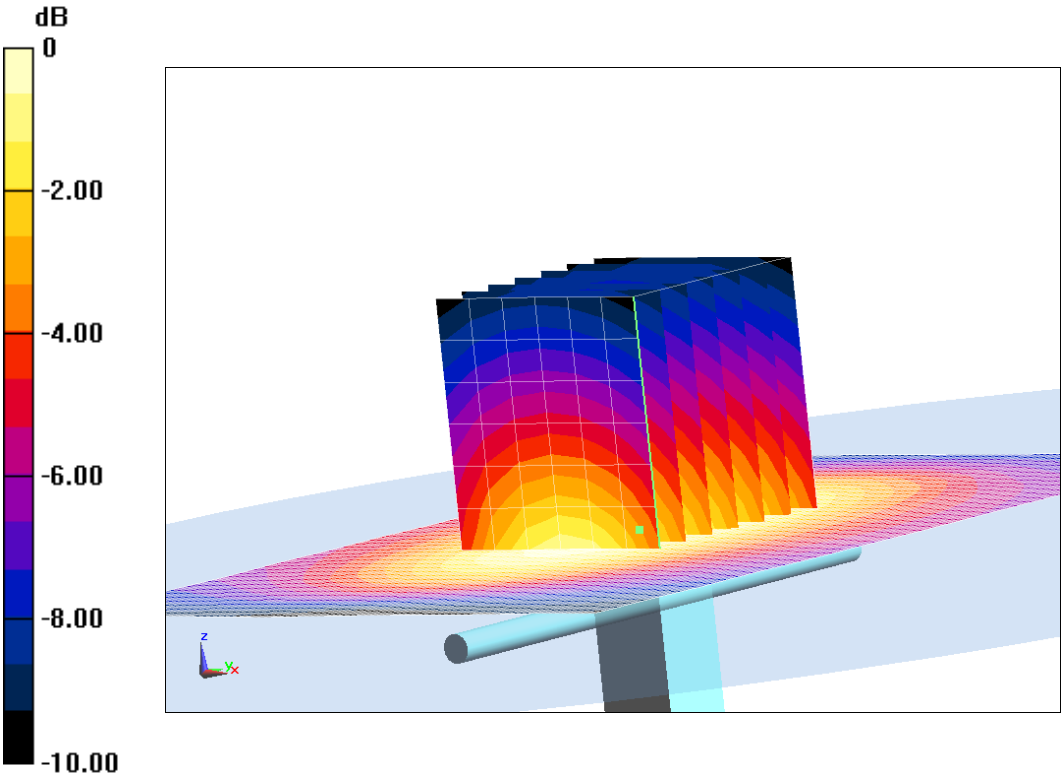
Fig.B.3 validation 835 MHz 250mW

835 MHz

Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: Body 835 MHz
Medium parameters used: f = 835 MHz; σ =0.988 mho/m; ε_r = 56.1; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 835 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3617 ConvF(9.61,9.61,9.61)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 57.67 V/m; Power Drift = -0.09
Fast SAR: SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.57 W/kg
Maximum value of SAR (interpolated) = 3.45 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =57.67 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 3.68 W/kg
SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.6 W/kg
Maximum value of SAR (measured) = 3.26 W/kg



