Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.8 Ω - 2.0 jΩ
Return Loss	- 29.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.0 Ω - 1.5 jΩ
Return Loss	- 36.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.152 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 03, 2012

DASY5 Validation Report for Head TSL

Date: 24.07.2015

Test Laboratory: SPEAG, Zurich, Switzerland

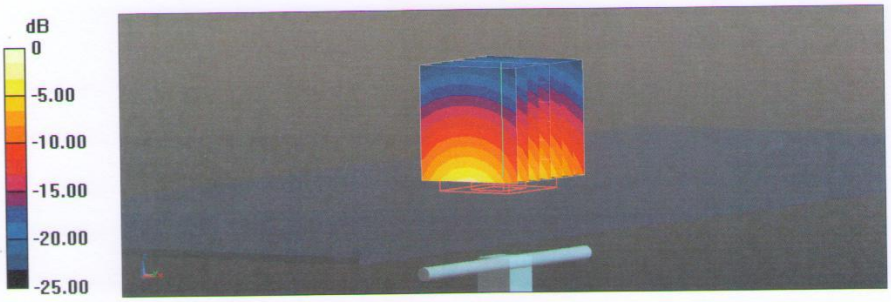
DUT: Dipole 2550 MHz; Type: D2550V2; Serial: D2550V2 - SN: 1010

Communication System: UID 0 - CW; Frequency: 2550 MHz
Medium parameters used: f = 2550 MHz; σ = 1.99 S/m; ε_r = 37.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

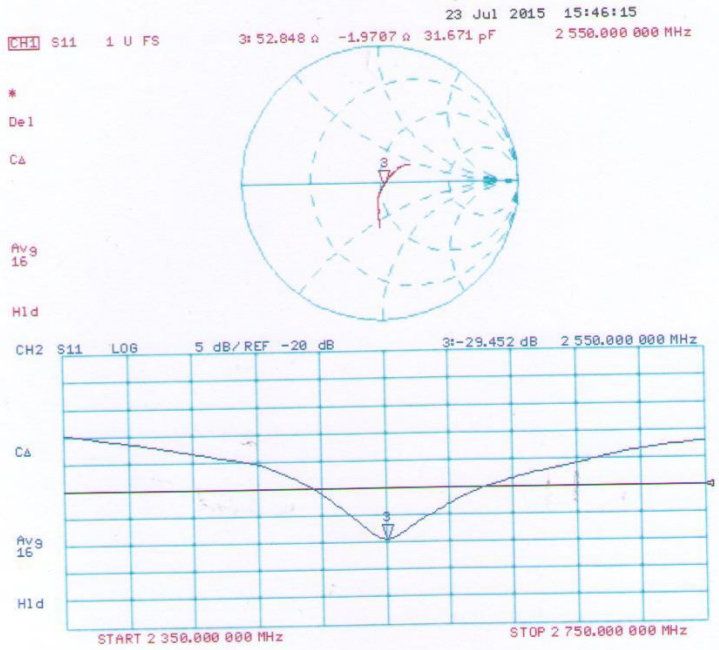
- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.6 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 30.5 W/kg
SAR(1 g) = 14.7 W/kg; SAR(10 g) = 6.67 W/kg
Maximum value of SAR (measured) = 19.5 W/kg



0 dB = 19.5 W/kg = 12.90 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 24.07.2015

Test Laboratory: SPEAG, Zurich, Switzerland

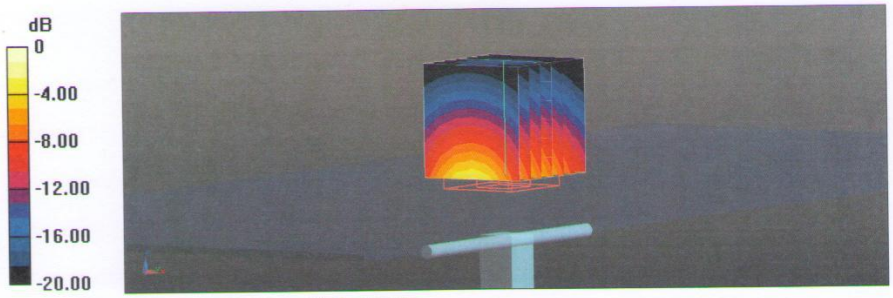
DUT: Dipole 2550 MHz; Type: D2550V2; Serial: D2550V2 - SN: 1010

Communication System: UID 0 - CW; Frequency: 2550 MHz
Medium parameters used: f = 2550 MHz; σ = 2.15 S/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

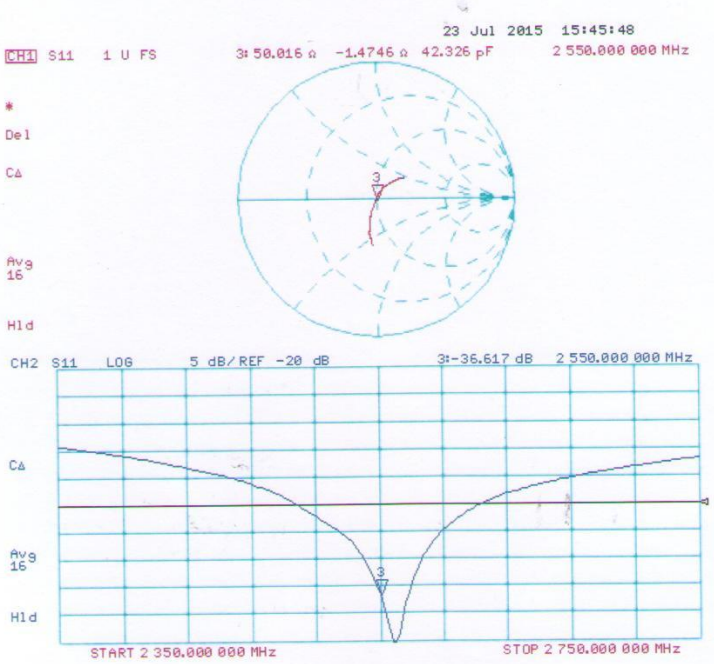
- Probe: ES3DV3 - SN3205; ConvF(4.2, 4.2, 4.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.75 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 28.7 W/kg
SAR(1 g) = 13.9 W/kg; SAR(10 g) = 6.32 W/kg
Maximum value of SAR (measured) = 18.5 W/kg



0 dB = 18.5 W/kg = 12.67 dBW/kg

Impedance Measurement Plot for Body TSL



5GHz Dipole 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 **TMC-SZ (Auden)** **Certificate No: D5GHzV2-1238_Sep16**

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN:1238
Calibration procedure(s)	QA CAL-22.v2 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date:	September 21, 2016

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	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 3503	30-Jun-16 (No. EX3-3503_Jun16)	Jun-17
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (No. 217-02223)	In house check: Oct-16
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Jun-15)	In house check: Oct-16
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 22, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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

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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
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

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 62209-2, "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
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

