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E-mail: cttl@chinattl.com http://www.chinattl.cn

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:

- 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
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- 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	DASY52	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz \pm 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	39.9 \pm 6 %	1.36 mho/m \pm 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.05 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.4 W/kg \pm 18.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.80 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.3 W/kg \pm 18.7 % (k=2)

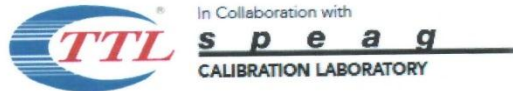
Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 \pm 0.2) °C	53.1 \pm 6 %	1.52 mho/m \pm 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	37.3 W/kg \pm 18.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.05 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.0 W/kg \pm 18.7 % (k=2)



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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.1Ω- 0.84 jΩ
Return Loss	- 38.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.2Ω- 1.37 jΩ
Return Loss	- 25.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.084 ns
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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
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DASY5 Validation Report for Head TSL

Date: 08.30.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1152

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.358$ S/m; $\epsilon_r = 39.91$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.38, 8.38, 8.38) @ 1750 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/22/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

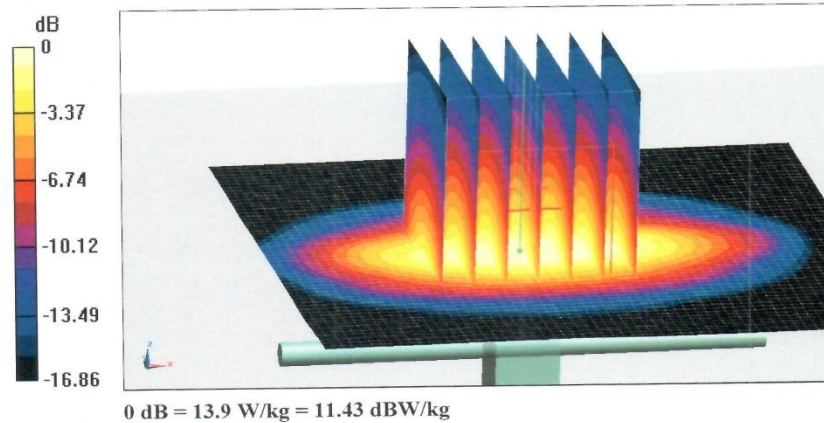
$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 97.38 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 9.05 W/kg; SAR(10 g) = 4.8 W/kg

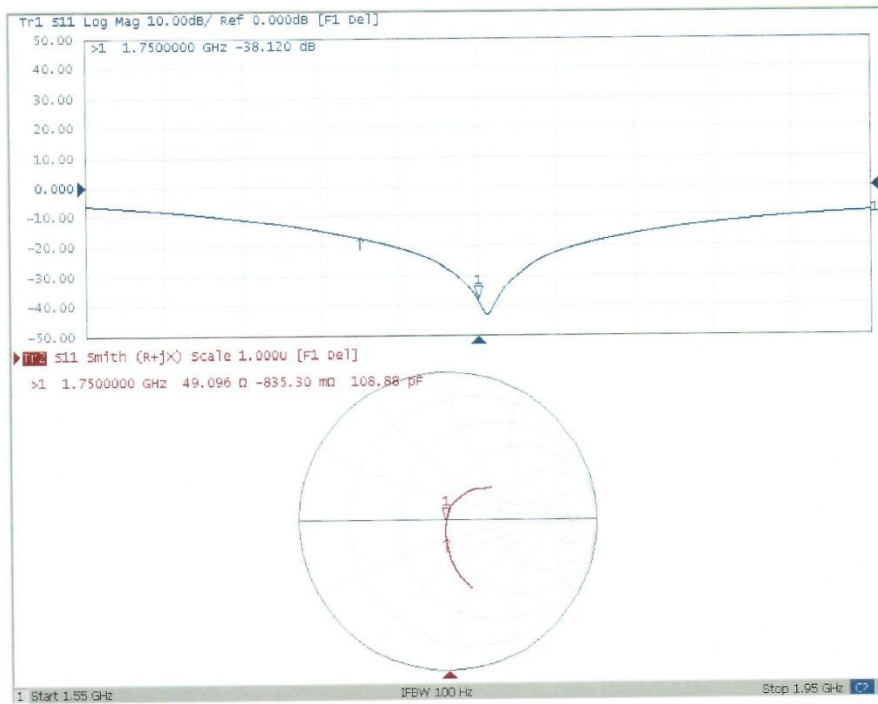
Maximum value of SAR (measured) = 13.9 W/kg





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Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 08.30.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1152

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.516$ S/m; $\epsilon_r = 53.05$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.03, 8.03, 8.03) @ 1750 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/22/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

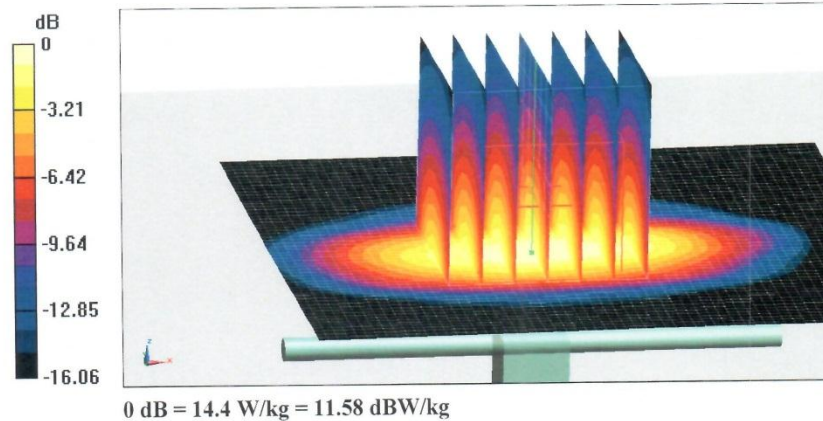
dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.16 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 17.0 W/kg

SAR(1 g) = 9.45 W/kg; SAR(10 g) = 5.05 W/kg

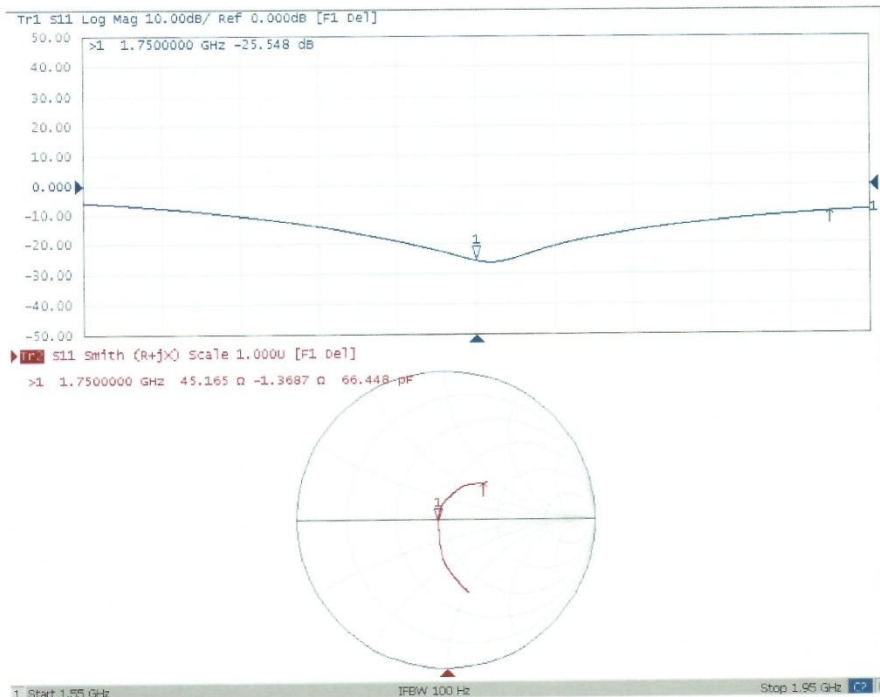
Maximum value of SAR (measured) = 14.4 W/kg





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Impedance Measurement Plot for Body TSL





1900MHz Dipole Calibration Certificate



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CNAS L0570

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Client **SAICT**

Certificate No: **Z21-60357**

CALIBRATION CERTIFICATE			
Object	D1900V2 - SN: 5d088		
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits		
Calibration date:	October 18, 2021		
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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7517	03-Feb-21(CTTL-SPEAG, No.Z21-60001)	Feb-22
DAE4	SN 1556	15-Jan-21(SPEAG, No.DAE4-1556_Jan21)	Jan-22
Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-21 (CTTL, No.J21X00593)	Jan-22
NetworkAnalyzer E5071C	MY46110673	14-Jan-21 (CTTL, No.J21X00232)	Jan-22
Calibrated by:	Name Zhao Jing	Function SAR Test Engineer	Signature
Reviewed by:	Name Lin Hao	Function SAR Test Engineer	Signature
Approved by:	Name Qi Dianyuan	Function SAR Project Leader	Signature
Issued: October 24, 2021			
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			



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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:

- 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
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- 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%.



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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

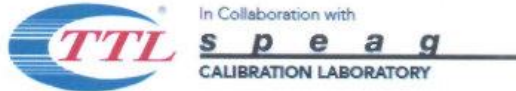
Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.9 ± 6 %	1.39 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.0 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.2 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.5 W/kg ± 18.7 % (k=2)



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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.7Ω+ 6.80jΩ
Return Loss	- 22.6dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.110 ns
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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
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DASY5 Validation Report for Head TSL

Date: 10.18.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d088

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.387$ S/m; $\epsilon_r = 39.88$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7517; ConvF(7.81, 7.81, 7.81) @ 1900 MHz; Calibrated: 2021-02-03
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2021-01-15
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 103.6 V/m; Power Drift = 0.00 dB

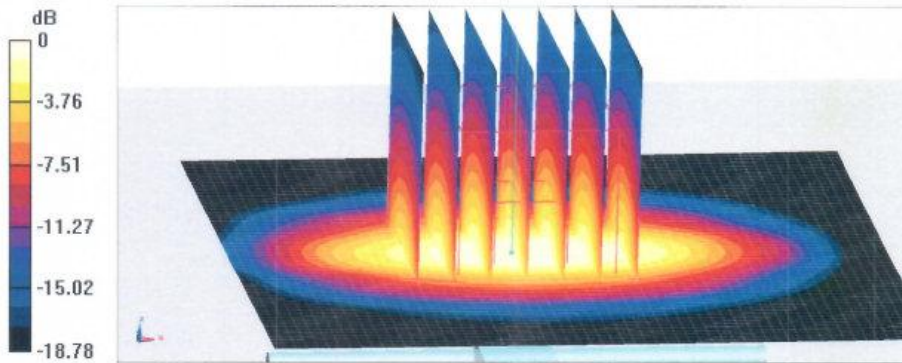
Peak SAR (extrapolated) = 19.2 W/kg

SAR(1 g) = 10 W/kg; SAR(10 g) = 5.1 W/kg

Smallest distance from peaks to all points 3 dB below = 10 mm

Ratio of SAR at M2 to SAR at M1 = 52.1%

Maximum value of SAR (measured) = 15.8 W/kg

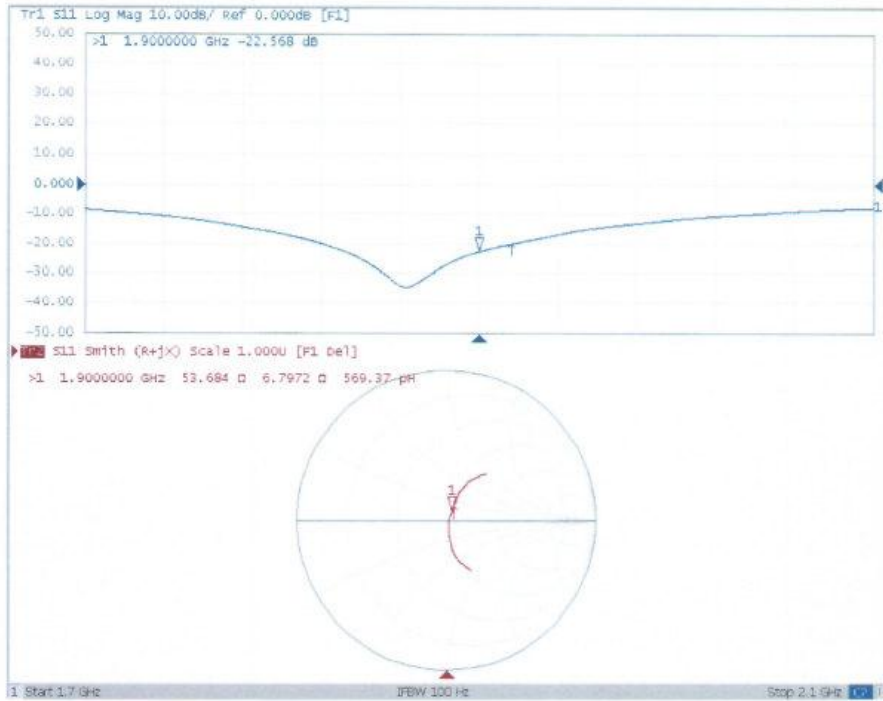


0 dB = 15.8 W/kg = 11.99 dBW/kg



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Impedance Measurement Plot for Head TSL





2450MHz Dipole Calibration Certificate



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Client **SAICT**

Certificate No: **Z21-60358**

CALIBRATION CERTIFICATE			
Object	D2450V2 - SN: 873		
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits		
Calibration date:	October 21, 2021		
<p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature (22±3)°C and humidity<70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p>			
Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7517	03-Feb-21(CTTL-SPEAG.No.Z21-60001)	Feb-22
DAE4	SN 1556	15-Jan-21(SPEAG,No.DAE4-1556_Jan21)	Jan-22
Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-21 (CTTL, No.J21X00593)	Jan-22
NetworkAnalyzer E5071C	MY46110673	14-Jan-21 (CTTL, No.J21X00232)	Jan-22
Calibrated by:	Name Zhao Jing	Function SAR Test Engineer	Signature
Reviewed by:	Name Lin Hao	Function SAR Test Engineer	Signature
Approved by:	Name Qi Dianyuan	Function SAR Project Leader	Signature
Issued: October 27, 2021			
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- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- 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.
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- 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%.