0 dB = 3.26 W/kg = 5.13 dB W/kg

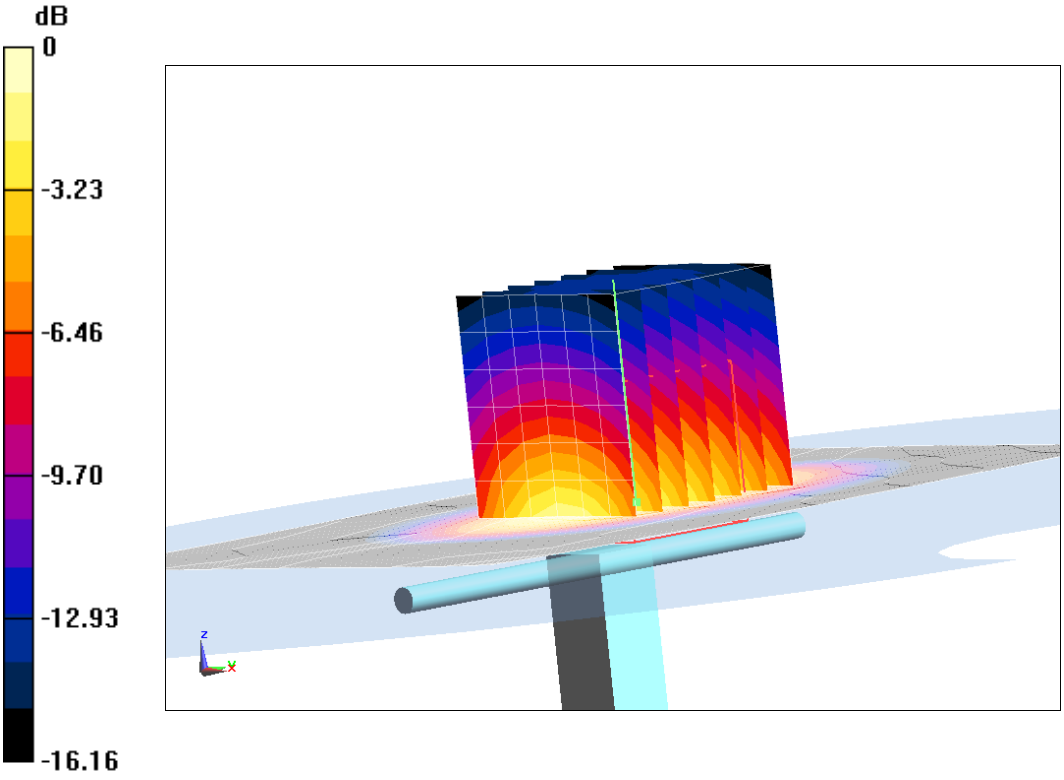
Fig.B.4 validation 835 MHz 250mW

1750 MHz

Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: Head 1750 MHz
Medium parameters used: f = 1750 MHz; σ =1.38 mho/m; ε_r = 40.68; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 1750 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3617 ConvF(8.38,8.38,8.38)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 104.5 V/m; Power Drift = 0.06
Fast SAR: SAR(1 g) = 9.03 W/kg; SAR(10 g) = 4.83 W/kg
Maximum value of SAR (interpolated) = 14.31 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =104.5 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 16.53 W/kg
SAR(1 g) = 9.01 W/kg; SAR(10 g) = 4.85 W/kg
Maximum value of SAR (measured) = 13.9 W/kg



0 dB = 13.9 W/kg = 11.43 dB W/kg

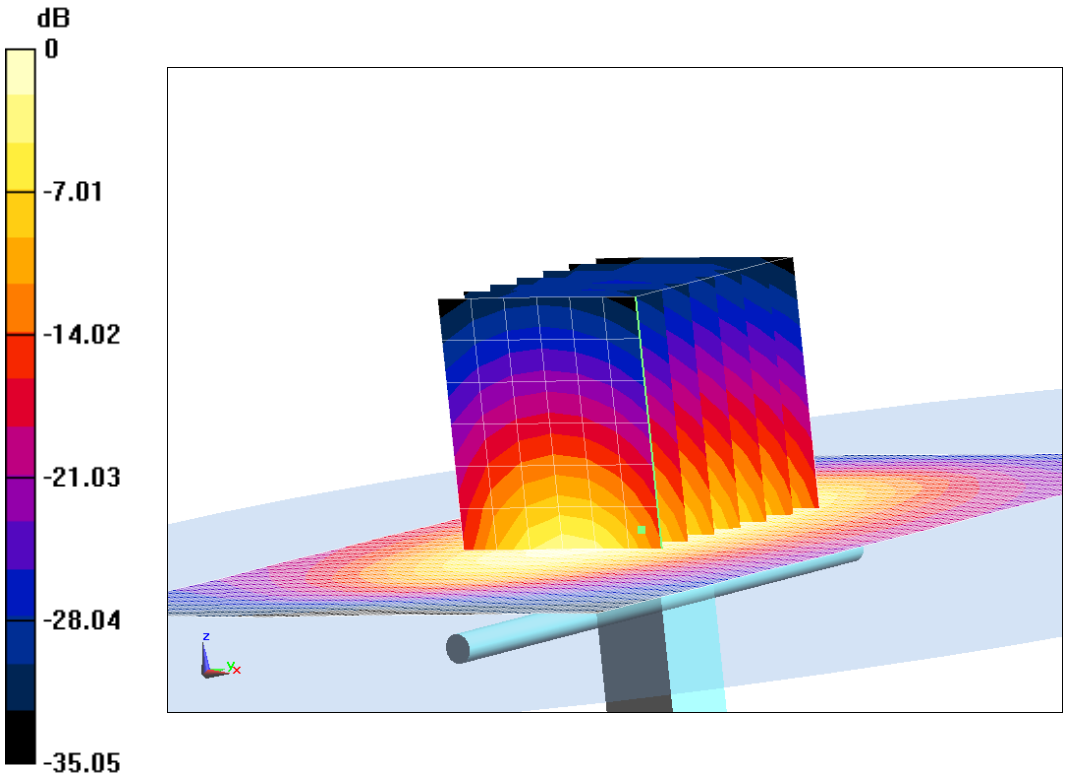
Fig.B.5 validation 1750 MHz 250mW

1750 MHz

Date: 12/29/2019
Electronics: DAE4 Sn771
Medium: Body 1750 MHz
Medium parameters used: f = 1750 MHz; σ =1.514 mho/m; ε_r = 53.22; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 1750 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3617 ConvF(8.03,8.03,8.03)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 103.14 V/m; Power Drift = 0.04
Fast SAR: SAR(1 g) = 9.08 W/kg; SAR(10 g) = 4.86 W/kg
Maximum value of SAR (interpolated) = 13.23 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =103.14 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 15.69 W/kg
SAR(1 g) = 9.12 W/kg; SAR(10 g) = 4.94 W/kg
Maximum value of SAR (measured) = 13.43 W/kg