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%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5300 MHz ± 1 MHz 5500 MHz ± 1 MHz 5600 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.6 ± 6 %	4.54 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	-----	-----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.76 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**76.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.22 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.9 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.4 ± 6 %	4.63 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5300 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.0 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.7 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.2 ± 6 %	4.83 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.21 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.3 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.1 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.0 ± 6 %	4.93 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**82.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.39 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.6 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.7 ± 6 %	5.14 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.96 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**78.8 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.3 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.5 ± 6 %	5.45 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.48 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**74.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.10 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.9 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.42 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.3 ± 6 %	5.59 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5300 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.69 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**76.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.5 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.0 ± 6 %	5.86 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.03 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**79.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.1 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.8 ± 6 %	6.00 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.95 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**79.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.1 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.4 ± 6 %	6.29 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.66 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**76.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.1 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	47.1 Ω - 5.8 jΩ
Return Loss	- 23.6 dB

Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	50.5 Ω - 3.2 jΩ
Return Loss	- 29.8 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	49.0 Ω + 2.5 jΩ
Return Loss	- 31.2 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	50.0 Ω + 0.6 jΩ
Return Loss	- 44.1 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	55.6 Ω + 1.9 jΩ
Return Loss	- 25.1 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	48.6 Ω - 3.4 jΩ
Return Loss	- 28.6 dB

Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to feed point	49.6 Ω - 2.4 jΩ
Return Loss	- 32.3 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	49.5 Ω + 2.5 jΩ
Return Loss	- 31.7 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	50.8 Ω + 2.5 jΩ
Return Loss	- 31.7 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	56.0 Ω + 3.0 jΩ
Return Loss	- 24.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.191 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 04, 2015

DASY5 Validation Report for Head TSL

Date: 21.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1238

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.54 S/m; ε_r = 34.6; ρ = 1000 kg/m^3
Medium parameters used: f = 5300 MHz; σ = 4.63 S/m; ε_r = 34.4; ρ = 1000 kg/m^3
Medium parameters used: f = 5500 MHz; σ = 4.83 S/m; ε_r = 34.2; ρ = 1000 kg/m^3
Medium parameters used: f = 5600 MHz; σ = 4.93 S/m; ε_r = 34.0; ρ = 1000 kg/m^3
Medium parameters used: f = 5800 MHz; σ = 5.14 S/m; ε_r = 33.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.59, 5.59, 5.59); Calibrated: 30.06.2016, ConvF(5.14, 5.14, 5.14); Calibrated: 30.06.2016, ConvF(5.02, 5.02, 5.02); Calibrated: 30.06.2016, ConvF(4.89, 4.89, 4.89); Calibrated: 30.06.2016, ConvF(4.85, 4.85, 4.85); Calibrated: 30.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

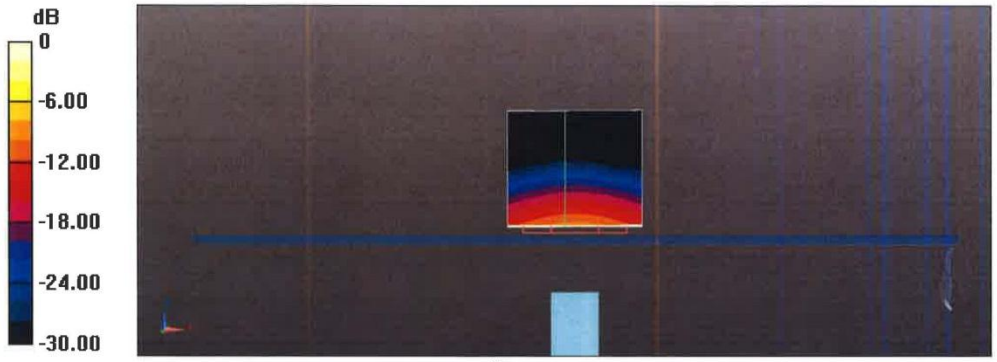
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 70.35 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 27.9 W/kg
SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.22 W/kg
Maximum value of SAR (measured) = 17.9 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.80 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 31.1 W/kg
SAR(1 g) = 8.38 W/kg; SAR(10 g) = 2.4 W/kg
Maximum value of SAR (measured) = 19.5 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 70.90 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 31.9 W/kg
SAR(1 g) = 8.21 W/kg; SAR(10 g) = 2.34 W/kg
Maximum value of SAR (measured) = 19.5 W/kg

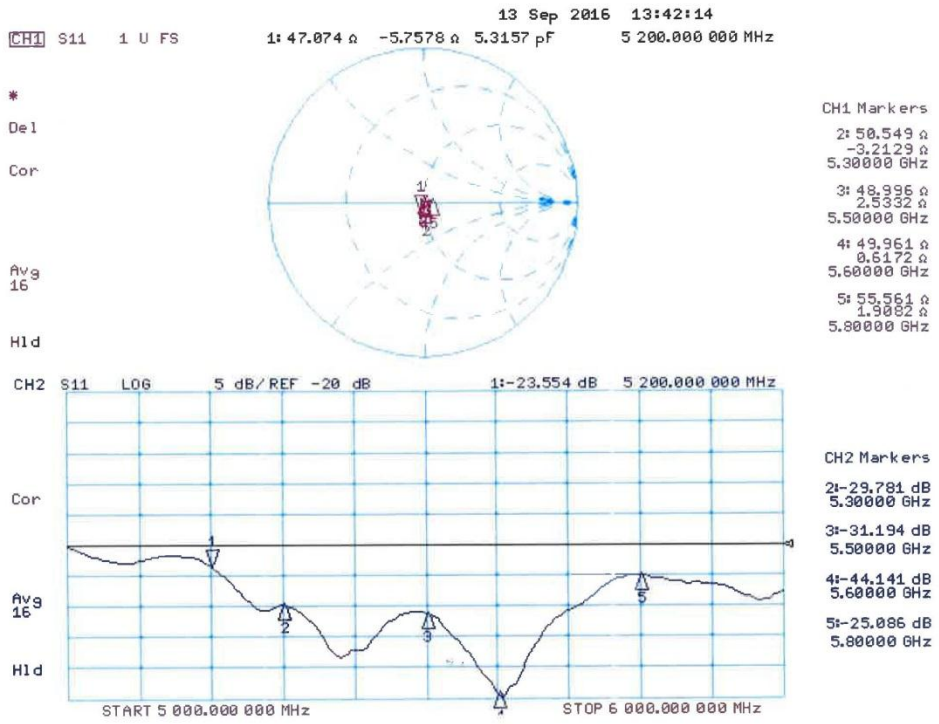
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 71.51 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 32.8 W/kg
SAR(1 g) = 8.38 W/kg; SAR(10 g) = 2.39 W/kg
Maximum value of SAR (measured) = 20.0 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 69.07 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 32.5 W/kg
SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.26 W/kg
Maximum value of SAR (measured) = 19.4 W/kg



0 dB = 17.9 W/kg = 12.53 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 20.09.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1238