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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.5 ± 6 %	1.81 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	53.2 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.05 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.2 W/kg ± 18.7 % (k=2)



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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.6Ω+ 1.26jΩ
Return Loss	- 28.8dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.066 ns
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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
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In Collaboration with
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CALIBRATION LABORATORY

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E-mail: ctll@chinattl.com http://www.chinattl.cn

DASY5 Validation Report for Head TSL

Date: 10.21.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 873

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.809$ S/m; $\epsilon_r = 39.51$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7517; ConvF(7.34, 7.34, 7.34) @ 2450 MHz; Calibrated: 2021-02-03
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2021-01-15
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

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

Reference Value = 108.0 V/m; Power Drift = -0.03 dB

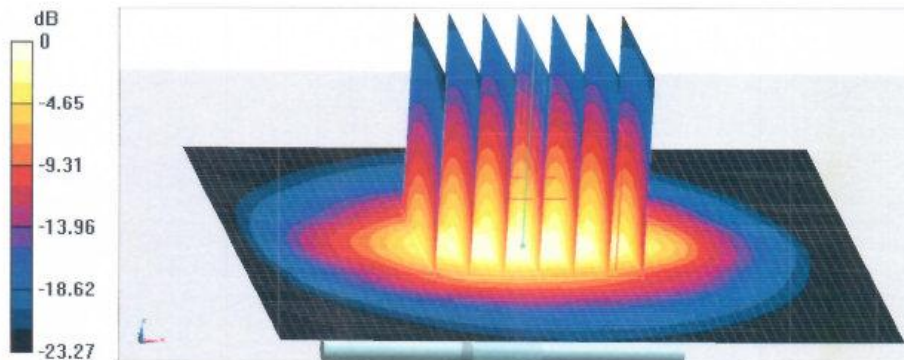
Peak SAR (extrapolated) = 28.0 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.05 W/kg

Smallest distance from peaks to all points 3 dB below = 9.2 mm

Ratio of SAR at M2 to SAR at M1 = 46.9%

Maximum value of SAR (measured) = 22.6 W/kg



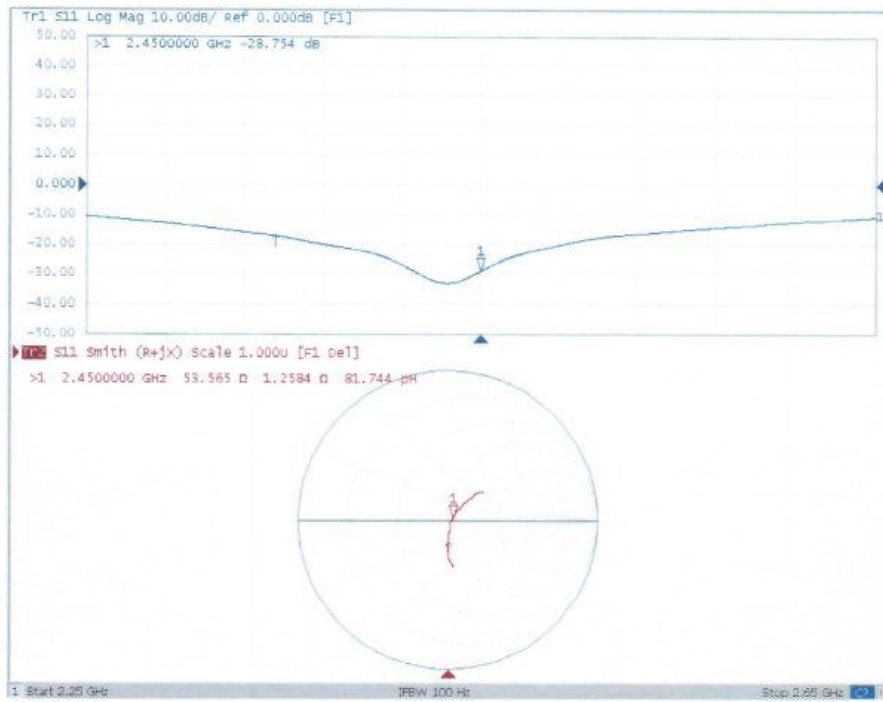
0 dB = 22.6 W/kg = 13.54 dBW/kg



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Impedance Measurement Plot for Head TSL





2550MHz 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
S 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: **D2550V2-1010_May21**

CALIBRATION CERTIFICATE

Object **D2550V2 - SN:1010**

Calibration procedure(s) **QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **May 21, 2021**

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	Name	Function	Signature
Calibrated by:	Jeffrey Katzman	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 21, 2021

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



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

Calibration is Performed According to the Following Standards:

- 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
- 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
- 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- 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	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2550 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.1	1.91 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.4 ± 6 %	1.99 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.4 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	55.9 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	25.2 W/kg ± 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.6	2.09 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.8 ± 6 %	2.16 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.4 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	52.4 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.04 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	23.8 W/kg ± 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.8 Ω - 3.8 $\mu\Omega$
Return Loss	- 26.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.3 Ω - 1.8 $\mu\Omega$
Return Loss	- 34.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.153 ns
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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
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DASY5 Validation Report for Head TSL

Date: 21.05.2021

Test Laboratory: SPEAG, Zurich, Switzerland

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

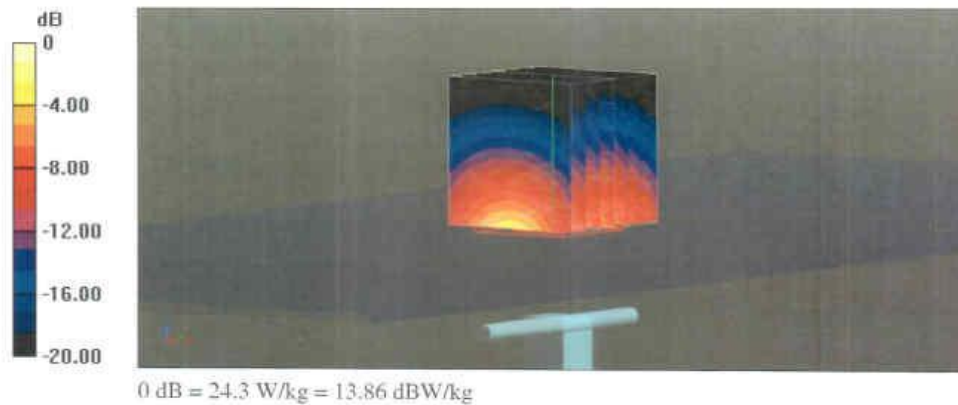
Communication System: UID 0 - CW; Frequency: 2550 MHz
 Medium parameters used: $f = 2550$ MHz; $\sigma = 1.99$ S/m; $\epsilon_r = 37.4$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

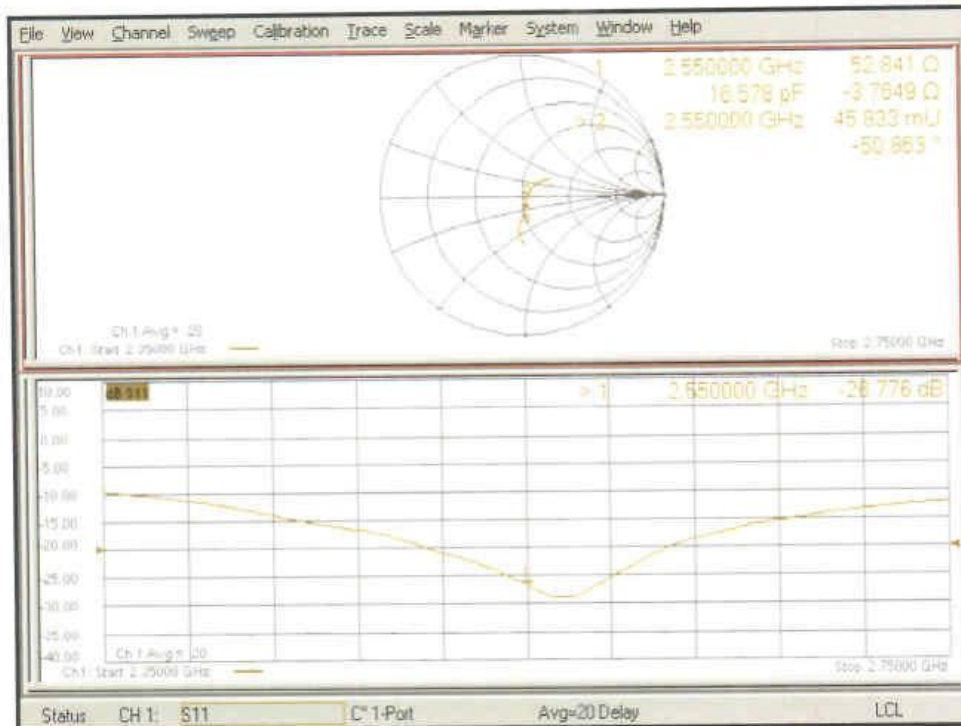
- Probe: EX3DV4 - SN7349; ConvF(7.85, 7.85, 7.85) @ 2550 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

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 = 119.0 V/m; Power Drift = 0.05 dB
 Peak SAR (extrapolated) = 29.6 W/kg
SAR(1 g) = 14.4 W/kg; SAR(10 g) = 6.42 W/kg
 Smallest distance from peaks to all points 3 dB below = 8.9 mm
 Ratio of SAR at M2 to SAR at M1 = 48.2%
 Maximum value of SAR (measured) = 24.3 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 21.05.2021

Test Laboratory: SPEAG, Zurich, Switzerland

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

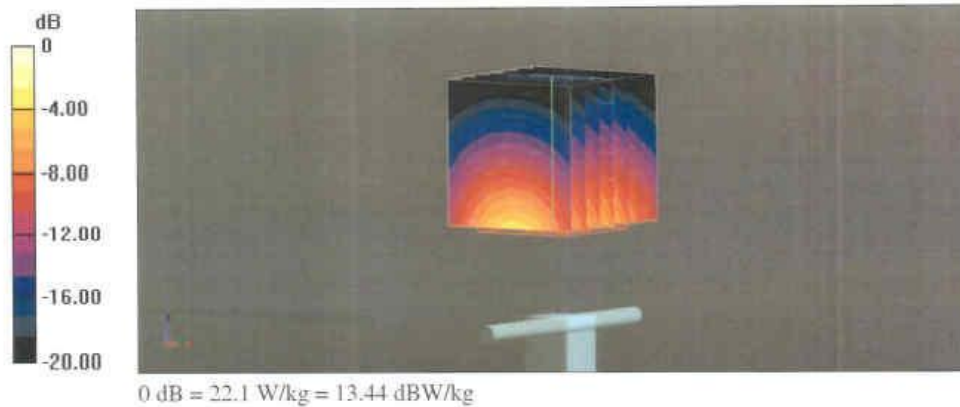
Communication System: UID 0 - CW; Frequency: 2550 MHz
 Medium parameters used: $f = 2550$ MHz; $\sigma = 2.16$ S/m; $\epsilon_r = 50.8$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

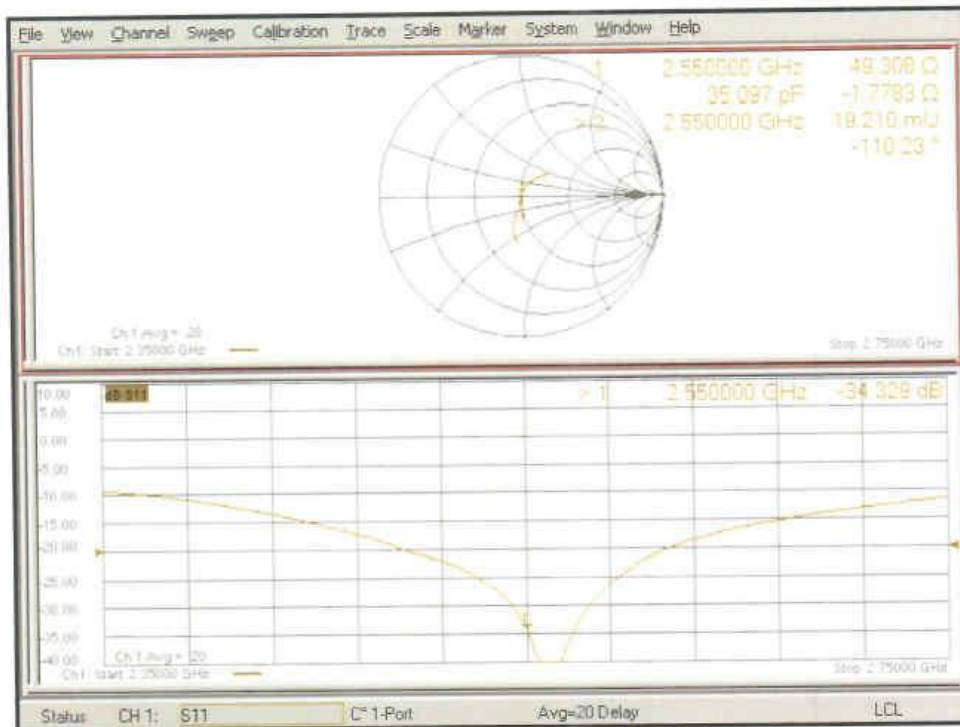
- Probe: EX3DV4 - SN7349; ConvF(7.98, 7.98, 7.98) @ 2550 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

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 = 110.2 V/m; Power Drift = -0.01 dB
 Peak SAR (extrapolated) = 26.1 W/kg
SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.04 W/kg
 Smallest distance from peaks to all points 3 dB below = 8 mm
 Ratio of SAR at M2 to SAR at M1 = 51.9%
 Maximum value of SAR (measured) = 22.1 W/kg



Impedance Measurement Plot for Body TSL



ANNEX J: Extended Calibration SAR Dipole

Referring to KDB865664 D01, if dipoles are verified in return loss ($<-20\text{dBm}$, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

Justification of Extended Calibration SAR Dipole D1750V2– serial no.1152

Head						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (johm)	Delta (johm)
2019-08-30	-38.1	/	49.1	/	-0.84	/
2020-08-28	-36.5	4.2	50.2	1.1	-0.49	0.35
2021-08-26	-35.7	6.3	50.8	1.7	-0.42	0.42

The Return-Loss is $<-20\text{dB}$, and within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the value result should support extended cabration.