0 dB = 13.43 W/kg = 11.28 dB W/kg

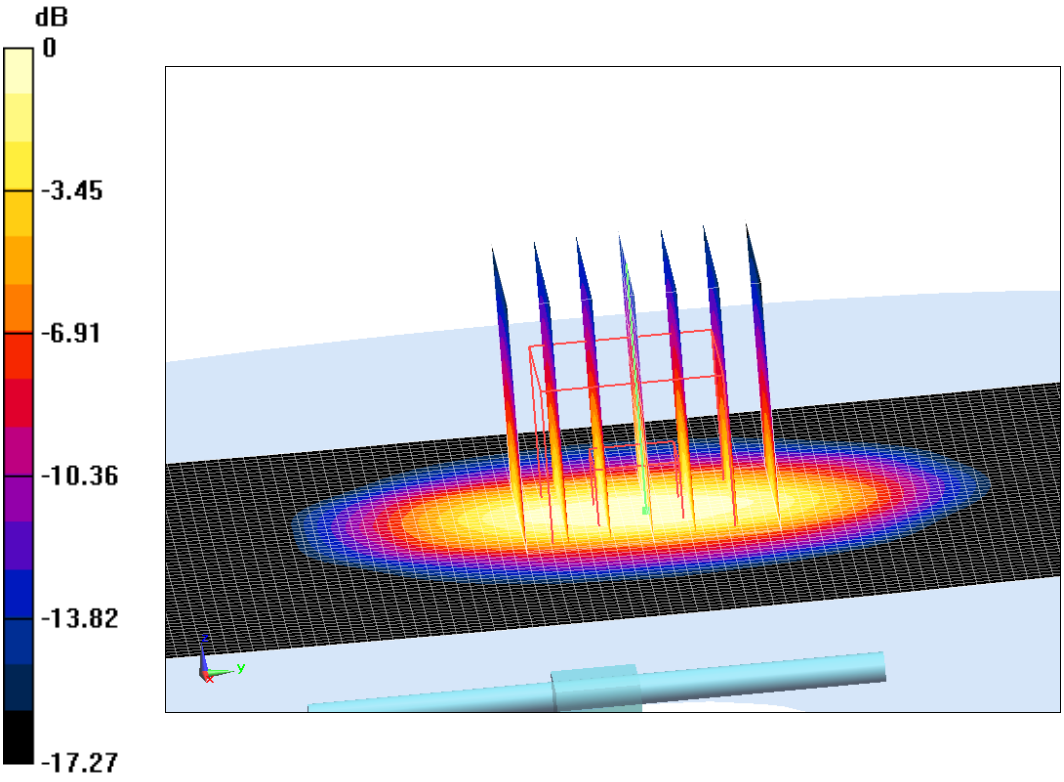
Fig.B.6 validation 1750 MHz 250mW

1900 MHz

Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: Head 1900 MHz
Medium parameters used: f = 1900 MHz; σ =1.39 mho/m; ε_r = 39.55; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 1900 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3617 ConvF(8.14,8.14,8.14)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 107.26 V/m; Power Drift = 0.02
Fast SAR: SAR(1 g) = 9.96 W/kg; SAR(10 g) = 5.2 W/kg
Maximum value of SAR (interpolated) = 15.34 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =107.26 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 17.52 W/kg
SAR(1 g) = 10.07 W/kg; SAR(10 g) = 5.15 W/kg
Maximum value of SAR (measured) = 14.81 W/kg