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 5.45 S/m; ε_r = 47.5; ρ = 1000 kg/m^3
Medium parameters used: f = 5300 MHz; σ = 5.59 S/m; ε_r = 47.3; ρ = 1000 kg/m^3
Medium parameters used: f = 5500 MHz; σ = 5.86 S/m; ε_r = 47.0; ρ = 1000 kg/m^3
Medium parameters used: f = 5600 MHz; σ = 6.00 S/m; ε_r = 46.8; ρ = 1000 kg/m^3
Medium parameters used: f = 5800 MHz; σ = 6.29 S/m; ε_r = 46.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.99, 4.99, 4.99); Calibrated: 30.06.2016, ConvF(4.75, 4.75, 4.75); Calibrated: 30.06.2016, ConvF(4.4, 4.4, 4.4); Calibrated: 30.06.2016, ConvF(4.35, 4.35, 4.35); Calibrated: 30.06.2016, ConvF(4.27, 4.27, 4.27); Calibrated: 30.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.67 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 27.8 W/kg
SAR(1 g) = 7.48 W/kg; SAR(10 g) = 2.1 W/kg
Maximum value of SAR (measured) = 17.3 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.01 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 29.4 W/kg
SAR(1 g) = 7.69 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 18.0 W/kg

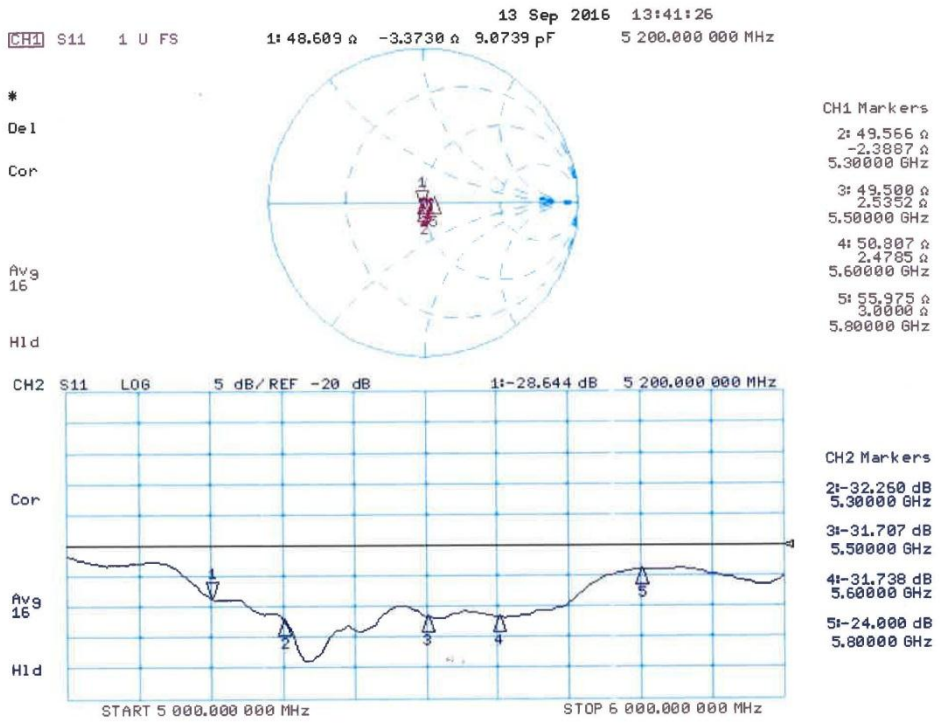
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.20 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 32.4 W/kg
SAR(1 g) = 8.03 W/kg; SAR(10 g) = 2.23 W/kg
Maximum value of SAR (measured) = 19.2 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.47 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 32.7 W/kg
SAR(1 g) = 7.95 W/kg; SAR(10 g) = 2.23 W/kg
Maximum value of SAR (measured) = 19.1 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.40 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 33.2 W/kg
SAR(1 g) = 7.66 W/kg; SAR(10 g) = 2.13 W/kg
Maximum value of SAR (measured) = 18.8 W/kg

0 dB = 17.3 W/kg = 12.38 dBW/kg

Impedance Measurement Plot for Body TSL



ANNEX J Spot Check Test

As the test lab for DSB-0090 from Doro AB, we, Shenzhen Academy of Information and Communications Technology, declare on our sole responsibility that, according to "Product Equality Declaration — DSB-0090" provided by applicant, only the Spot check test should be performed. The test results are as below.

K.1 Internal Identification of EUT used during the spot check test

EUT ID*	IMEI	HW Version	SW Version
EUT3	355115080818484	1021	FRANK01A-S10A_DSB0090_600_USER DEBUG_180503

K.2 Measurement results

SAR Values (GSM850)

Frequency		Test Position		SAR(1g) (W/kg)		
				Spot check data		Original data
MHz	Ch.			Measured SAR	Reported SAR	
848.8	251	Head	Right Touch	0.281	0.33	**0.43**
848.8	251	Body	Rear	0.626	0.71	**0.97**

SAR Values (GSM1900)

Frequency		Test Position		SAR(1g) (W/kg)		
				Spot check data		Original data
MHz	Ch.			Measured SAR	Reported SAR	
1909.8	810	Head	Left Touch	0.321	0.41	**0.52**
1850.2	512	Body	Rear	0.575	0.61	**0.87**

SAR Values (WCDMA 1900)

Frequency		Test Position		SAR(1g) (W/kg)		
				Spot check data		Original data
MHz	Ch.			Measured SAR	Reported SAR	
1852.4	9262	Head	Left Touch	0.386	0.47	**0.89**

SAR Values (LTE-Band 7)

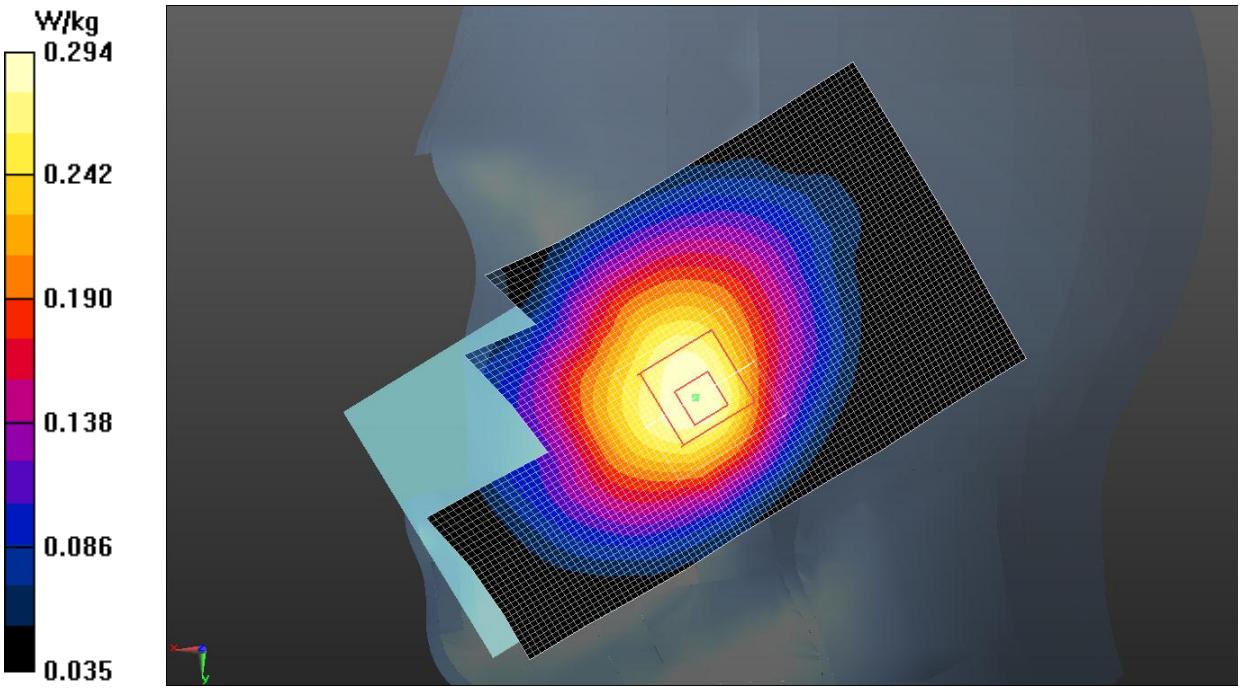
Frequency		Test Position		SAR(1g) (W/kg)		
				Spot check data		Original data
MHz	Ch.			Measured SAR	Reported SAR	
2560	21350	Body	Bottom	1.13	1.17	**1.22**