ANNEX K: Spot Check Test

As the test lab for MT40A from TCL Communication Ltd., we, Shenzhen Academy of Information and Communications Technology, declare on our sole responsibility that, according to “Justification Letter” 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	Receipt Date
UT05aa	351317101726828	PIO	V1.0	2021-12-20
UT07aa	352213110163758	PIO	V1.0	2021-12-20

K.2. Measurement results

GSM850 SAR Values

Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (1g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
190	836.6	Next to the mouth	32.45	33.5	0.184	0.23	0.35
Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (10g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
190	836.6	Wrist worn	30.46	31.5	0.586	0.74	0.76

GSM1900 SAR Values

Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (1g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
661	1880.0	Next to the mouth	29.42	30.5	0.405	0.52	0.57
Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (10g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
661	1880.0	Wrist worn	26.21	26.5	0.709	0.76	0.82

WCDMA Band 2 SAR Values

Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (1g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
9538	1907.6	Next to the mouth	21.80	22.5	0.715	0.84	1.05
Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (10g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
9400	1880.0	Wrist worn	22.60	23.5	0.879	1.08	1.10

WCDMA Band 4 SAR Values

Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (1g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
1413	1732.6	Next to the mouth	21.20	21.5	0.462	0.50	0.62
Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (10g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
1413	1732.6	Wrist worn	22.80	23.5	0.694	0.82	0.74

WCDMA Band 5 SAR Values

Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (1g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
4182	836.4	Next to the mouth	22.80	23.5	0.196	0.23	0.23
Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (10g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
4182	836.4	Wrist worn	22.80	23.5	0.352	0.41	0.39

LTE Band 2 SAR Values

Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (1g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
18700	1860.0	Next to the mouth	23.07	24.0	0.888	1.10	1.14
Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (10g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
18900	1880.0	Wrist worn	23.32	24.0	1.150	1.34	1.57

LTE Band 4 SAR Values

Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (1g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
20300	1745.0	Next to the mouth	21.05	22.0	0.801	1.00	0.95
Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (10g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
20050	1720.0	Wrist worn	23.37	24.0	0.642	0.74	0.74

LTE Band 5 SAR Values

Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (1g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
20600	844.0	Next to the mouth	23.41	24.0	0.188	0.22	0.19
Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (10g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
20600	844.0	Wrist worn	23.41	24.0	0.141	0.16	0.12

LTE Band 7 SAR Values

Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (1g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
21100	2535.0	Next to the mouth	19.65	21.5	0.719	1.10	1.12
Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (10g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
21350	2560.0	Wrist worn	22.86	24.0	0.601	0.78	1.19

WLAN 2.4G SAR Values

Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (1g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
1	2412.0	Next to the mouth	14.35	15.0	0.293	0.34	0.33
Frequency		Test Position	Conducted Power (dBm)	Max. tune-up Power (dBm)	SAR (10g) (W/kg)		
Ch.	MHz				Spot check data		Original data
					Measured SAR	Reported SAR	
1	2412.0	Wrist worn	14.35	15.0	0.352	0.41	0.33

K.3. Graph Results for Spot Check

GSM850 Next to the mouth

Date: 2022-1-13

Electronics: DAE4 Sn786

Medium: Head 835MHz

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.916$ S/m; $\epsilon_r = 40.694$; $\rho = 1000$ kg/m³

Communication System: UID 0, GSM (0) Frequency: 836.6 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 – SN3151 ConvF (6.40, 6.40, 6.40);

Front Side Middle/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.234 W/kg

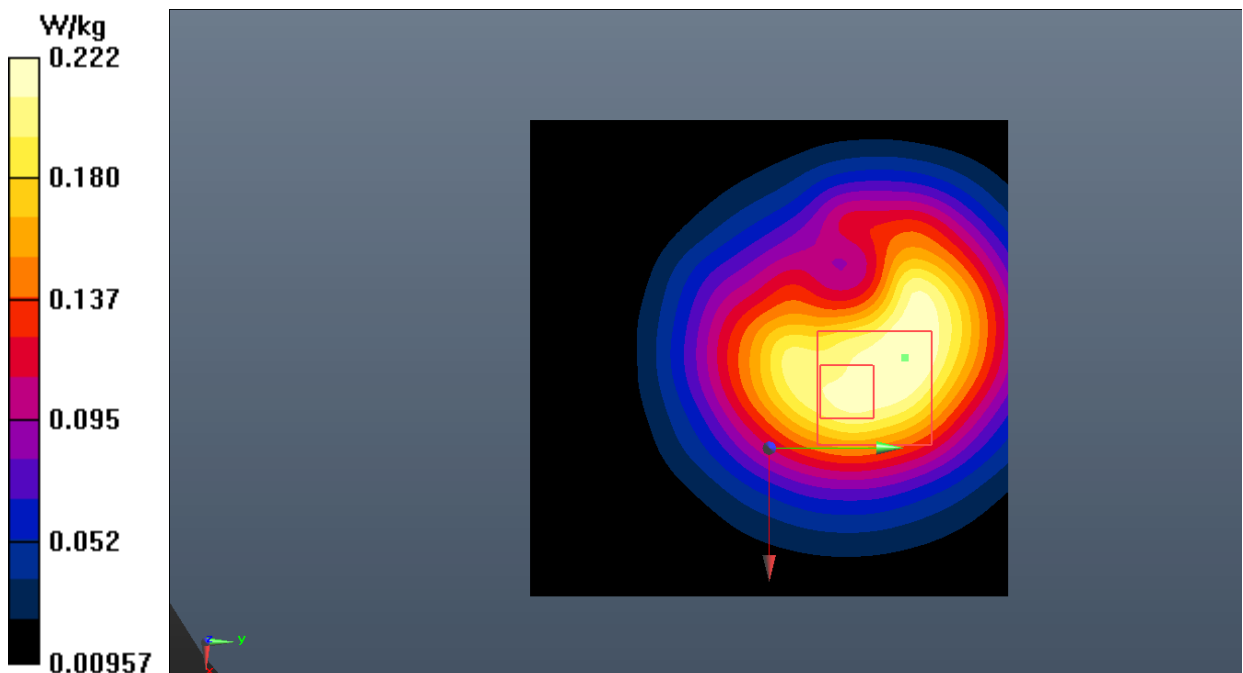
Front Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 13.27 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.318 W/kg

SAR(1 g) = 0.184 W/kg; SAR(10 g) = 0.110 W/kg

Maximum value of SAR (measured) = 0.222 W/kg



GSM850 Wrist worn

Date: 2022-1-13

Electronics: DAE4 Sn786

Medium: Head 835MHz

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.916$ S/m; $\epsilon_r = 40.694$; $\rho = 1000$ kg/m³

Communication System: UID 0, 3 slot GPRS (0) Frequency: 836.6 MHz Duty Cycle: 1:2.67

Probe: ES3DV3 – SN3151 ConvF (6.40, 6.40, 6.40);

Rear Side Middle/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.29 W/kg

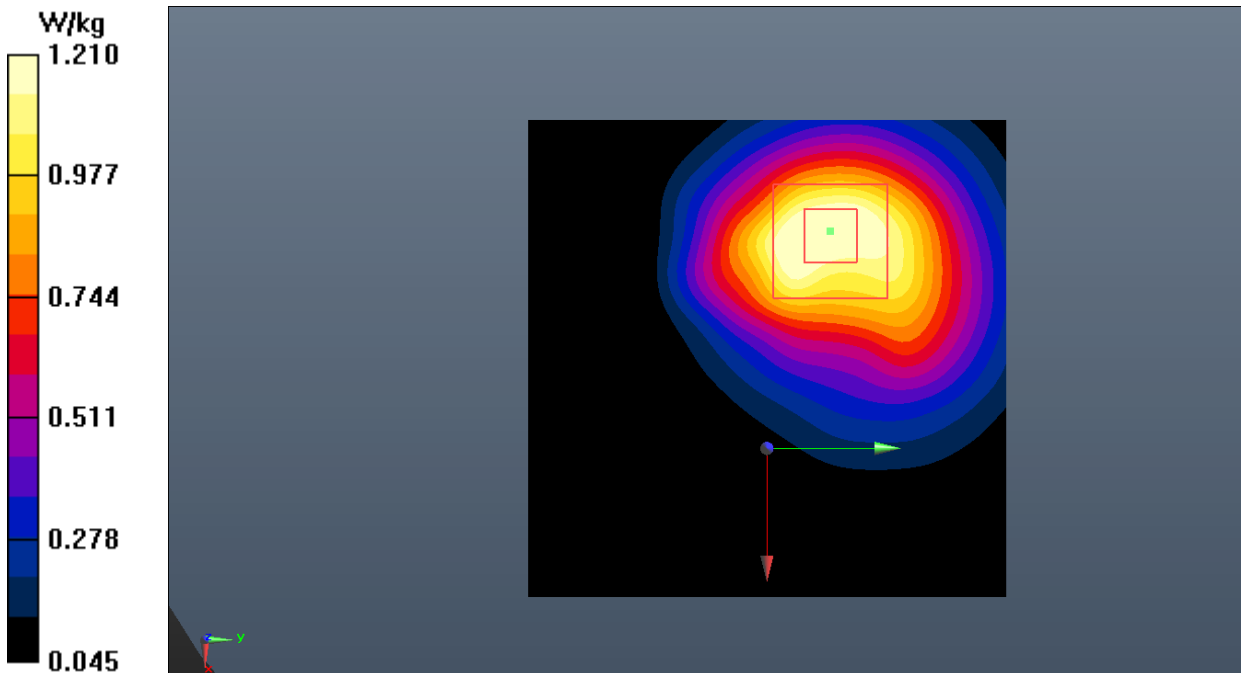
Rear Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.05 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.73 W/kg

SAR(1 g) = 0.993 W/kg; SAR(10 g) = 0.586 W/kg

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



GSM1900 Next to the mouth

Date: 2022-1-5

Electronics: DAE4 Sn786

Medium: Head 1900MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.399$ S/m; $\epsilon_r = 39.331$; $\rho = 1000$ kg/m³

Communication System: UID 0, GSM (0) Frequency: 1880 MHz Duty Cycle: 1:8.3

Probe: ES3DV3 – SN3151 ConvF (5.09, 5.09, 5.09);

Front Side Middle/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.569 W/kg

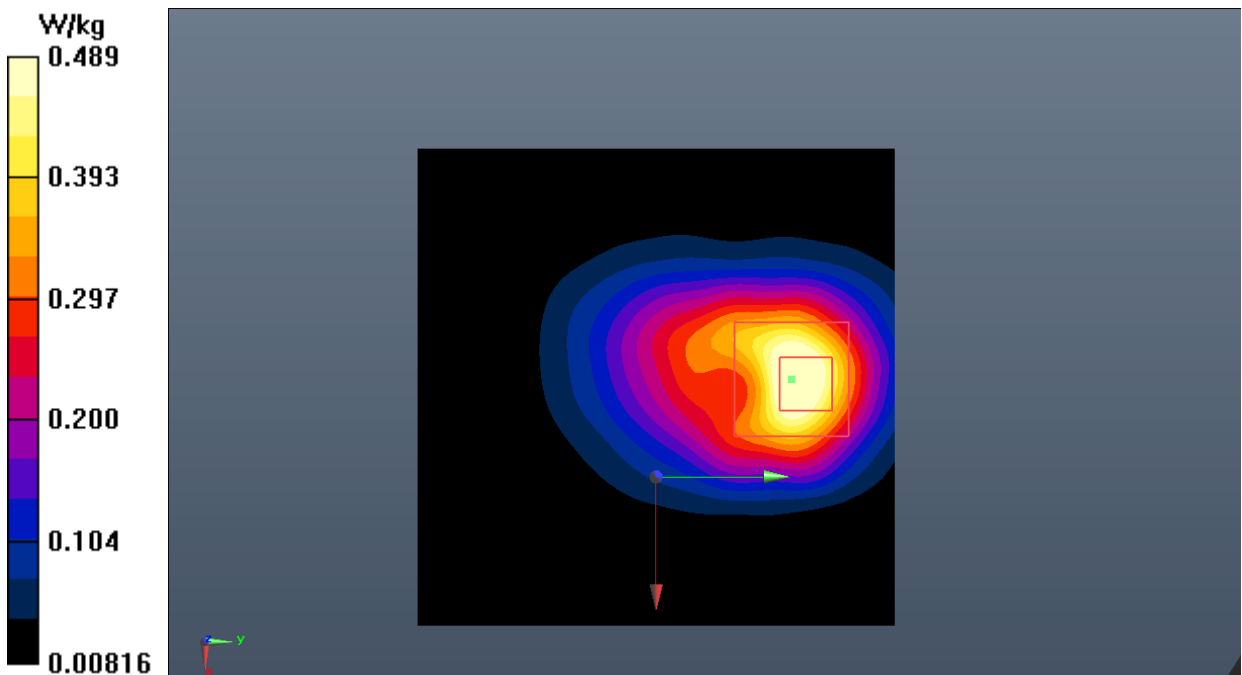
Front Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 12.34 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.751 W/kg