0 dB = 14.81 W/kg = 11.71 dB W/kg

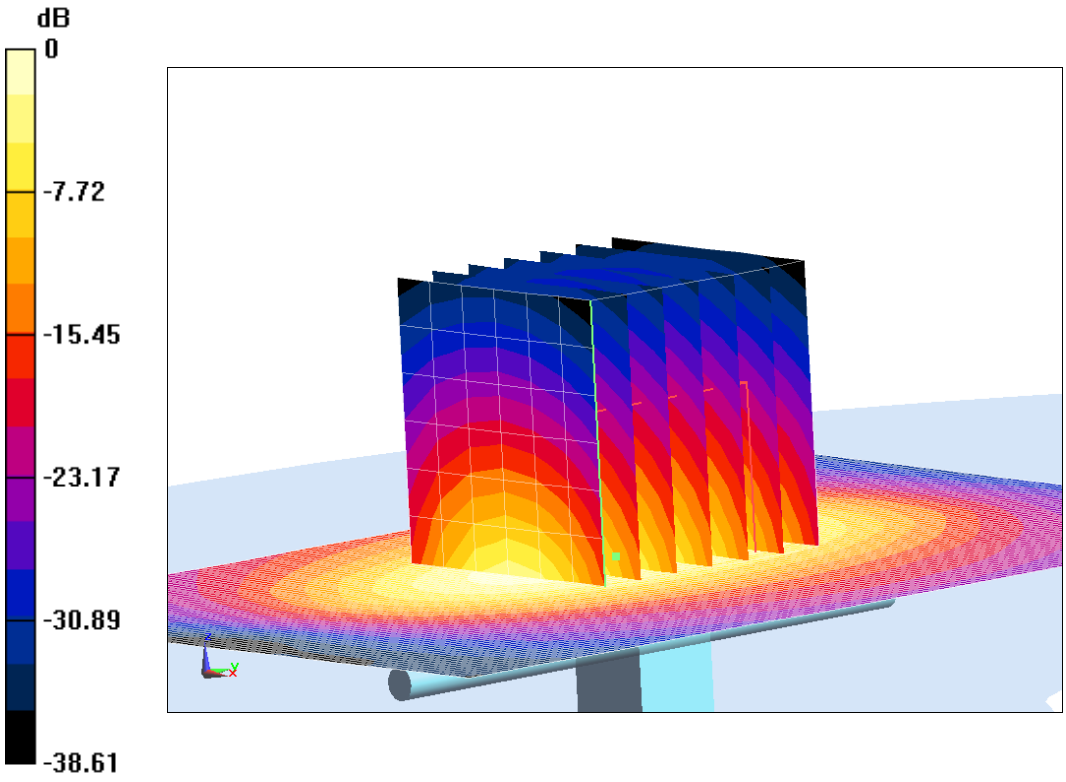
Fig.B.7 validation 1900 MHz 250mW

1900 MHz

Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: Body 1900 MHz
Medium parameters used: f = 1900 MHz; σ =1.536 mho/m; ε_r = 53.19; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 1900 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3617 ConvF(7.78,7.78,7.78)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 105.88 V/m; Power Drift = -0.03
Fast SAR: SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.19 W/kg
Maximum value of SAR (interpolated) = 17.03 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =105.88 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 17.55 W/kg
SAR(1 g) = 9.83 W/kg; SAR(10 g) = 5.16 W/kg
Maximum value of SAR (measured) = 14.41 W/kg



0 dB = 14.41 W/kg = 11.59 dB W/kg

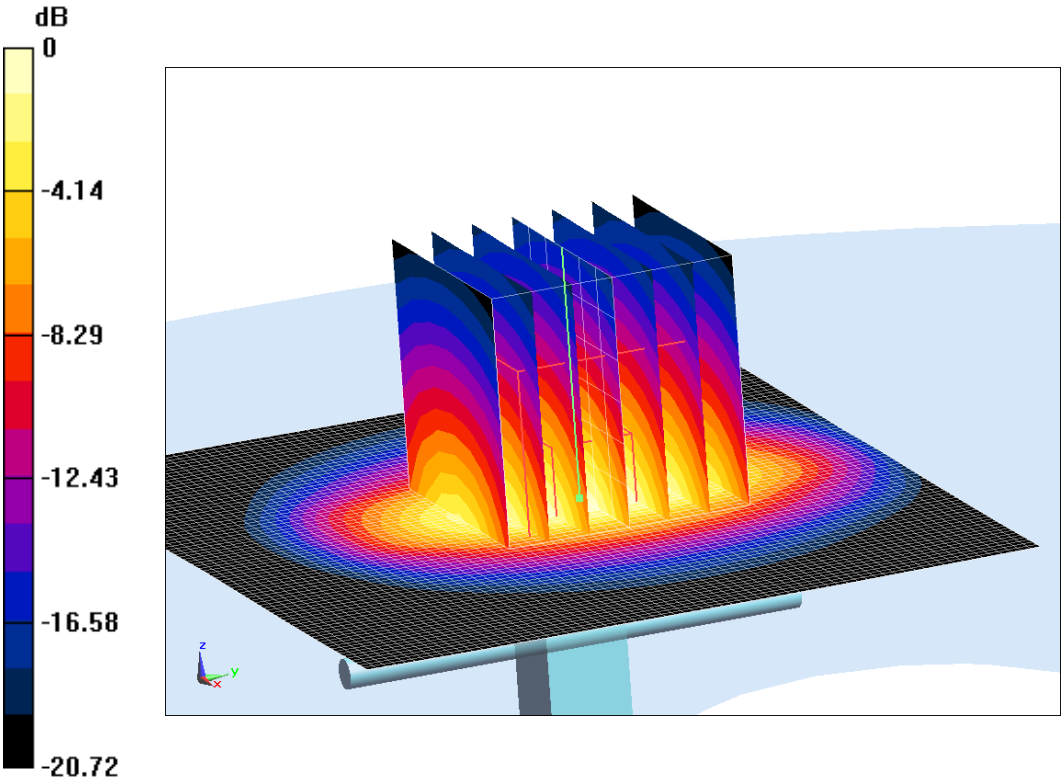
Fig.B.8 validation 1900 MHz 250mW

2300 MHz

Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: Head 2300 MHz
Medium parameters used: f = 2300 MHz; σ =1.655 mho/m; ε_r = 39.35; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 2300 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3617 ConvF(7.74,7.74,7.74)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 117.22 V/m; Power Drift = -0.08
Fast SAR: SAR(1 g) = 12.33 W/kg; SAR(10 g) = 5.94 W/kg
Maximum value of SAR (interpolated) = 20.09 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =117.22 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 23.65 W/kg
SAR(1 g) = 12.65 W/kg; SAR(10 g) = 6.13 W/kg
Maximum value of SAR (measured) = 20.29 W/kg