GSM850 Head

Date: 2018-5-20
Electronics: DAE4 Sn786
Medium: Head 835 MHz
Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.895 S/m; ε_r = 41.226; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, GSM (0) Frequency: 848.8 MHz Duty Cycle: 1:8.3
Probe: EX3DV4 - SN3633 ConvF (9.33, 9.33, 9.33);

Right Cheek High/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.298 W/kg

Right Cheek High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.983 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 0.356 W/kg
SAR(1 g) = 0.281 W/kg; SAR(10 g) = 0.214 W/kg
Maximum value of SAR (measured) = 0.294 W/kg

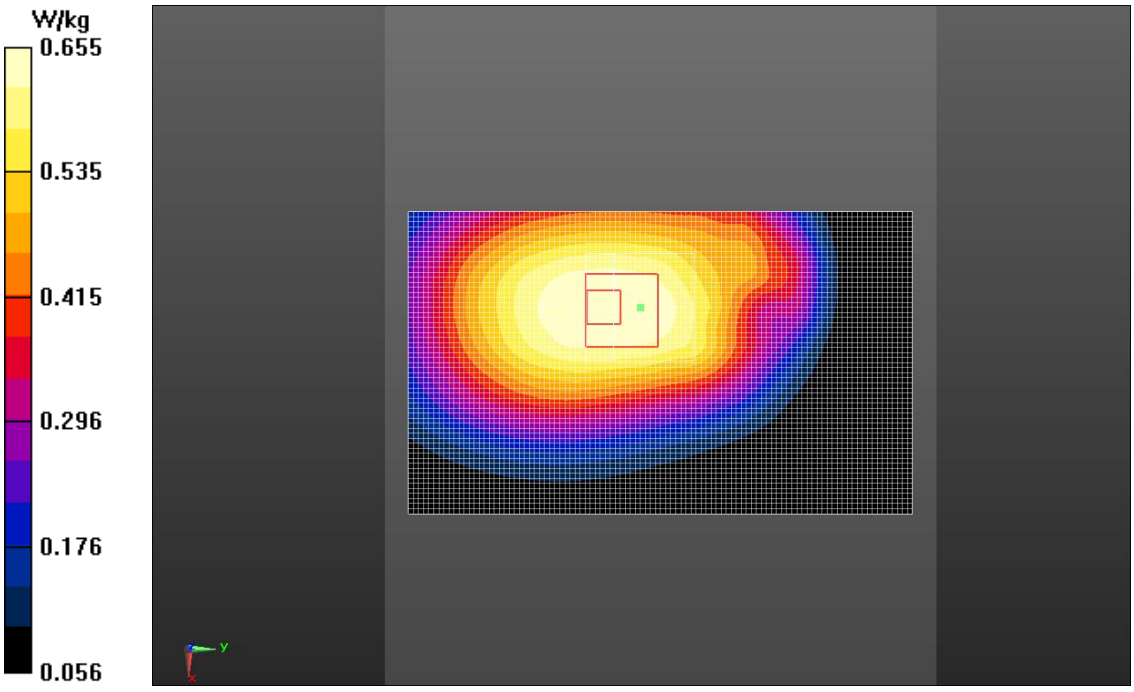


GSM850 Body

Date: 2018-5-20
Electronics: DAE4 Sn1527
Medium: Body 900 MHz
Medium parameters used (interpolated): f = 848.8 MHz; σ = 1.001 S/m; ε_r = 53.555; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, 4 slot GPRS (0) Frequency: 848.8 MHz Duty Cycle: 1:2
Probe: EX3DV4 - SN3633 ConvF (9.69, 9.69, 9.69);

Rear side High/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.655 W/kg

Rear side High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 23.42 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.784 W/kg
SAR(1 g) = 0.626 W/kg; SAR(10 g) = 0.476 W/kg
Maximum value of SAR (measured) = 0.655 W/kg

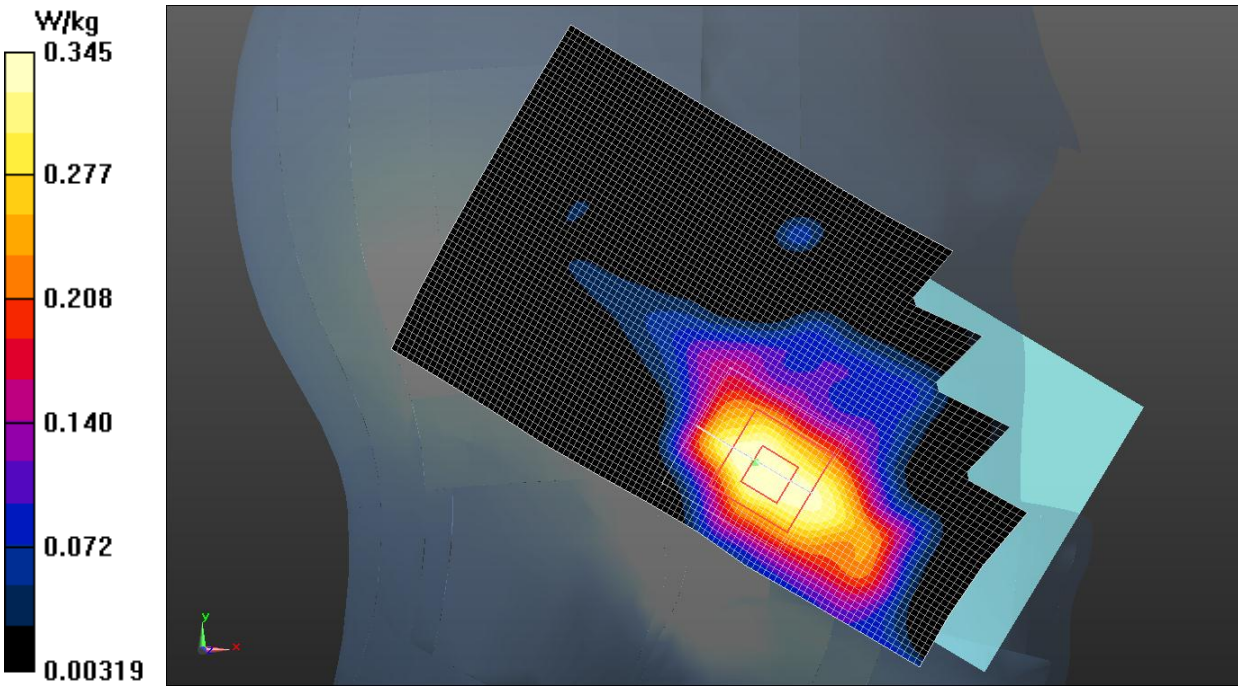


GSM1900 Head

Date: 2018-5-20
Electronics: DAE4 Sn786
Medium: Head 1900MHz
Medium parameters used: f = 1910 MHz; σ = 1.426 S/m; ε_r = 39.131; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, GSM (0) Frequency: 1910 MHz Duty Cycle: 1:8.3
Probe: EX3DV4 - SN3633 ConvF (7.81, 7.81, 7.81);