SAR(1 g) = 0.405 W/kg; SAR(10 g) = 0.212 W/kg

Maximum value of SAR (measured) = 0.489 W/kg



GSM1900 Wrist worn

Date: 2022-1-5

Electronics: DAE4 Sn786

Medium: Head 1900MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.399$ S/m; $\epsilon_r = 39.331$; $\rho = 1000$ kg/m³

Communication System: UID 0, 3 slot GPRS (0) Frequency: 1880 MHz Duty Cycle: 1:2.67

Probe: ES3DV3 – SN3151 ConvF (5.09, 5.09, 5.09);

Rear Side Middle/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.91 W/kg

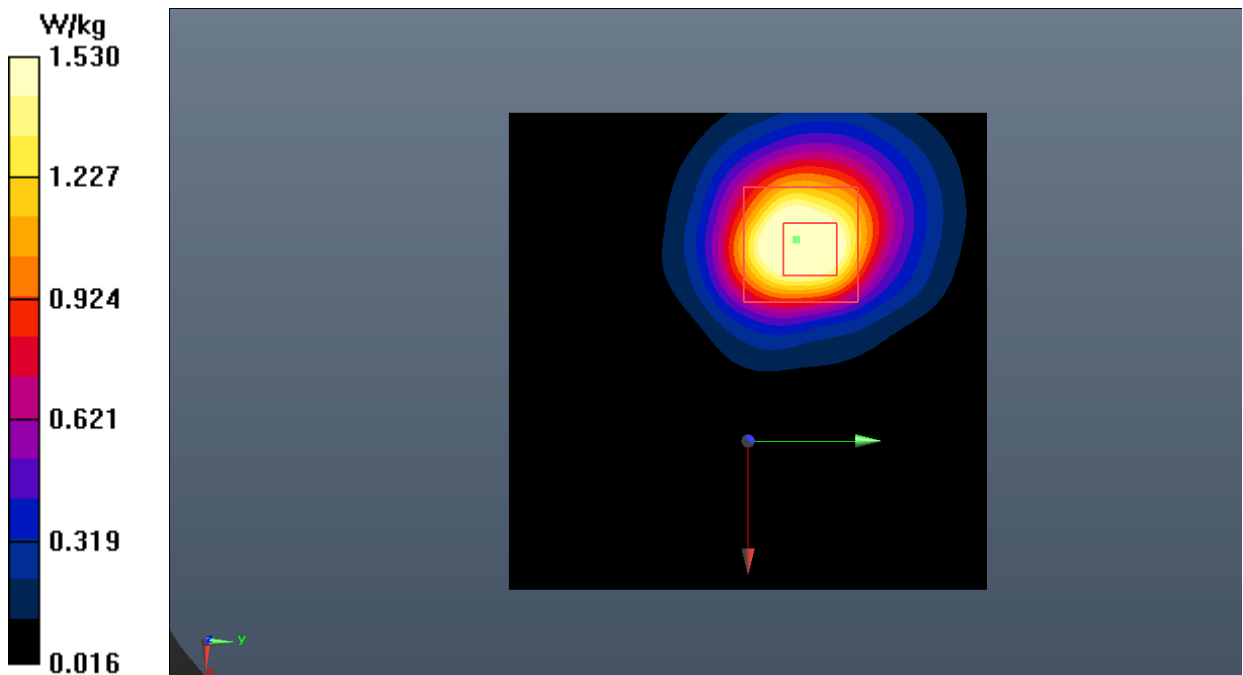
Rear Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.78 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 2.37 W/kg

SAR(1 g) = 1.32 W/kg; SAR(10 g) = 0.709 W/kg

Maximum value of SAR (measured) = 1.53 W/kg



WCDMA Band 2 Next to the mouth

Date: 2022-1-5

Electronics: DAE4 Sn786

Medium: Head 1900MHz

Medium parameters used: $f = 1908$ MHz; $\sigma = 1.421$ S/m; $\epsilon_r = 39.231$; $\rho = 1000$ kg/m³

Communication System: UID 0, WCDMA (0) Frequency: 1908 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (5.09, 5.09, 5.09);

Front Side High/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 1.02 W/kg

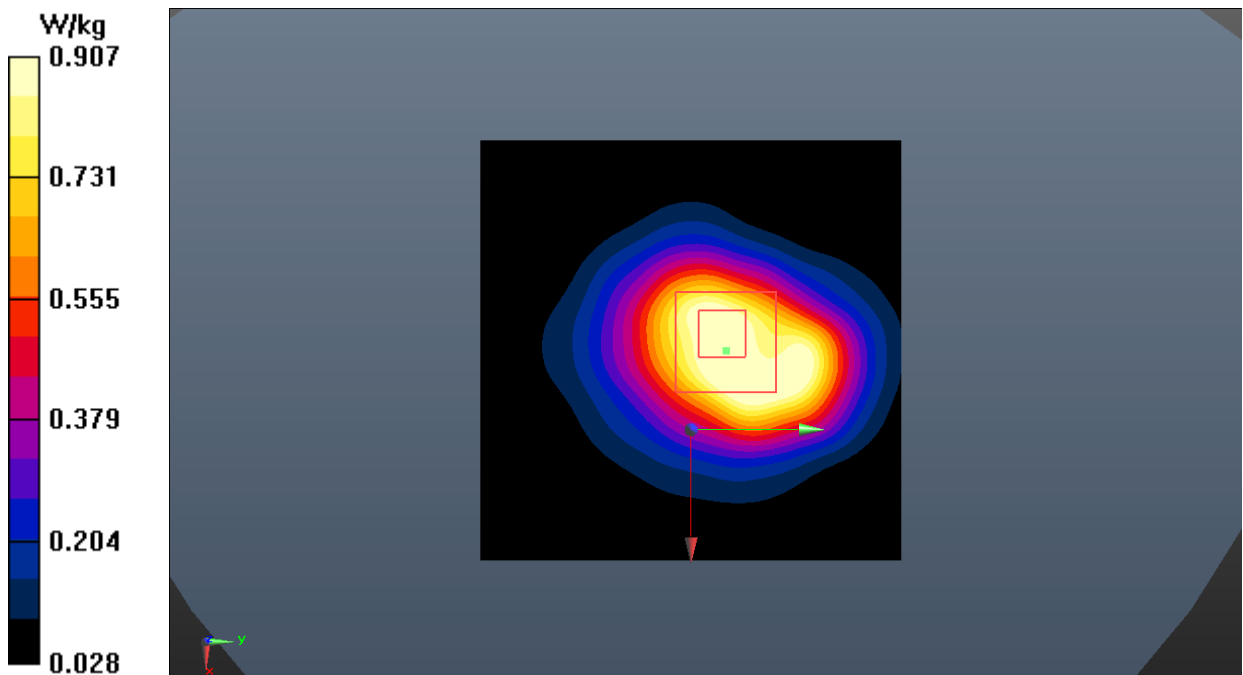
Front Side High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 22.65 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 1.14 W/kg

SAR(1 g) = 0.715 W/kg; SAR(10 g) = 0.428 W/kg

Maximum value of SAR (measured) = 0.907 W/kg



WCDMA Band 2 Wrist worn

Date: 2022-1-5

Electronics: DAE4 Sn786

Medium: Head 1900MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.399$ S/m; $\epsilon_r = 39.331$; $\rho = 1000$ kg/m³

Communication System: UID 0, WCDMA (0) Frequency: 1880 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (5.09, 5.09, 5.09);

Rear Side Middle/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.53 W/kg

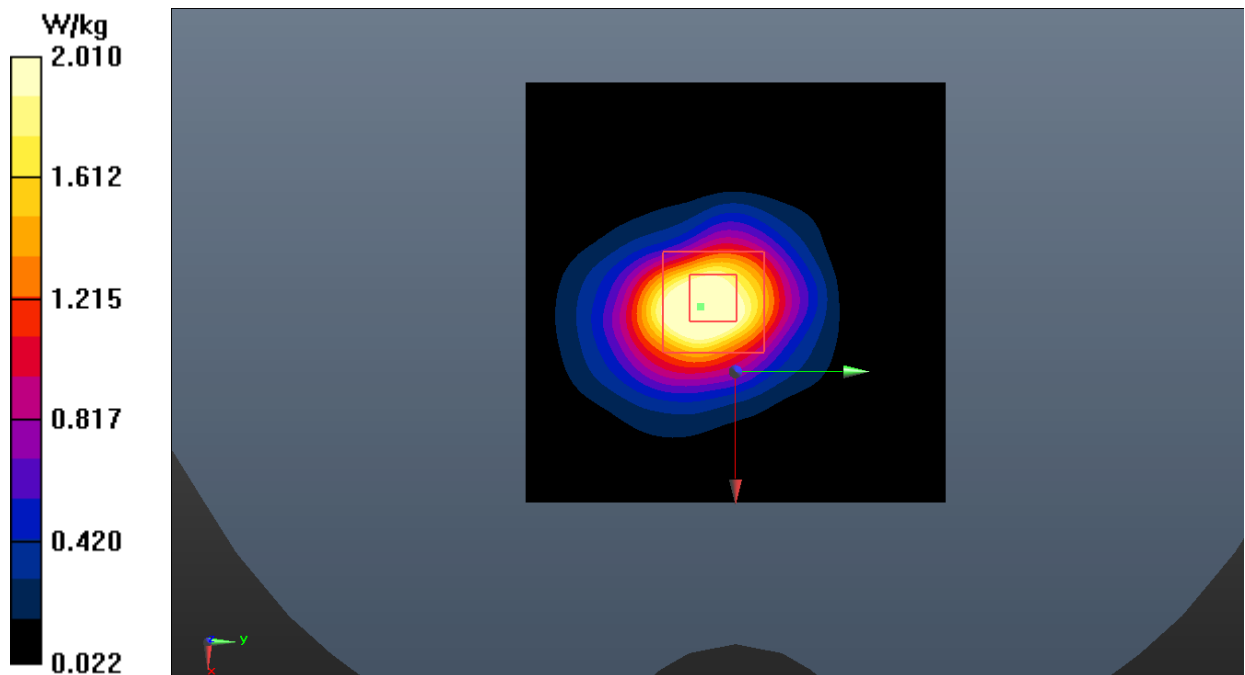
Rear Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 35.40 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 2.61 W/kg

SAR(1 g) = 1.61 W/kg; SAR(10 g) = 0.879 W/kg

Maximum value of SAR (measured) = 2.01 W/kg



WCDMA Band 4 Next to the mouth

Date: 2022-1-1

Electronics: DAE4 Sn786

Medium: Head 1750MHz

Medium parameters used: $f = 1733$ MHz; $\sigma = 1.37$ S/m; $\epsilon_r = 39.553$; $\rho = 1000$ kg/m³

Communication System: UID 0, WCDMA (0) Frequency: 1732.6 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (5.25, 5.25, 5.25);

Front Side Middle/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.714 W/kg

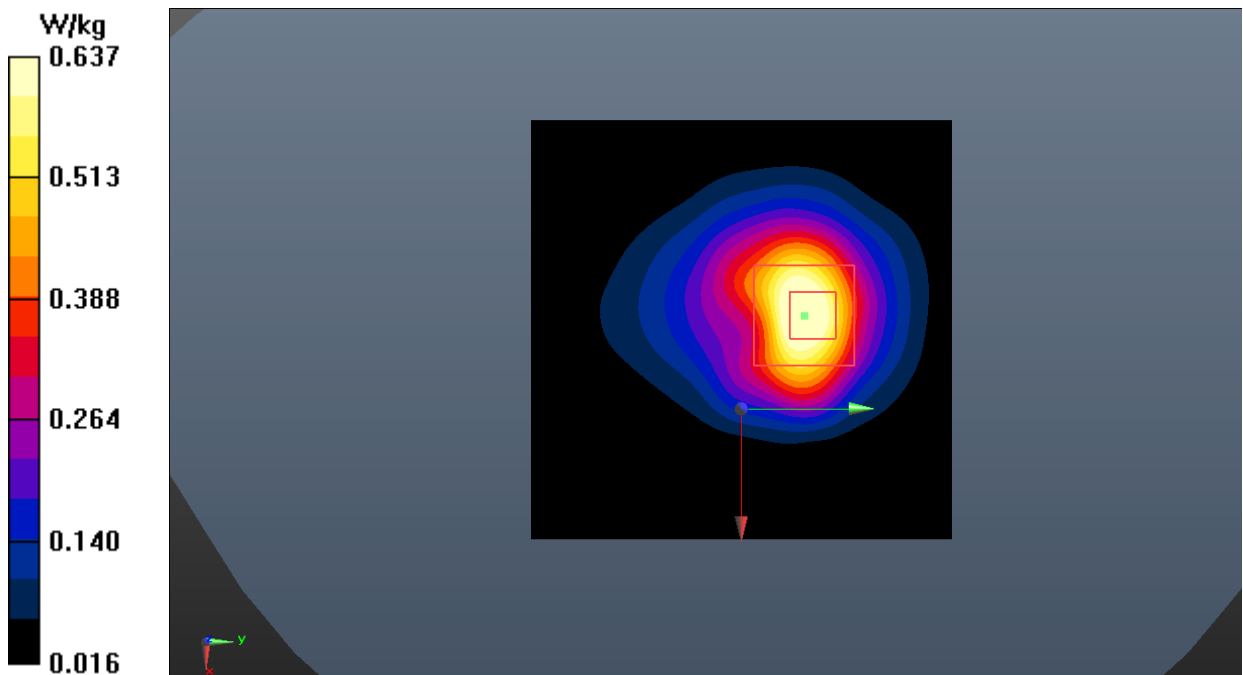
Front Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.98 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.793 W/kg