0 dB = 20.29 W/kg = 13.07 dB W/kg

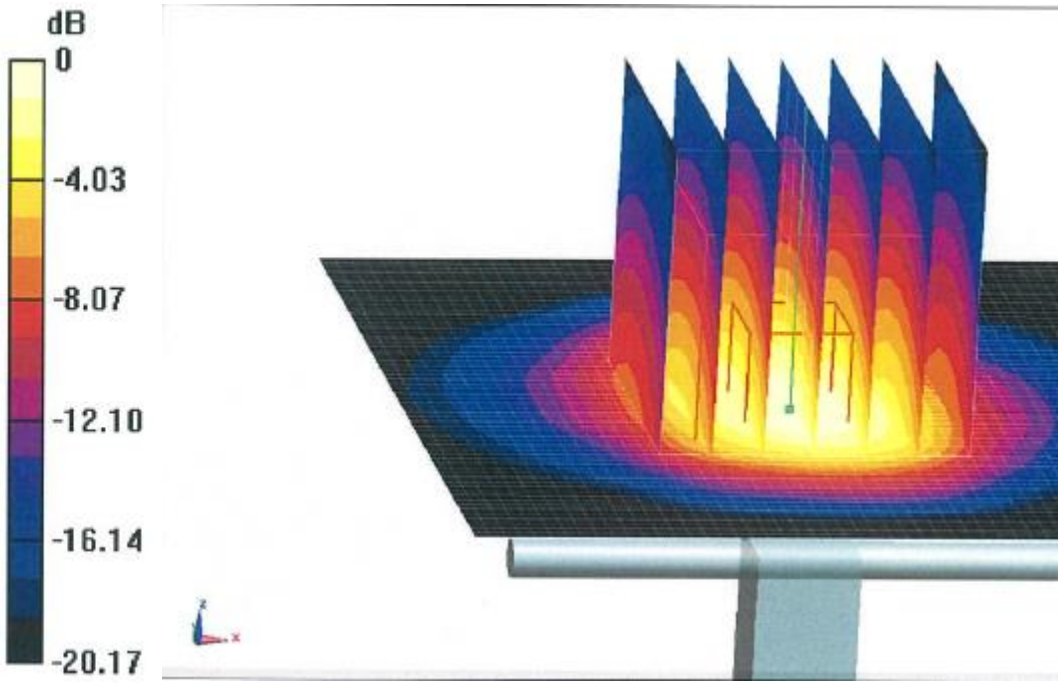
Fig.B.9 validation 2300 MHz 250mW

2300 MHz

Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: Body 2300 MHz
Medium parameters used: f = 2300 MHz; σ =1.825 mho/m; ε_r = 53.56; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 2300 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3617 ConvF(7.84,7.84,7.84)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 107.13 V/m; Power Drift = -0.02
Fast SAR: SAR(1 g) = 11.94 W/kg; SAR(10 g) = 5.75 W/kg
Maximum value of SAR (interpolated) = 19.41 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =107.13 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 22.79 W/kg
SAR(1 g) = 11.68 W/kg; SAR(10 g) = 5.64 W/kg
Maximum value of SAR (measured) = 19 W/kg