Left Cheek High/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.368 W/kg

Left Cheek High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.328 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 0.519 W/kg
SAR(1 g) = 0.321 W/kg; SAR(10 g) = 0.190 W/kg
Maximum value of SAR (measured) = 0.345 W/kg

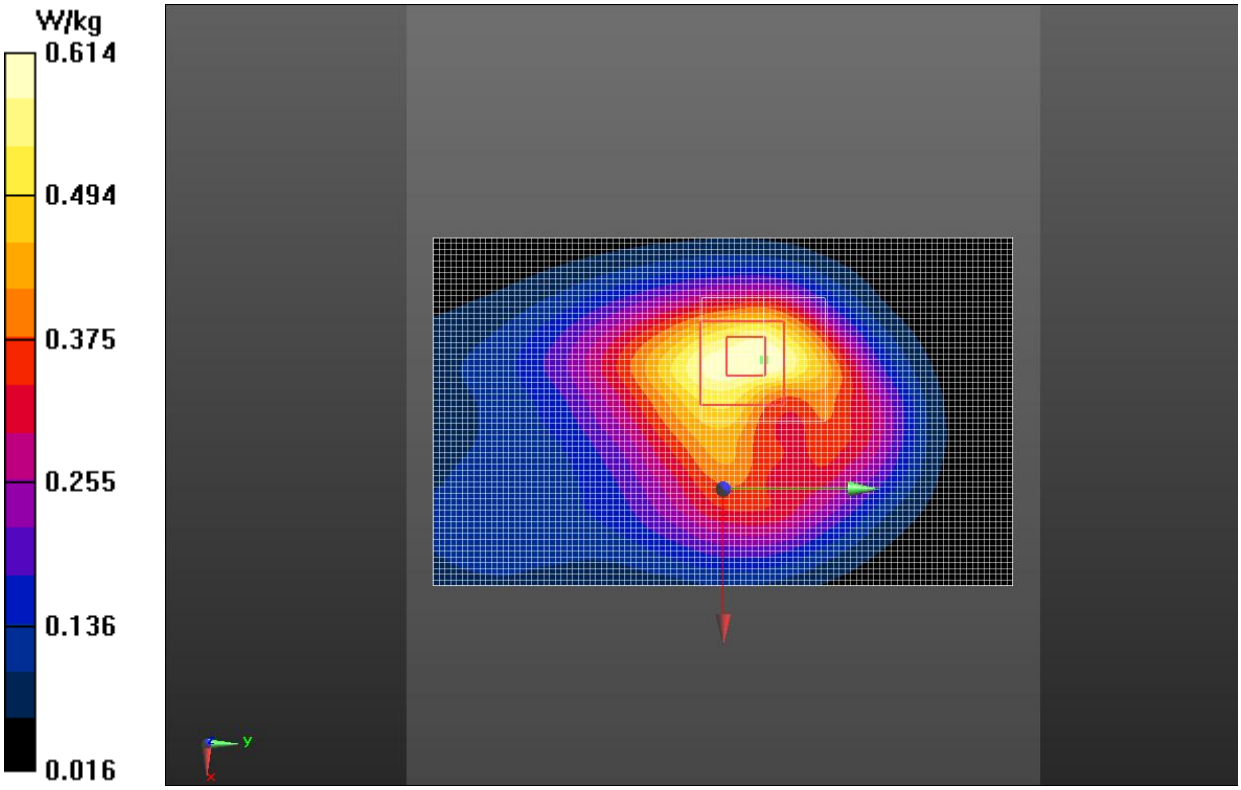


GSM1900 Body

Date: 2018-5-20
Electronics: DAE4 Sn1527
Medium: Body 1900 MHz
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.502 S/m; ε_r = 52.464; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, 4 slot GPRS (0) Frequency: 1850.2 MHz Duty Cycle: 1:2
Probe: EX3DV4 - SN3633 ConvF (7.75, 7.75, 7.75);

Rear side Low/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.621 W/kg

Rear side Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.90 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.968 W/kg
SAR(1 g) = 0.575 W/kg; SAR(10 g) = 0.345 W/kg
Maximum value of SAR (measured) = 0.614 W/kg