SAR(1 g) = 0.462 W/kg; SAR(10 g) = 0.255 W/kg

Maximum value of SAR (measured) = 0.637 W/kg



WCDMA Band 4 Wrist worn

Date: 2022-1-1

Electronics: DAE4 Sn786

Medium: Head 1750MHz

Medium parameters used: $f = 1733$ MHz; $\sigma = 1.37$ S/m; $\epsilon_r = 39.553$; $\rho = 1000$ kg/m³

Communication System: UID 0, WCDMA (0) Frequency: 1732.6 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (5.25, 5.25, 5.25);

Rear Side Middle/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.56 W/kg

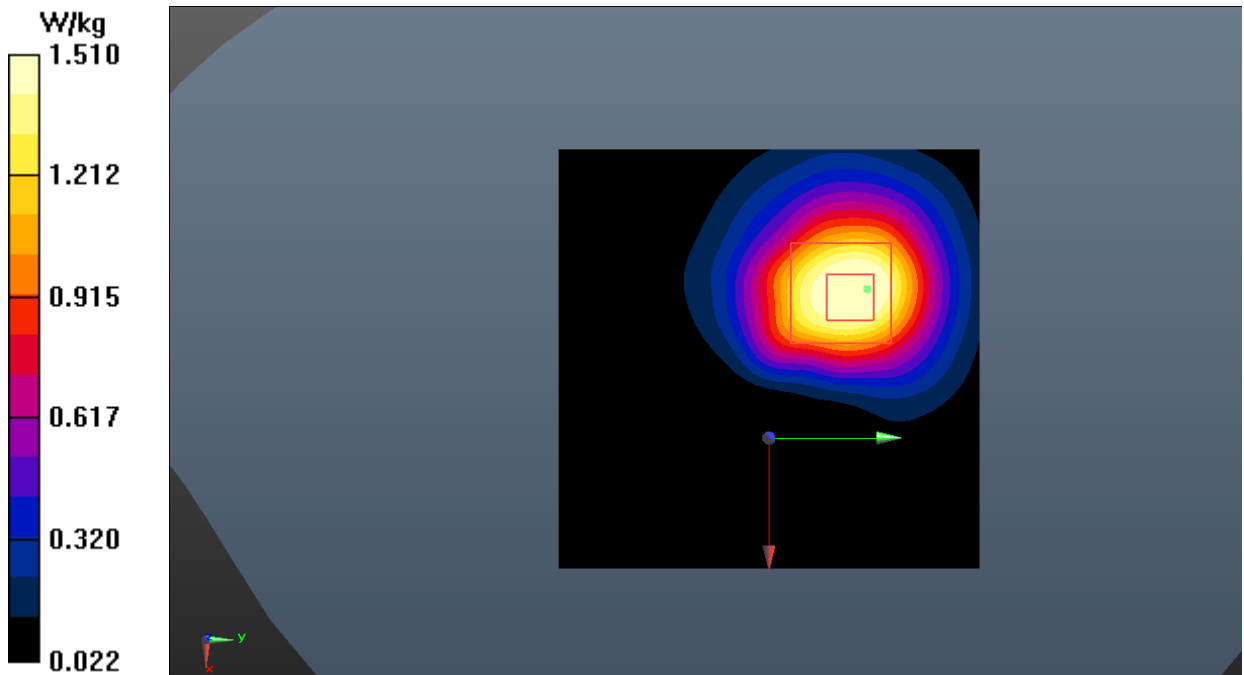
Rear Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.04 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 2.17 W/kg

SAR(1 g) = 1.22 W/kg; SAR(10 g) = 0.694 W/kg

Maximum value of SAR (measured) = 1.51 W/kg



WCDMA Band 5 Next to the mouth

Date: 2022-1-13

Electronics: DAE4 Sn786

Medium: Head 835MHz

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.916$ S/m; $\epsilon_r = 40.694$; $\rho = 1000$ kg/m³

Communication System: UID 0, WCDMA (0) Frequency: 836.6 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (6.40, 6.40, 6.40);

Front Side Middle/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.249 W/kg

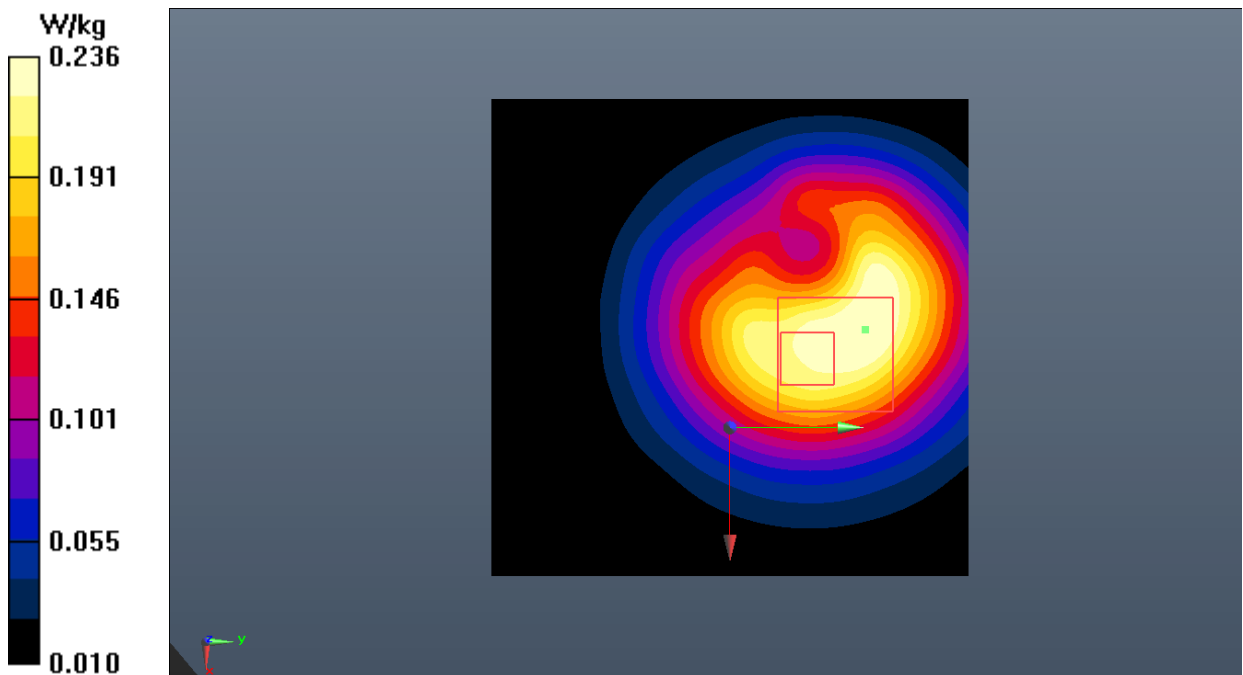
Front Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 13.50 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.342 W/kg

SAR(1 g) = 0.196 W/kg; SAR(10 g) = 0.117 W/kg

Maximum value of SAR (measured) = 0.236 W/kg



WCDMA Band 5 Wrist worn

Date: 2022-1-13

Electronics: DAE4 Sn786

Medium: Head 835MHz

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.916$ S/m; $\epsilon_r = 40.694$; $\rho = 1000$ kg/m³

Communication System: UID 0, WCDMA (0) Frequency: 836.6 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (6.40, 6.40, 6.40);

Rear Side Middle/Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.752 W/kg

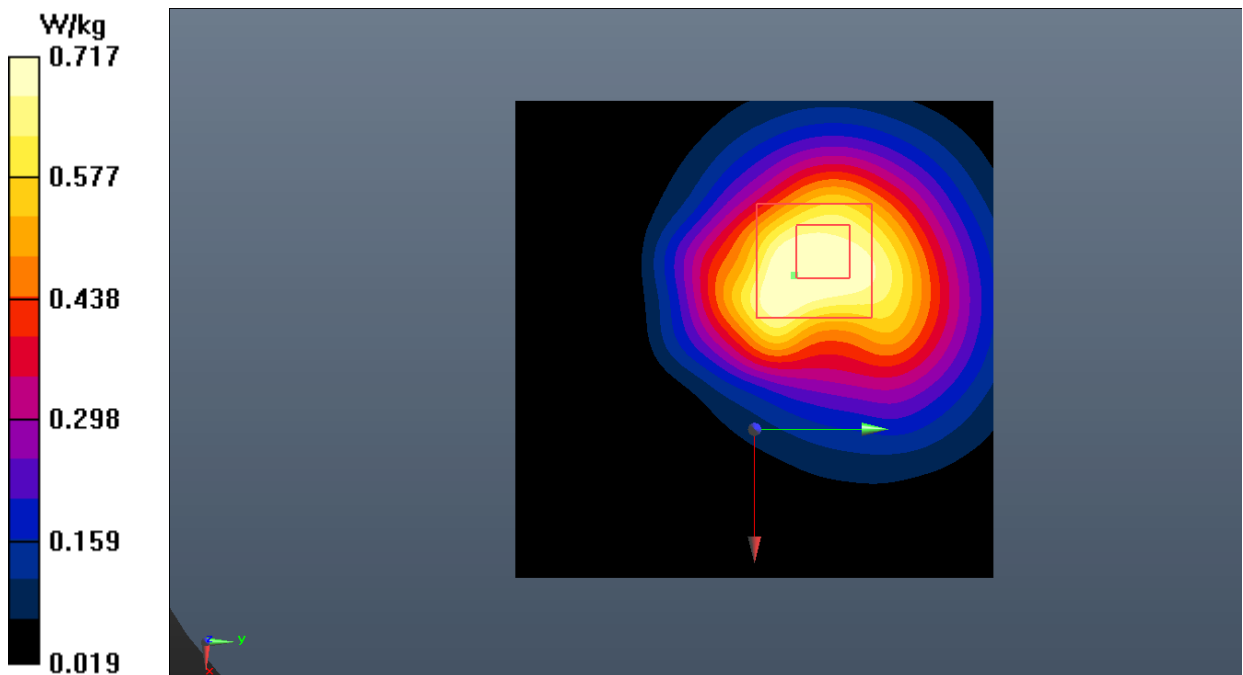
Rear Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 21.17 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 1.08 W/kg

SAR(1 g) = 0.594 W/kg; SAR(10 g) = 0.352 W/kg

Maximum value of SAR (measured) = 0.717 W/kg



LTE Band 2 Next to the mouth

Date: 2022-1-5

Electronics: DAE4 Sn786

Medium: Head 1900MHz

Medium parameters used: $f = 1860$ MHz; $\sigma = 1.385$ S/m; $\epsilon_r = 39.403$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 1860 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (5.09, 5.09, 5.09);

Front Side Low/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.32 W/kg

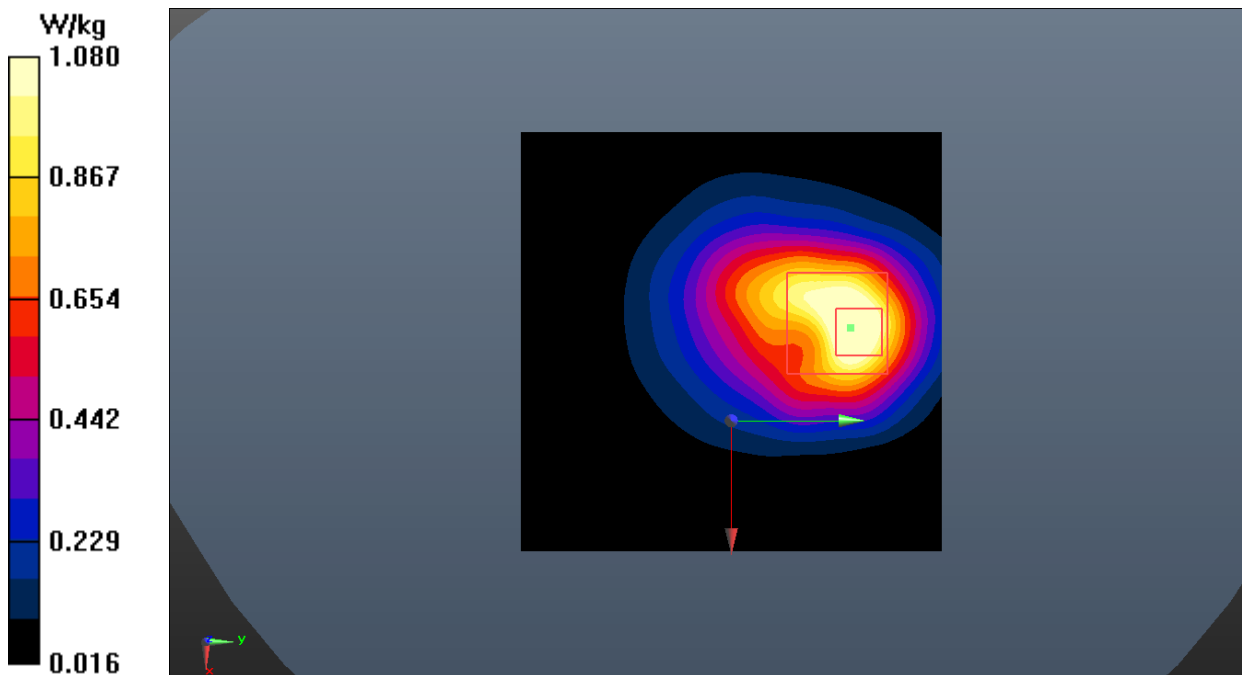
Front Side Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.59 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 1.61 W/kg

SAR(1 g) = 0.888 W/kg; SAR(10 g) = 0.491 W/kg

Maximum value of SAR (measured) = 1.08 W/kg



LTE Band 2 Wrist worn

Date: 2022-1-5

Electronics: DAE4 Sn786

Medium: Head 1900MHz

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.399$ S/m; $\epsilon_r = 39.331$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 1880 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (5.09, 5.09, 5.09);