0 dB = 19 W/kg = 12.79 dB W/kg

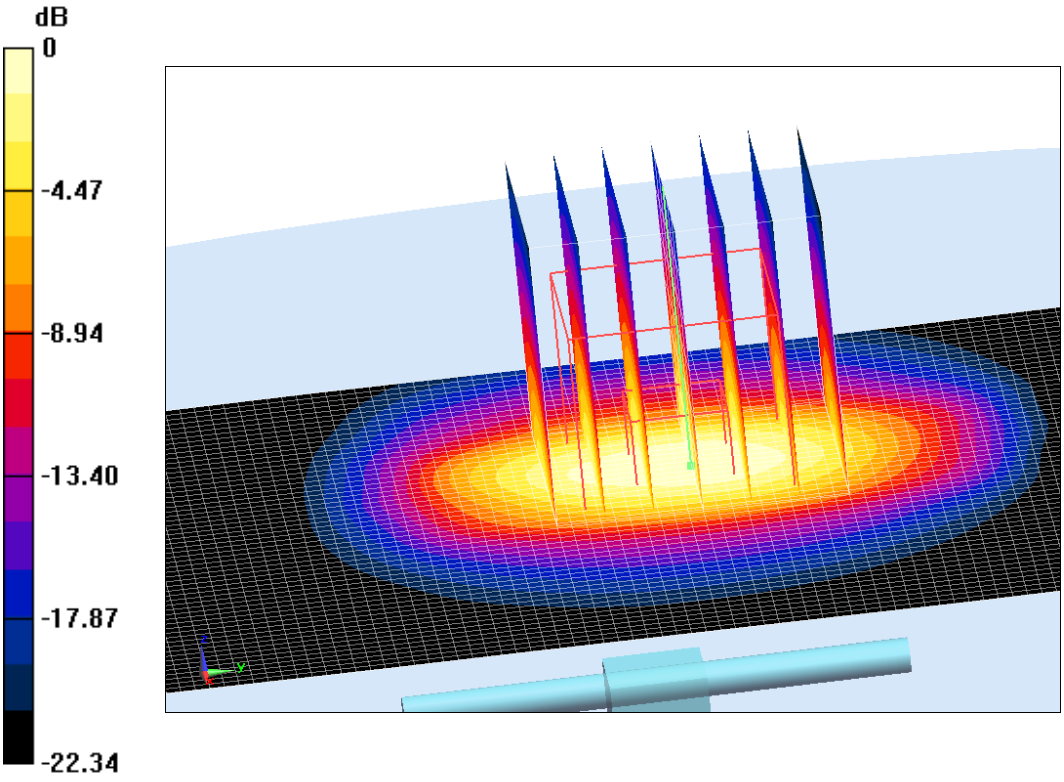
Fig.B.10 validation 2300 MHz 250mW

2450 MHz

Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: Head 2450 MHz
Medium parameters used: f = 2450 MHz; σ =1.805 mho/m; ε_r = 39.76; ρ = 1000 kg/m^3
Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C
Communication System: CW Frequency: 2450 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3617 ConvF(7.62,7.62,7.62)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 115.32 V/m; Power Drift = -0.05
Fast SAR: SAR(1 g) = 12.78 W/kg; SAR(10 g) = 5.98 W/kg
Maximum value of SAR (interpolated) = 22.2 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =115.32 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 25.59 W/kg
SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.09 W/kg
Maximum value of SAR (measured) = 21.27 W/kg



0 dB = 21.27 W/kg = 13.28 dB W/kg

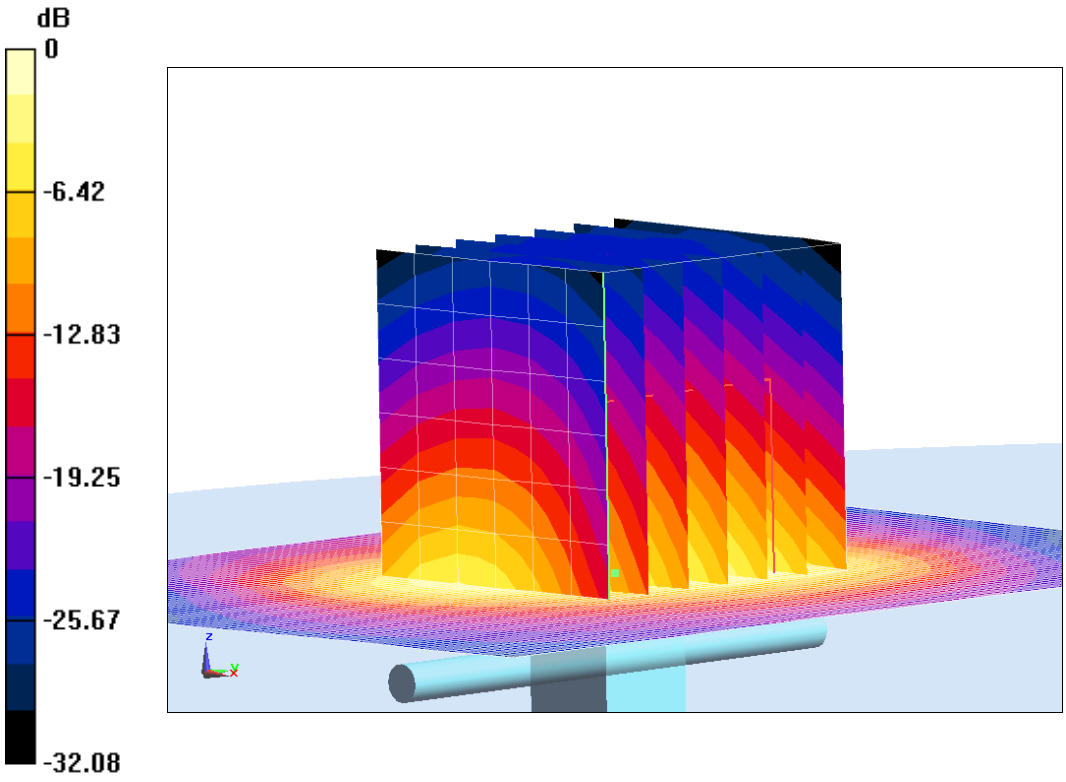
Fig.B.11 validation 2450 MHz 250mW

2450 MHz

Date: 12/30/2019
Electronics: DAE4 Sn771
Medium: Body 2450 MHz
Medium parameters used: f = 2450 MHz; σ =1.93 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 2450 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN3617 ConvF(7.79,7.79,7.79)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 111.35 V/m; Power Drift = -0.02
Fast SAR: SAR(1 g) = 13.12 W/kg; SAR(10 g) = 6.02 W/kg
Maximum value of SAR (interpolated) = 21.05 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =111.35 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 26.33 W/kg
SAR(1 g) = 12.87 W/kg; SAR(10 g) = 6.22 W/kg
Maximum value of SAR (measured) = 22.19 W/kg