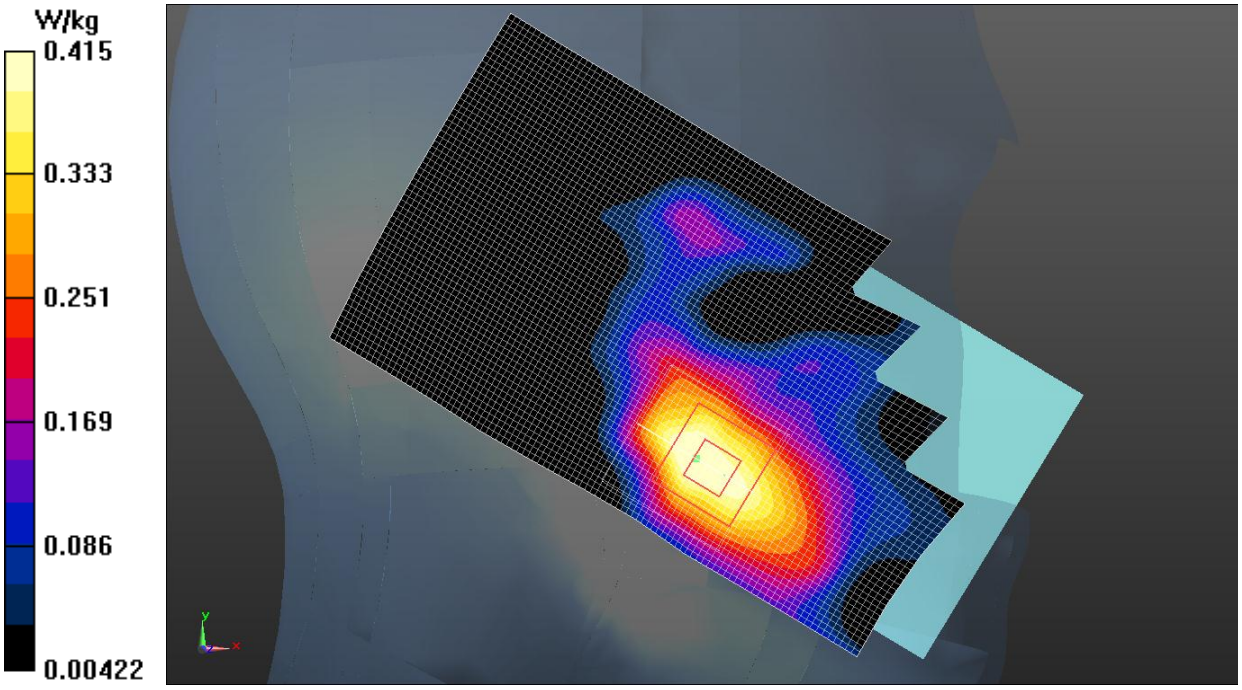


WCDMA1900 Head

Date: 2018-5-20
Electronics: DAE4 Sn786
Medium: 1800Head
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.374 S/m; ε_r = 39.286; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, WCDMA (0) Frequency: 1852.4 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3633 ConvF (7.81, 7.81, 7.81);

Left Cheek Low/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.443 W/kg

Left Cheek Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.486 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.608 W/kg
SAR(1 g) = 0.386 W/kg; SAR(10 g) = 0.233 W/kg
Maximum value of SAR (measured) = 0.415 W/kg

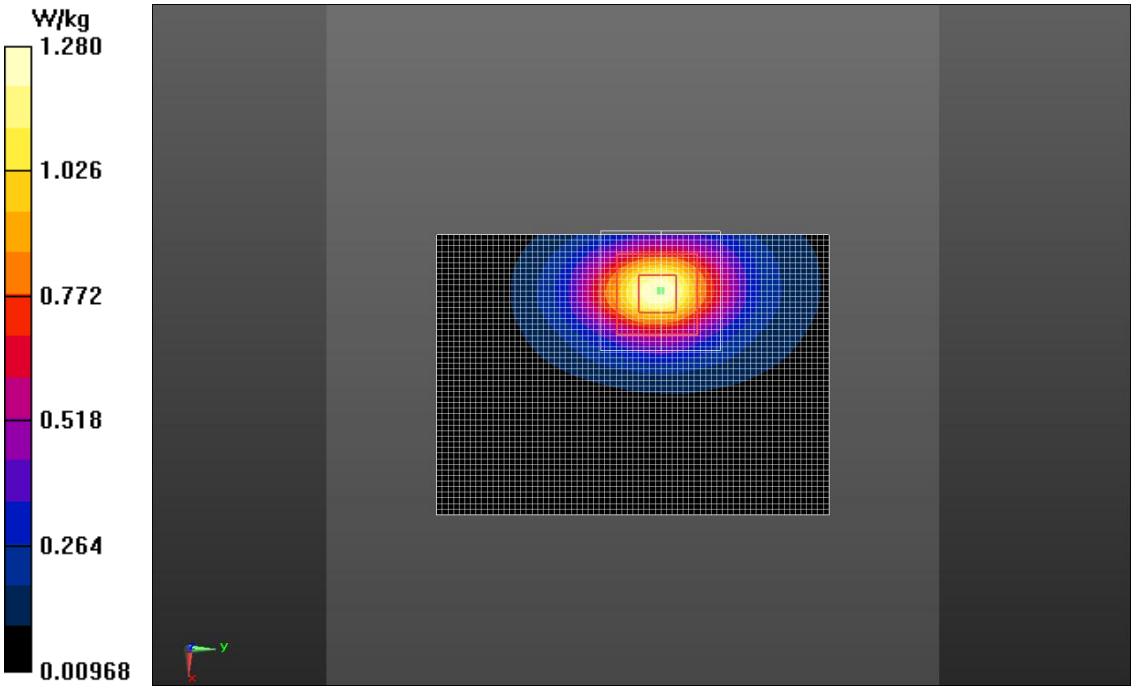


LTE Band 7 Body

Date: 2018-5-20
Electronics: DAE4 Sn1527
Medium: Body 2550MHz
Medium parameters used: f = 2560 MHz; σ = 2.044 S/m; ε_r = 53.183; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.5°C
Communication System: UID 0, LTE_FDD (0) Frequency: 2560 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3633 ConvF (7.31, 7.31, 7.31);

Bottom Side High 1RB_High/Area Scan (51x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.28 W/kg

Bottom Side High 1RB_High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.790 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 2.12 W/kg
SAR(1 g) = 1.13 W/kg; SAR(10 g) = 0.554 W/kg
Maximum value of SAR (measured) = 1.28 W/kg



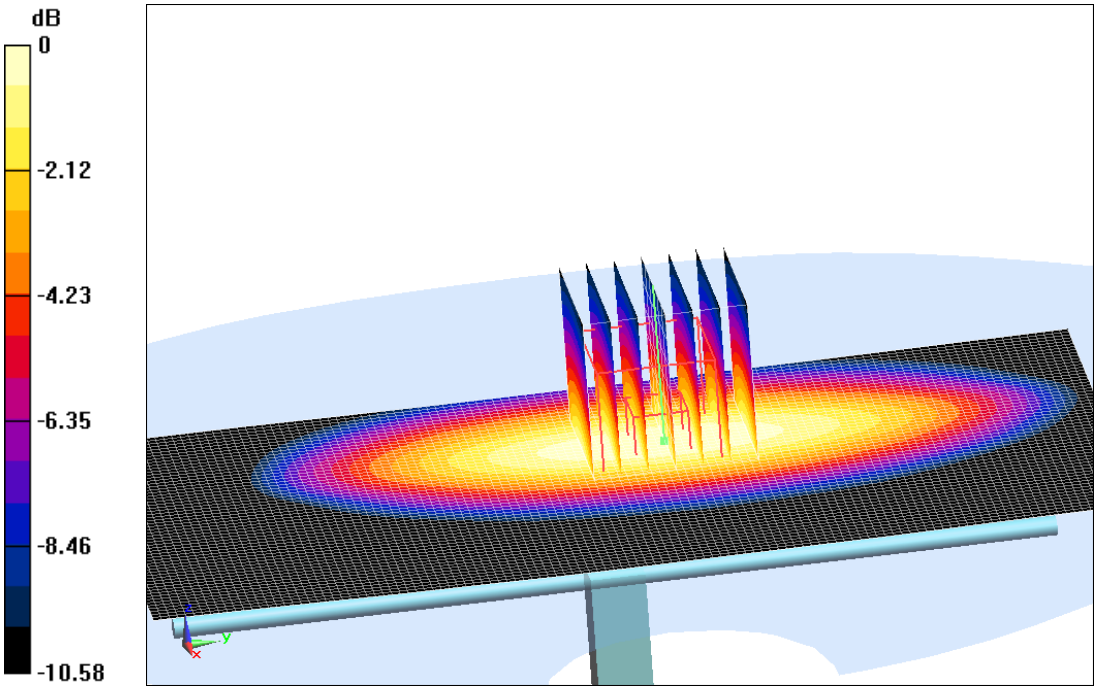
ANNEX K SystemVerification Results for Spot Check Test