Rear Side Middle/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.73 W/kg

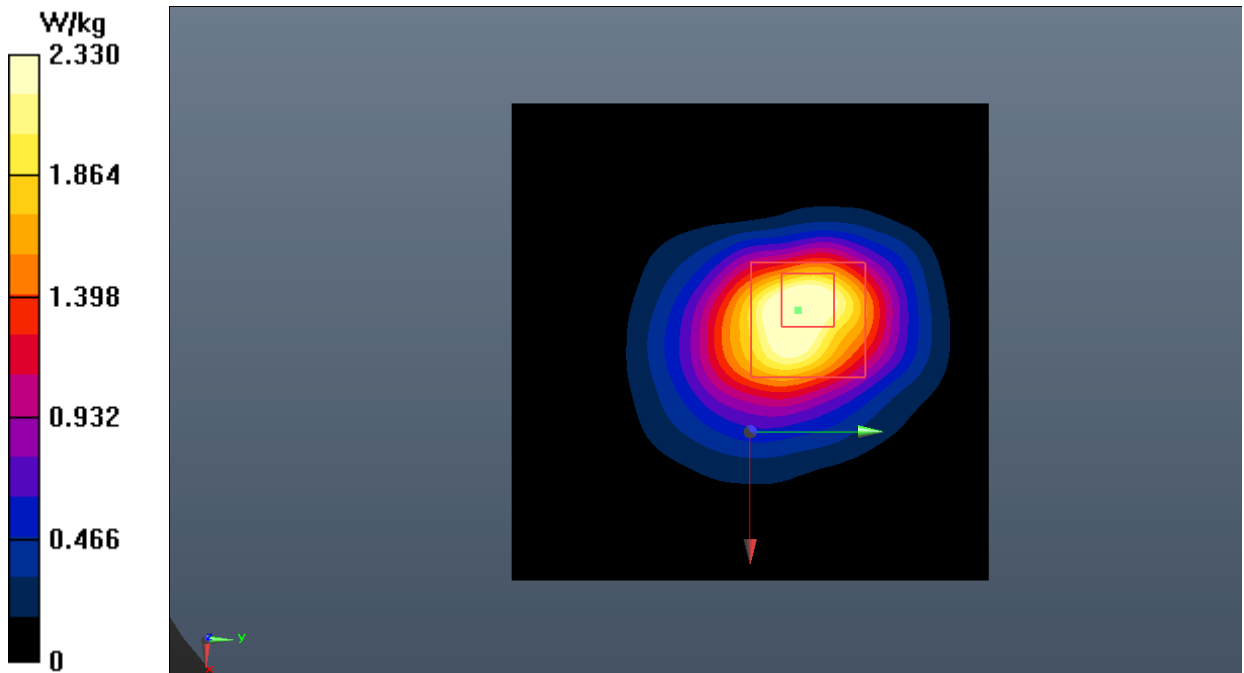
Rear Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 35.31 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 4.39 W/kg

SAR(1 g) = 2.24 W/kg; SAR(10 g) = 1.15 W/kg

Maximum value of SAR (measured) = 2.33 W/kg



LTE Band 4 Next to the mouth

Date: 2022-1-1

Electronics: DAE4 Sn786

Medium: Head 1750MHz

Medium parameters used: $f = 1745$ MHz; $\sigma = 1.381$ S/m; $\epsilon_r = 39.507$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 1745 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (5.25, 5.25, 5.25);

Front Side High/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.09 W/kg

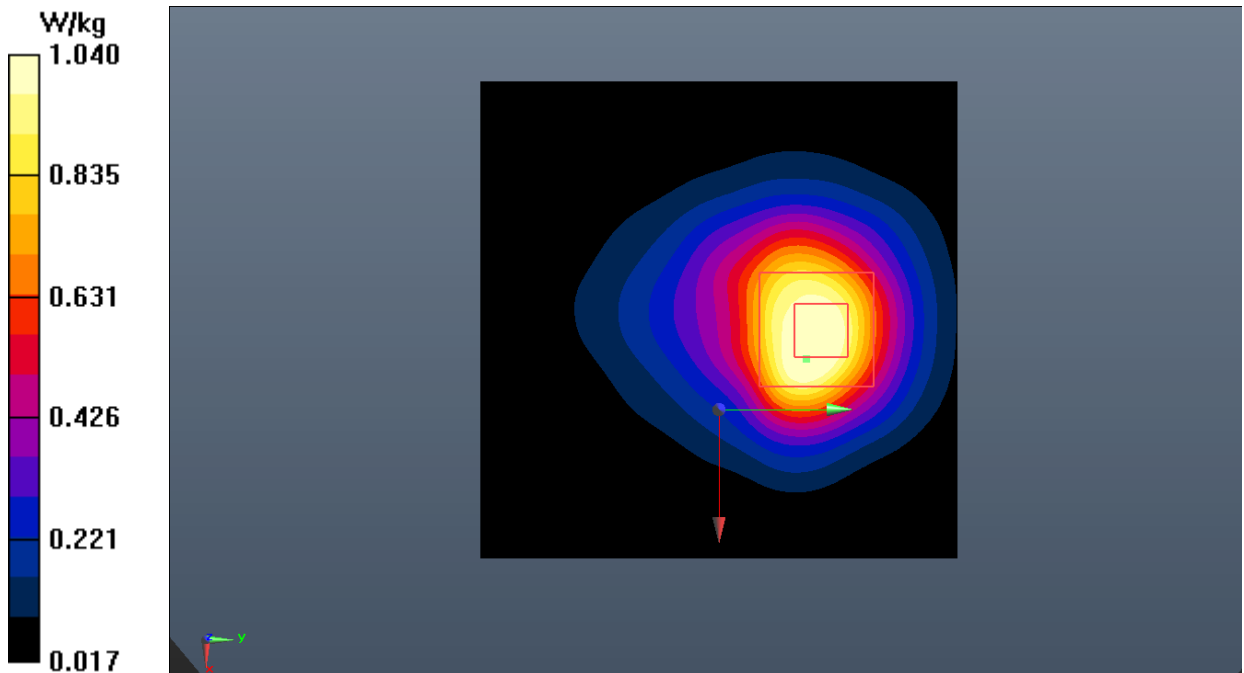
Front Side High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.61 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.37 W/kg

SAR(1 g) = 0.801 W/kg; SAR(10 g) = 0.444 W/kg

Maximum value of SAR (measured) = 1.04 W/kg



LTE Band 4 Wrist worn

Date: 2022-1-1

Electronics: DAE4 Sn786

Medium: Head 1750MHz

Medium parameters used: $f = 1720$ MHz; $\sigma = 1.370$ S/m; $\epsilon_r = 39.589$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 1720 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (5.25, 5.25, 5.25);

Rear Side Low/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.42 W/kg

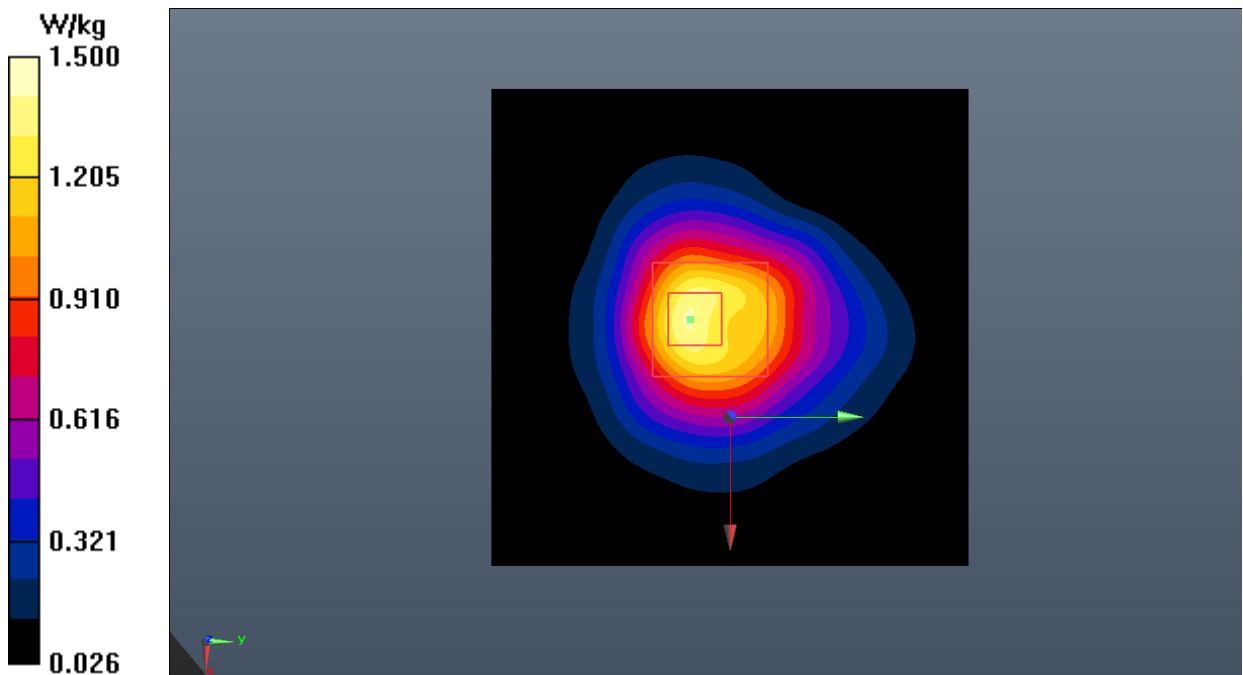
Rear Side Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 28.81 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 2.16 W/kg

SAR(1 g) = 1.18 W/kg; SAR(10 g) = 0.642 W/kg

Maximum value of SAR (measured) = 1.50 W/kg



LTE Band 5 Next to the mouth

Date: 2022-1-13

Electronics: DAE4 Sn786

Medium: Head 835MHz

Medium parameters used (interpolated): $f = 844$ MHz; $\sigma = 0.921$ S/m; $\epsilon_r = 40.685$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 844 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (6.40, 6.40, 6.40);

Front Side High/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.245 W/kg

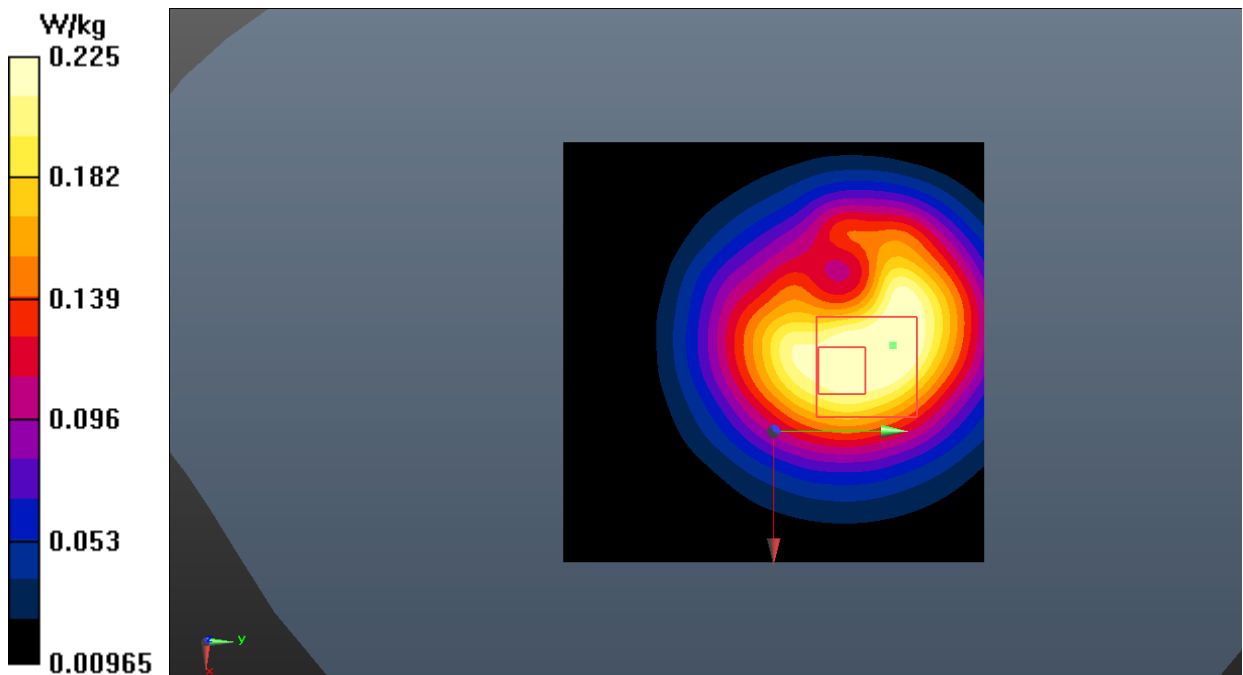
Front Side High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.91 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.324 W/kg

SAR(1 g) = 0.188 W/kg; SAR(10 g) = 0.112 W/kg

Maximum value of SAR (measured) = 0.225 W/kg



LTE Band 5 Wrist worn

Date: 2022-1-13

Electronics: DAE4 Sn786

Medium: Head 835MHz

Medium parameters used (interpolated): $f = 844$ MHz; $\sigma = 0.921$ S/m; $\epsilon_r = 40.685$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 844 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (6.40, 6.40, 6.40);