0 dB = 22.19 W/kg = 13.46 dB W/kg

Fig.B.12 validation 2450 MHz 250mW

J.6 Probe Calibration Certificate

Probe 3617 Calibration Certificate

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

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

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

Accreditation No.: SCS 0108

Client CTTL (Auden)

Certificate No: EX3-3617_Jan19

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3617
Calibration procedure(s)	QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-25.v7 Calibration procedure for dosimetric E-field probes
Calibration date:	January 31, 2019

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-18 (No. 217-02682)	Apr-19
DAE4	SN: 660	19-Dec-18 (No. DAE4-660_Dec18)	Dec-19
Reference Probe ES3DV2	SN: 3013	31-Dec-18 (No. ES3-3013_Dec18)	Dec-19
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

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

Issued: February 2, 2019

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

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

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

Accreditation No.: SCS 0108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, ", "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

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

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.35	0.21	0.32	± 10.1 %
DCP (mV)[B]	102.9	95.7	101.9	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max dev.	Max Unc[E] (k=2)
0	CW	X	0.00	0.00	1.00	0.00	151.4	± 3.0 %	± 4.7 %
		Y	0.00	0.00	1.00		154.7		
		Z	0.00	0.00	1.00		150.4		
10352-AAA	Pulse Waveform (200Hz, 10%)	X	5.31	73.42	14.63	10.00	60.0	± 2.6 %	± 9.6 %
		Y	2.86	65.84	11.90		60.0		
		Z	15.00	87.67	20.10		60.0		
10353-AAA	Pulse Waveform (200Hz, 20%)	X	10.57	81.97	16.23	6.99	80.0	± 1.7 %	± 9.6 %
		Y	2.03	65.40	10.27		80.0		
		Z	15.00	89.79	19.80		80.0		
10354-AAA	Pulse Waveform (200Hz, 40%)	X	15.00	86.62	16.29	3.98	95.0	± 1.1 %	± 9.6 %
		Y	0.82	61.50	6.58		95.0		
		Z	15.00	97.47	22.01		95.0		
10355-AAA	Pulse Waveform (200Hz, 60%)	X	15.00	89.99	16.64	2.22	120.0	± 1.2 %	± 9.6 %
		Y	0.40	60.00	3.98		120.0		
		Z	15.00	114.21	28.32		120.0		
10387-AAA	QPSK Waveform, 1 MHz	X	0.65	62.36	8.93	0.00	150.0	± 3.9 %	± 9.6 %
		Y	0.45	60.00	5.43		150.0		
		Z	0.90	65.62	10.92		150.0		
10388-AAA	QPSK Waveform, 10 MHz	X	2.42	70.53	17.16	0.00	150.0	± 1.8 %	± 9.6 %
		Y	1.99	67.57	15.24		150.0		
		Z	2.71	72.39	18.22		150.0		
10396-AAA	64-QAM Waveform, 100 kHz	X	3.78	75.33	20.79	3.01	150.0	± 0.7 %	± 9.6 %
		Y	3.23	71.01	18.81		150.0		
		Z	3.71	74.94	20.97		150.0		
10399-AAA	64-QAM Waveform, 40 MHz	X	3.58	68.11	16.37	0.00	150.0	± 4.0 %	± 9.6 %
		Y	3.32	66.75	15.59		150.0		
		Z	3.71	68.68	16.83		150.0		
10414-AAA	WLAN CCDF, 64-QAM, 40MHz	X	4.84	66.21	15.87	0.00	150.0	± 6.7 %	± 9.6 %
		Y	4.48	64.72	15.19		150.0		
		Z	4.93	66.43	16.14		150.0		

Note: For details on UID parameters see Appendix

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms.V^{-2}$	T2 $ms.V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
X	38.8	281.02	33.92	10.58	0.71	4.99	1.88	0.20	1.01
Y	39.2	310.65	39.54	8.92	1.27	5.05	0.00	0.75	1.01
Z	40.7	300.62	35.22	10.39	0.59	5.05	1.28	0.33	1.01