835MHz

Date: 2018-5-20
Electronics: DAE4 Sn786
Medium: Head 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.882 S/m; εr = 41.372; ρ = 1000 kg/m^3
Ambient Temperature: 22.9^{o}C Liquid Temperature: 22.5^{o}C
Communication System: CW Frequency: 835 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3633 ConvF (9.33, 9.33, 9.33);

System Validation /Area Scan (81x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 55.075 V/m; Power Drift = -0.05 dB
Fast SAR: SAR(1 g) = 2.35 W/kg; SAR(10 g) = 1.50 W/kg
Maximum value of SAR (interpolated) = 2.52 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.075 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 3.36 W/kg
SAR(1 g) = 2.32 W/kg; SAR(10 g) = 1.48 W/kg
Maximum value of SAR (measured) = 2.48 W/kg



0 dB = 2.48 W/kg = 3.94 dB W/kg

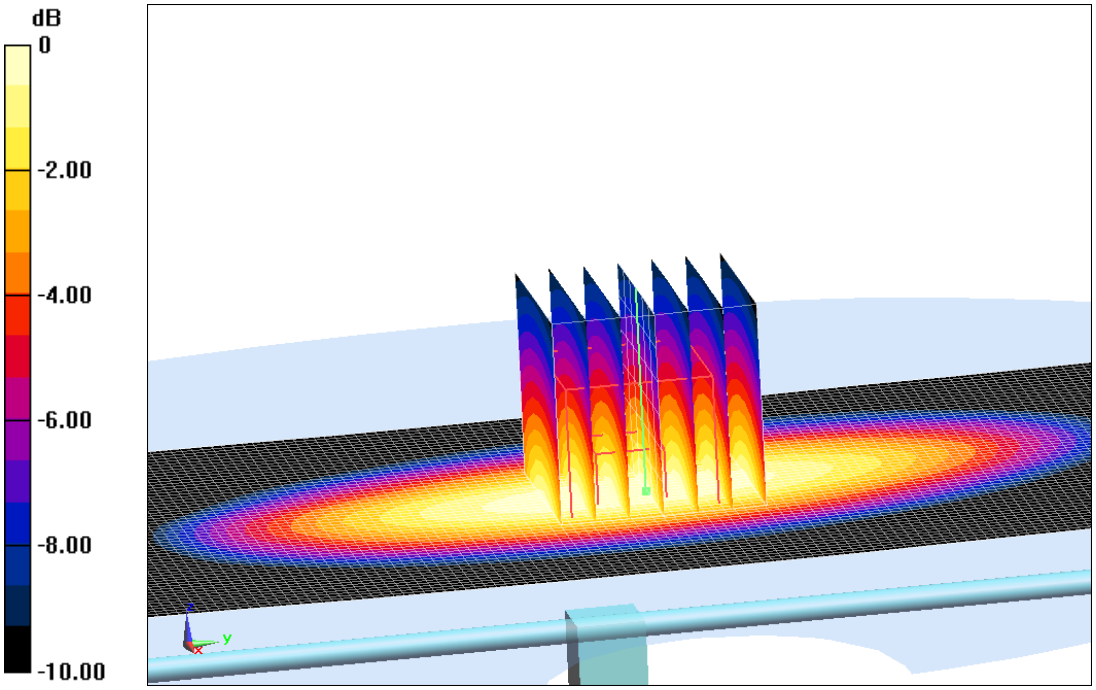
Fig.L.1. Validation 835MHz 250mW

835MHz

Date: 2018-5-20
Electronics: DAE4 Sn786
Medium: Body 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.986 S/m; ε_r = 53.677; ρ = 1000 kg/m^3
Ambient Temperature: 22.9°C Liquid Temperature: 22.5°C
Communication System: CW Frequency: 835 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3633 ConvF (9.69, 9.69, 9.69);

System Validation /Area Scan (81x171x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 56.562 V/m; Power Drift = 0.09 dB
Fast SAR: SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.55 W/kg
Maximum value of SAR (interpolated) = 2.52 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.562 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 3.52 W/kg
SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.57 W/kg
Maximum value of SAR (measured) = 2.58 W/kg



0 dB = 2.58 W/kg = 4.12 dB W/kg

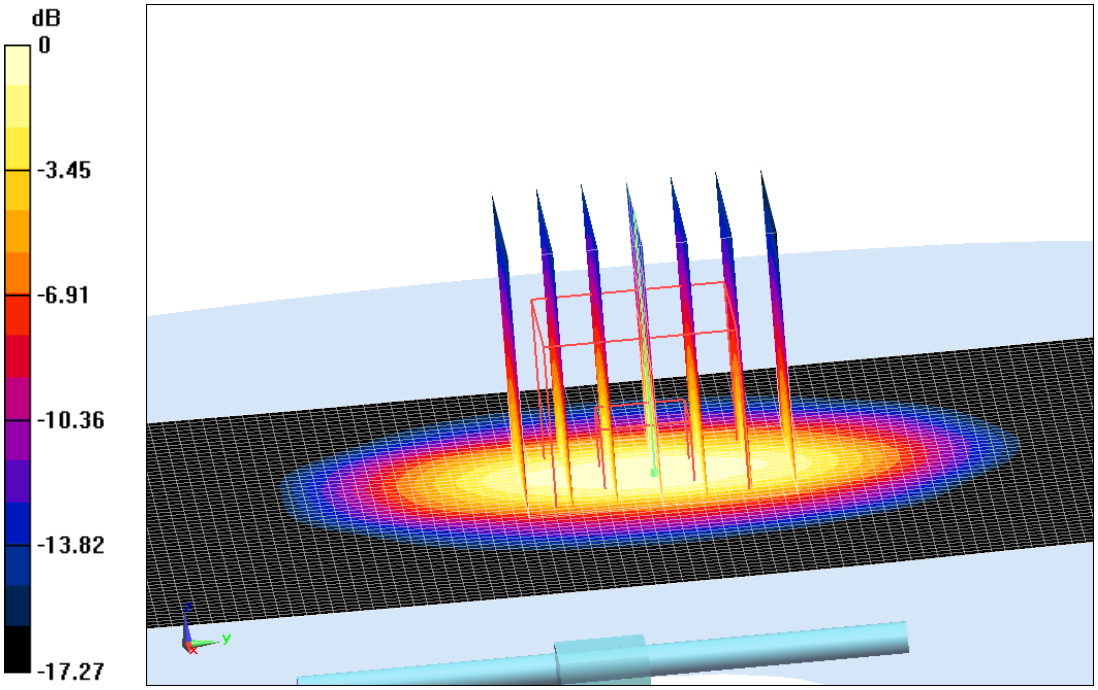
Fig.L.2. Validation 835MHz 250mW

1900MHz

Date: 2018-5-20
Electronics: DAE4 Sn786
Medium: Head 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.417 S/m; ε_r = 39.154; ρ = 1000 kg/m^3
Ambient Temperature: 22.9°C Liquid Temperature: 22.5°C
Communication System: CW Frequency: 1900 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3633 ConvF (7.81, 7.81, 7.81);