Rear Side High/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.414 W/kg

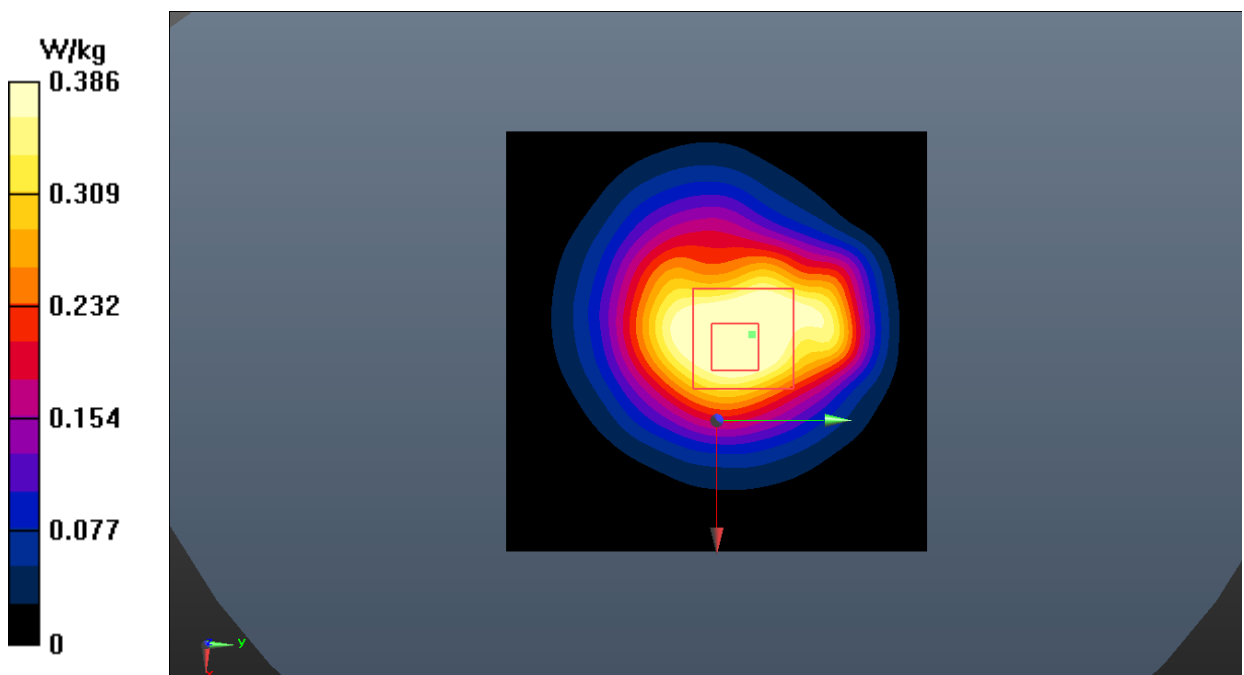
Rear Side High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 26.54 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.284 W/kg; SAR(10 g) = 0.141 W/kg

Maximum value of SAR (measured) = 0.386 W/kg



LTE Band 7 Next to the mouth

Date: 2021-12-22

Electronics: DAE4 Sn786

Medium: Head 2550MHz

Medium parameters used: $f = 2535$ MHz; $\sigma = 1.932$ S/m; $\epsilon_r = 38.332$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 2535 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (4.58, 4.58, 4.58);

Front Side Middle/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.18 W/kg

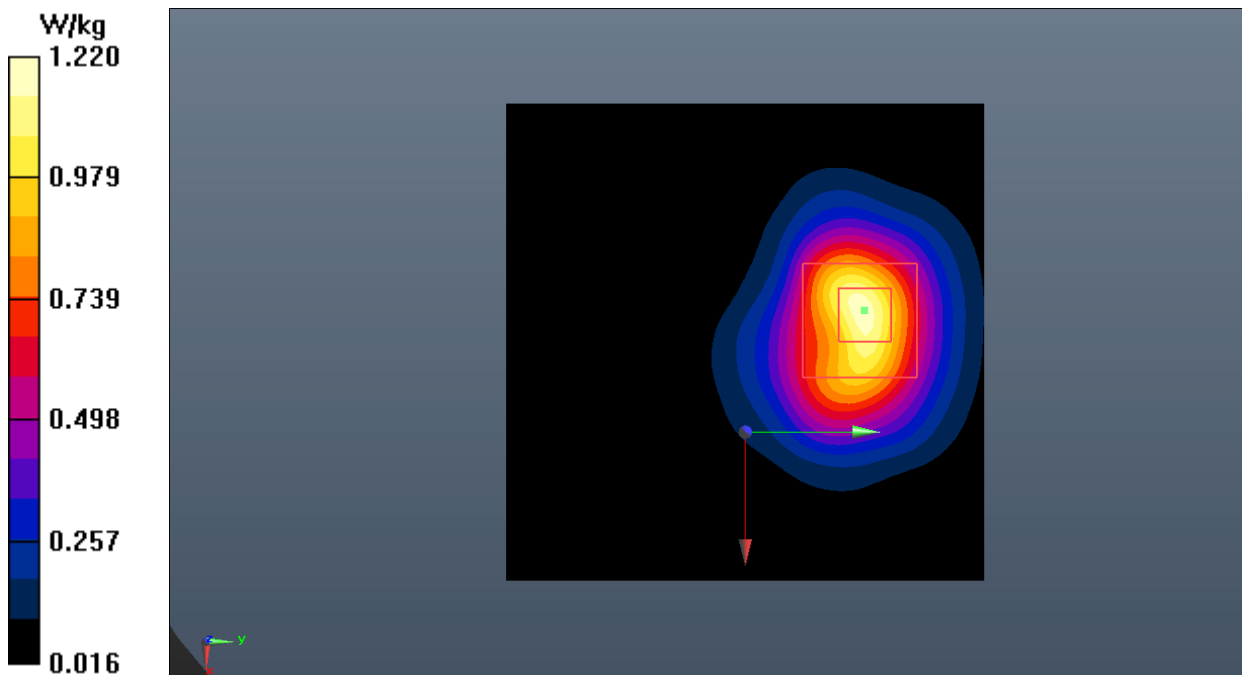
Front Side Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 9.845 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.61 W/kg

SAR(1 g) = 0.719 W/kg; SAR(10 g) = 0.401 W/kg

Maximum value of SAR (measured) = 1.22 W/kg



LTE Band 7 Wrist worn

Date: 2021-12-22

Electronics: DAE4 Sn786

Medium: Head 2550MHz

Medium parameters used: $f = 2560$ MHz; $\sigma = 1.962$ S/m; $\epsilon_r = 38.249$; $\rho = 1000$ kg/m³

Communication System: UID 0, LTE_FDD (0) Frequency: 2560 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (4.39, 4.39, 4.39);

Rear Side High/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.71 W/kg

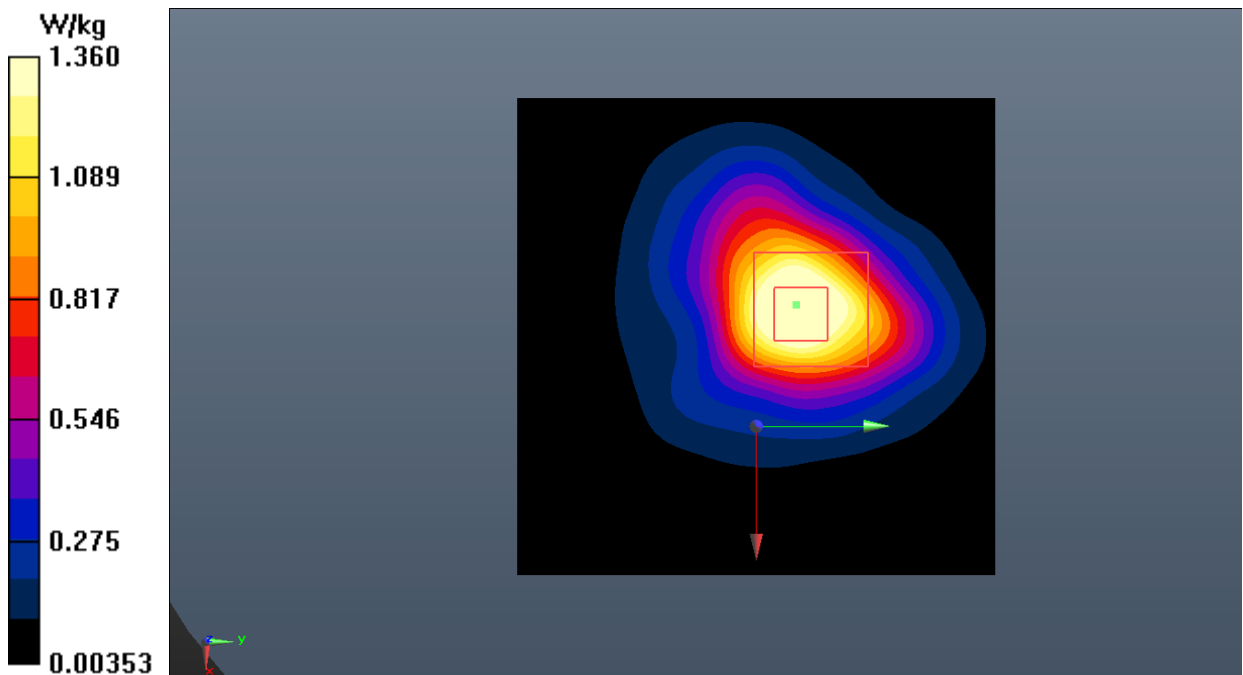
Rear Side High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.22 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 2.18 W/kg

SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.601 W/kg

Maximum value of SAR (measured) = 1.36 W/kg



WLAN 2.4G Next to the mouth

Date: 2022-1-12

Electronics: DAE4 Sn786

Medium: Head 2450MHz

Medium parameters used): $f = 2412$ MHz; $\sigma = 1.819$ S/m; $\epsilon_r = 38.482$; $\rho = 1000$ kg/m³

Communication System: UID 0, WiFi (0) Frequency: 2412 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (4.58, 4.58, 4.58);

Front Side Ch.1/Area Scan (91x91x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.382 W/kg

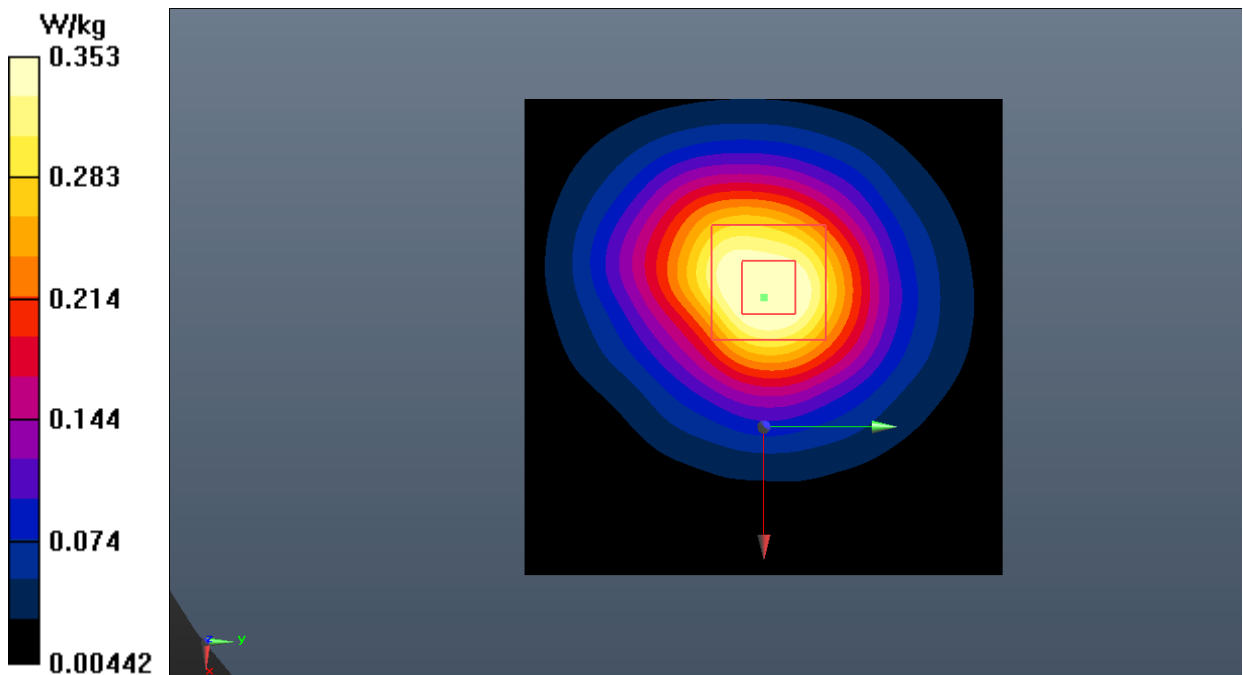
Front Side Ch.1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 12.69 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.500 W/kg

SAR(1 g) = 0.293 W/kg; SAR(10 g) = 0.165 W/kg

Maximum value of SAR (measured) = 0.353 W/kg



WLAN 2.4G Wrist worn

Date: 2022-1-12

Electronics: DAE4 Sn786

Medium: Head 2450MHz

Medium parameters used): $f = 2412$ MHz; $\sigma = 1.819$ S/m; $\epsilon_r = 38.482$; $\rho = 1000$ kg/m³

Communication System: UID 0, WiFi (0) Frequency: 2412 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (4.58, 4.58, 4.58);