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	14.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
64	54.2	0.75	12.45	12.45	12.45	0.00	1.00	± 13.3 %
150	52.3	0.76	11.88	11.88	11.88	0.00	1.00	± 13.3 %
300	45.3	0.87	11.40	11.40	11.40	0.08	1.20	± 13.3 %
450	43.5	0.87	10.54	10.54	10.54	0.14	1.40	± 13.3 %
750	41.9	0.89	10.03	10.03	10.03	0.63	0.84	± 12.0 %
835	41.5	0.90	9.75	9.75	9.75	0.39	0.95	± 12.0 %
900	41.5	0.97	9.66	9.66	9.66	0.47	0.85	± 12.0 %
1450	40.5	1.20	8.68	8.68	8.68	0.37	0.80	± 12.0 %
1640	40.2	1.31	8.48	8.48	8.48	0.38	0.80	± 12.0 %
1750	40.1	1.37	8.38	8.38	8.38	0.36	0.82	± 12.0 %
1810	40.0	1.40	8.11	8.11	8.11	0.32	0.84	± 12.0 %
1900	40.0	1.40	8.14	8.14	8.14	0.32	0.85	± 12.0 %
2000	40.0	1.40	8.13	8.13	8.13	0.28	0.84	± 12.0 %
2100	39.8	1.49	8.30	8.30	8.30	0.37	0.85	± 12.0 %
2300	39.5	1.67	7.74	7.74	7.74	0.32	0.84	± 12.0 %
2450	39.2	1.80	7.62	7.62	7.62	0.31	0.95	± 12.0 %
2600	39.0	1.96	7.19	7.19	7.19	0.43	0.85	± 12.0 %
3300	38.2	2.71	6.98	6.98	6.98	0.25	1.20	± 13.1 %
3500	37.9	2.91	6.97	6.97	6.97	0.50	1.20	± 13.1 %
3700	37.7	3.12	6.89	6.89	6.89	0.20	1.20	± 13.1 %
3900	37.5	3.32	6.88	6.88	6.88	0.20	1.20	± 13.1 %
4600	36.7	4.04	6.84	6.84	6.84	0.20	1.50	± 13.1 %
4950	36.3	4.40	5.60	5.60	5.60	0.40	1.80	± 13.1 %
5200	36.0	4.66	5.50	5.50	5.50	0.40	1.80	± 13.1 %
5250	35.9	4.71	5.39	5.39	5.39	0.40	1.80	± 13.1 %
5300	35.9	4.76	5.25	5.25	5.25	0.40	1.80	± 13.1 %
5500	35.6	4.96	5.18	5.18	5.18	0.40	1.80	± 13.1 %
5600	35.5	5.07	5.06	5.06	5.06	0.40	1.80	± 13.1 %
5750	35.4	5.22	5.07	5.07	5.07	0.40	1.80	± 13.1 %
5800	35.3	5.27	5.04	5.04	5.04	0.40	1.80	± 13.1 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
150	61.9	0.80	11.45	11.45	11.45	0.00	1.00	± 13.3 %
300	58.2	0.92	10.57	10.57	10.57	0.03	1.20	± 13.3 %
450	56.7	0.94	10.39	10.39	10.39	0.08	1.20	± 13.3 %
750	55.5	0.96	9.85	9.85	9.85	0.50	0.84	± 12.0 %
835	55.2	0.97	9.61	9.61	9.61	0.37	0.95	± 12.0 %
900	55.0	1.05	9.57	9.57	9.57	0.45	0.84	± 12.0 %
1450	54.0	1.30	8.33	8.33	8.33	0.34	0.80	± 12.0 %
1640	53.7	1.42	8.53	8.53	8.53	0.35	0.80	± 12.0 %
1750	53.4	1.49	8.03	8.03	8.03	0.39	0.84	± 12.0 %
1810	53.3	1.52	7.94	7.94	7.94	0.43	0.84	± 12.0 %
1900	53.3	1.52	7.78	7.78	7.78	0.38	0.87	± 12.0 %
2000	53.3	1.52	8.00	8.00	8.00	0.22	1.15	± 12.0 %
2100	53.2	1.62	8.23	8.23	8.23	0.41	0.85	± 12.0 %
2300	52.9	1.81	7.84	7.84	7.84	0.40	0.84	± 12.0 %
2450	52.7	1.95	7.79	7.79	7.79	0.31	0.86	± 12.0 %
2600	52.5	2.16	7.49	7.49	7.49	0.26	0.98	± 12.0 %
3500	51.3	3.31	6.86	6.86	6.86	0.25	1.20	± 13.1 %
3700	51.0	3.55	6.60	6.60	6.60	0.26	1.25	± 13.1 %
3900	51.2	3.78	6.69	6.69	6.69	0.26	1.25	± 13.1 %
4600	49.8	4.60	6.50	6.50	6.50	0.28	1.30	± 13.1 %
3500	51.3	3.31	6.46	6.46	6.46	0.20	1.70	± 13.1 %
4950	49.4	5.01	4.99	4.99	4.99	0.50	1.90	± 13.1 %
5200	49.0	5.30	4.84	4.84	4.84	0.50	1.90	± 13.1 %
5250	48.9	5.36	4.76	4.76	4.76	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.63	4.63	4.63	0.50	1.90	± 13.1 %
5500	48.6	5.65	4.32	4.32	4.32	0.50	1.90	± 13.1 %
5600	48.5	5.77	4.23	4.23	4.23	0.50	1.90	± 13.1 %
5750	48.3	5.94	4.36	4.36	4.36	0.50	1.90	± 13.1 %
5800	48.2	6.00	4.24	4.24	4.24	0.50	1.90	± 13.1 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.