System Validation /Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 93.532 V/m; Power Drift = 0.07 dB
Fast SAR: SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.33 W/kg
Maximum value of SAR (interpolated) = 13.4 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.532 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 24.9 W/kg
SAR(1 g) = 10.6 W/kg; SAR(10 g) = 5.36 W/kg
Maximum value of SAR (measured) = 13.8 W/kg



0 dB = 13.8 W/kg = 11.40 dB W/kg

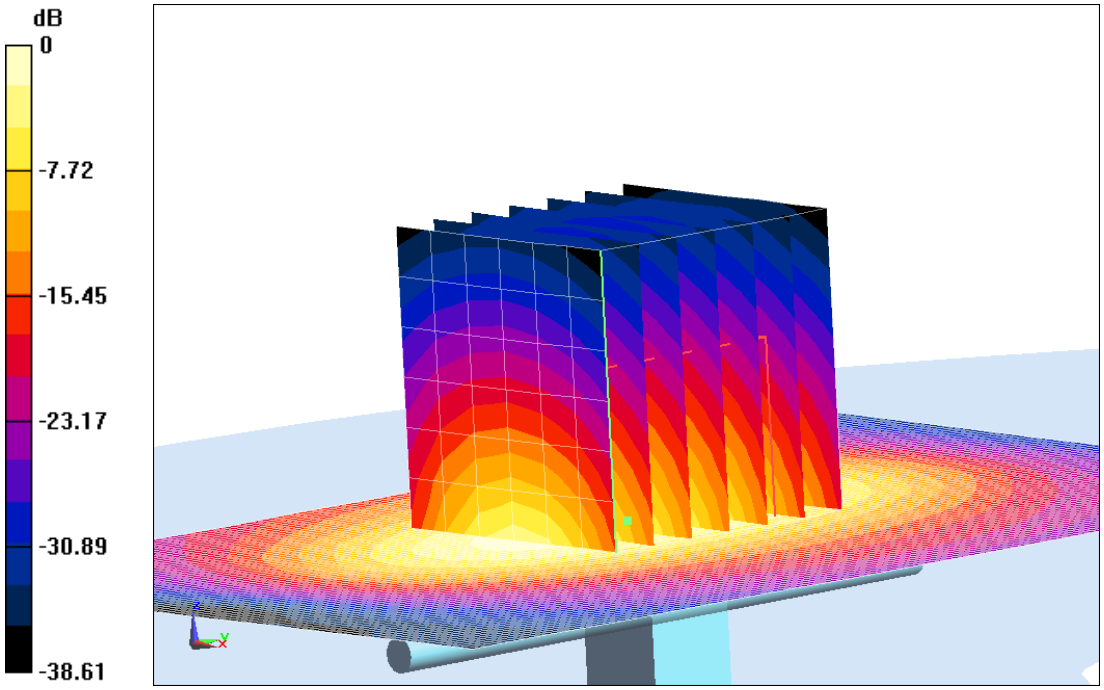
Fig.L.3. Validation 1900MHz 250mW

1900MHz

Date: 2018-5-20
Electronics: DAE4 Sn786
Medium: Body 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.544 S/m; ε_r = 52.35; ρ = 1000 kg/m^3
Ambient Temperature: 22.9°C Liquid Temperature: 22.5°C
Communication System: CW Frequency: 1900 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3633 ConvF (7.75, 7.75, 7.75);

System validation /Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 80.638 V/m; Power Drift = 0.10 dB
Fast SAR: SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.39 W/kg
Maximum value of SAR (interpolated) = 13.5 W/kg

System validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 80.638 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 25.6 W/kg
SAR(1 g) = 10.7 W/kg; SAR(10 g) = 5.45 W/kg
Maximum value of SAR (measured) = 14.1 W/kg



0 dB = 14.1 W/kg = 11.49 dB W/kg

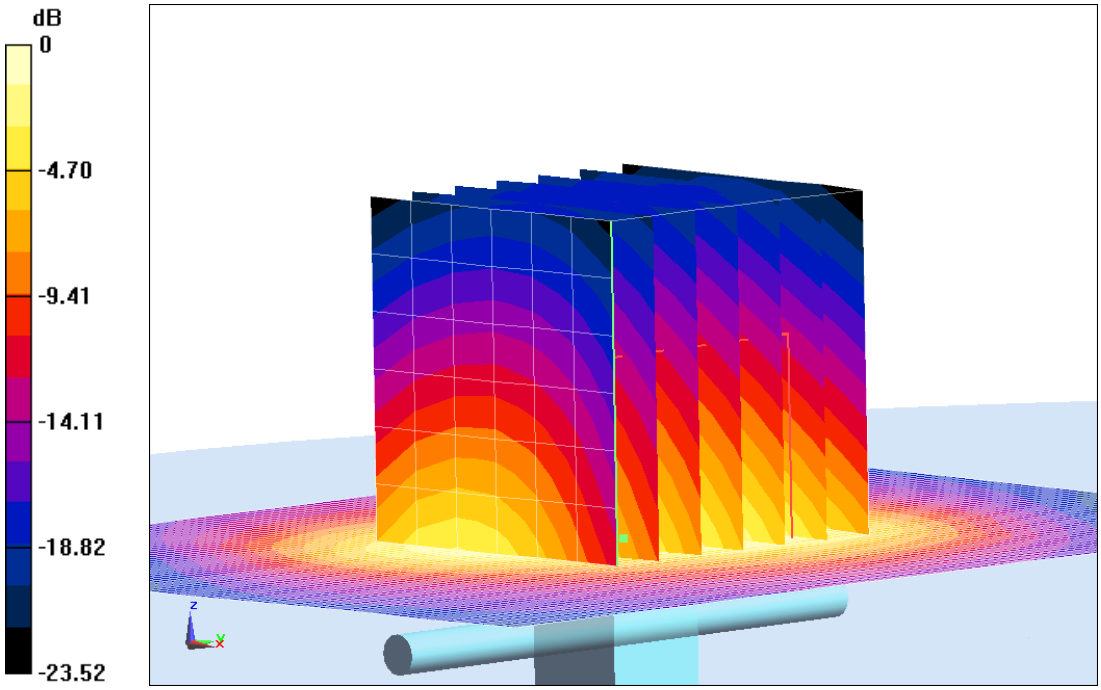
Fig.L.4. Validation 1900MHz 250mW

2550MHz

Date: 2018-5-20
Electronics: DAE4 Sn786
Medium: Body 2550 MHz
Medium parameters used: f = 2550 MHz; σ = 2.032 S/m; ε_r = 53.212; ρ = 1000 kg/m^3
Ambient Temperature: 22.0°C Liquid Temperature: 21.6°C
Communication System: CW Frequency: 2550 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3633 ConvF (7.31, 7.31, 7.31);

System Validation/Area Scan (81x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 86.544 V/m; Power Drift = -0.02 dB
Fast SAR: SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.23 W/kg
Maximum value of SAR (interpolated) = 15.5 W/kg

System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 86.544 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 26.2 W/kg
SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.18 W/kg
Maximum value of SAR (measured) = 15.0 W/kg



0 dB = 15.0 W/kg = 11.76 dB W/kg

Fig.L.5. Validation 2550MHz 250mW