Rear Side Ch.1/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.984 W/kg

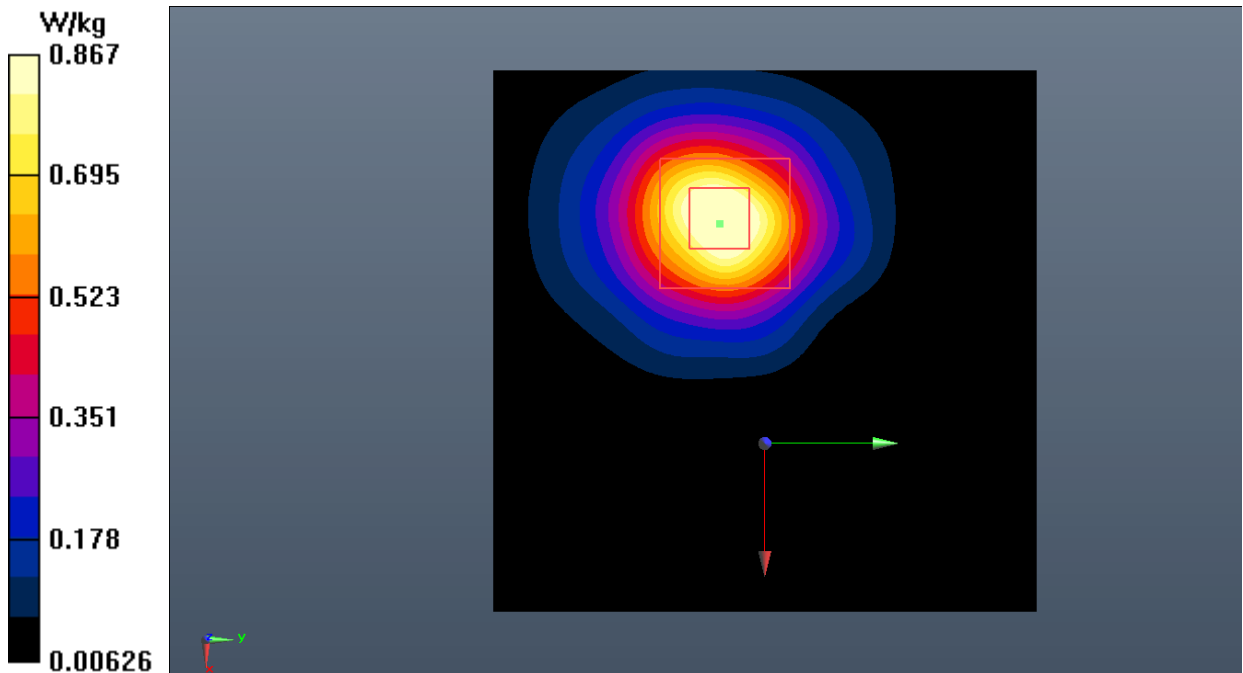
Rear Side Ch.1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.954 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.35 W/kg

SAR(1 g) = 0.699 W/kg; SAR(10 g) = 0.352 W/kg

Maximum value of SAR (measured) = 0.867 W/kg



K.4. System Verification Results for Spot Check

835MHz

Date: 2022-1-13

Electronics: DAE4 Sn786

Medium: Head 835MHz

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.915 \text{ S/m}$; $\epsilon_r = 40.713$; $\rho = 1000 \text{ kg/m}^3$

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

Probe: ES3DV3 – SN3151 ConvF (6.40, 6.40, 6.40);

System Validation/Area Scan (81x151x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Reference Value = 64.756 V/m; Power Drift = -0.09 dB

SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.61 W/kg

Maximum value of SAR (interpolated) = 3.36 W/kg

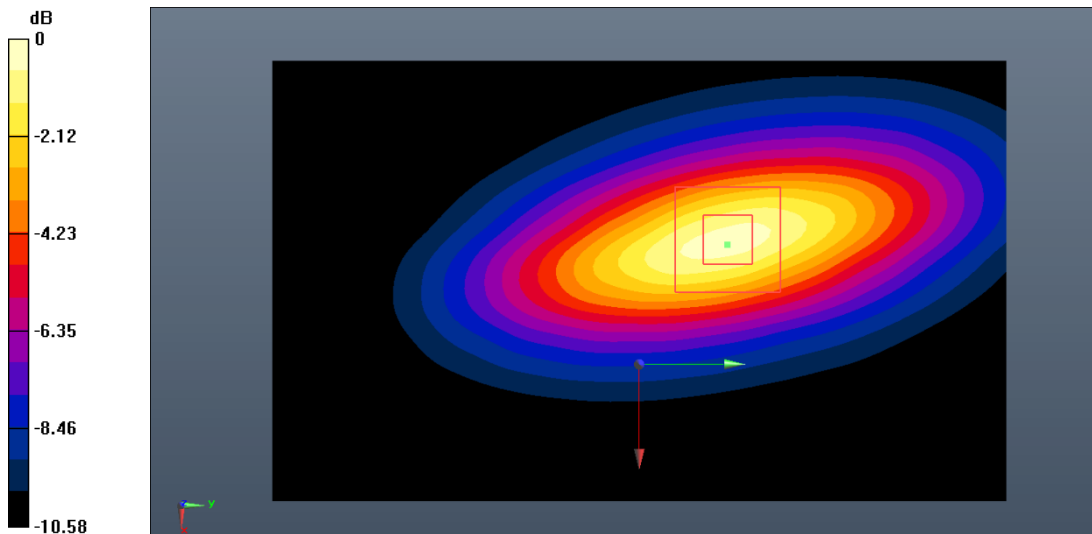
System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 64.756 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 3.65 W/kg

SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.59 W/kg

Maximum value of SAR (measured) = 3.33 W/kg



0 dB = 3.33 W/kg = 5.22 dB W/kg

1750MHz

Date: 2022-1-1

Electronics: DAE4 Sn786

Medium: Head 1750MHz

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.385$ S/m; $\epsilon_r = 39.487$; $\rho = 1000$ kg/m³

Communication System: CW_TMC Frequency: 1750 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (5.25, 5.25, 5.25);

System Validation/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 78.923 V/m; Power Drift = 0.12 dB

SAR(1 g) = 9.13 W/kg; SAR(10 g) = 4.81 W/kg

Maximum value of SAR (interpolated) = 11.0 W/kg

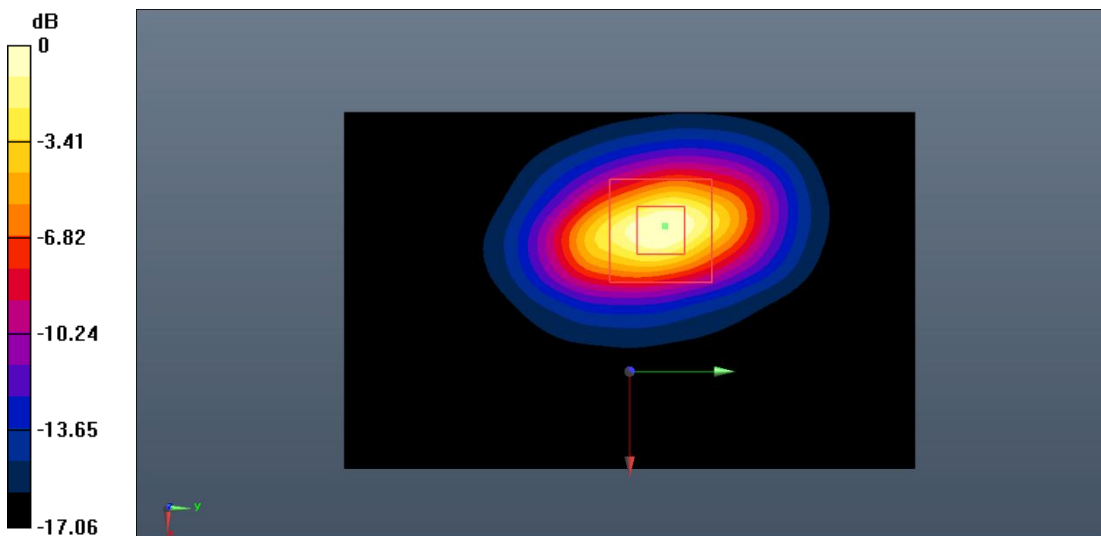
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 78.923 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 22.1 W/kg

SAR(1 g) = 9.30 W/kg; SAR(10 g) = 4.88 W/kg

Maximum value of SAR (measured) = 11.2 W/kg



0 dB = 11.2 W/kg = 10.49 dB W/kg

1900MHz

Date: 2022-1-5

Electronics: DAE4 Sn786

Medium: Head 1900MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.417$ S/m; $\epsilon_r = 39.253$; $\rho = 1000$ kg/m³

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

Probe: ES3DV3 – SN3151 ConvF (5.09, 5.09, 5.09);

System Validation/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 82.529 V/m; Power Drift = 0.12 dB

SAR(1 g) = 10.2 W/kg; SAR(10 g) = 5.14 W/kg

Maximum value of SAR (interpolated) = 12.1 W/kg

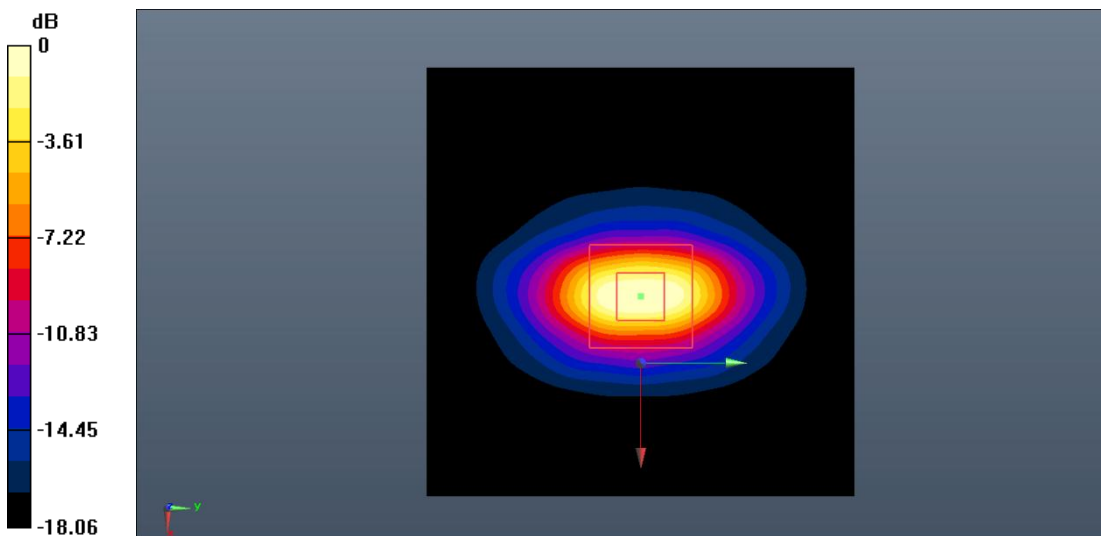
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 82.529 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 25.8 W/kg

SAR(1 g) = 10.5 W/kg; SAR(10 g) = 5.27 W/kg

Maximum value of SAR (measured) = 12.5 W/kg



0 dB = 12.5 W/kg = 10.99 dB W/kg

2450MHz

Date: 2022-1-12

Electronics: DAE4 Sn786

Medium: Head 2450MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.834$ S/m; $\epsilon_r = 38.322$; $\rho = 1000$ kg/m³

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

Probe: ES3DV3 – SN3151 ConvF (4.58, 4.58, 4.58);

System Validation/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 92.548 V/m; Power Drift = 0.07 dB

SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.04 W/kg

Maximum value of SAR (interpolated) = 15.5 W/kg

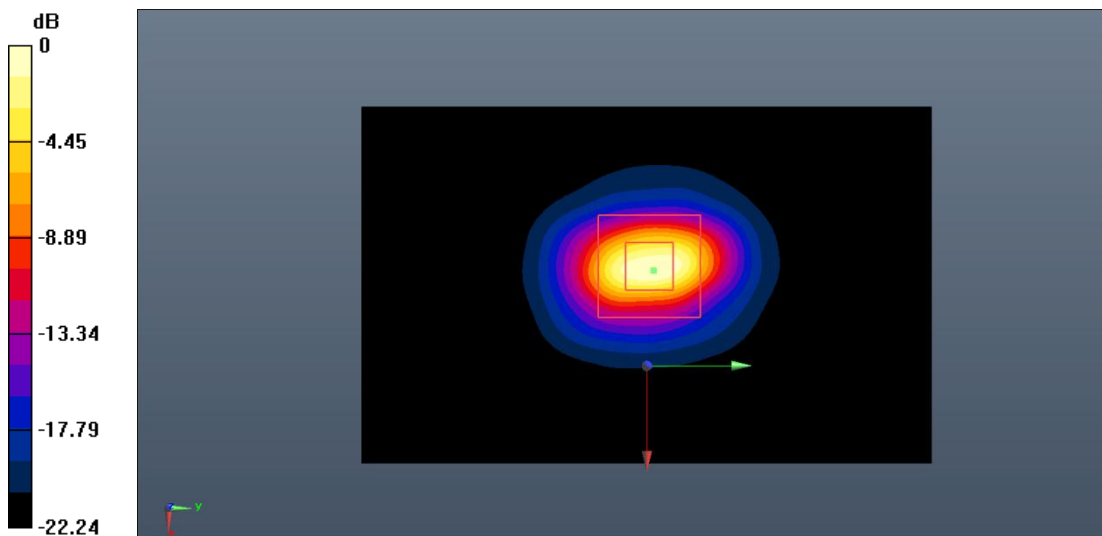
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.548 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 36.3 W/kg

SAR(1 g) = 13.7 W/kg; SAR(10 g) = 6.15 W/kg

Maximum value of SAR (measured) = 15.7 W/kg



0 dB = 15.7 W/kg = 11.96 dB W/kg

2550MHz

Date: 2021-12-22

Electronics: DAE4 Sn786

Medium: Head 2550MHz

Medium parameters used: $f = 2550$ MHz; $\sigma = 1.95$ S/m; $\epsilon_r = 38.282$; $\rho = 1000$ kg/m³

Communication System: CW_TMC Frequency: 2550 MHz Duty Cycle: 1:1

Probe: ES3DV3 – SN3151 ConvF (4.58, 4.58, 4.58);

System Validation/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 93.915 V/m; Power Drift = 0.06 dB

SAR(1 g) = 14.4 W/kg; SAR(10 g) = 6.39 W/kg

Maximum value of SAR (interpolated) = 16.5 W/kg

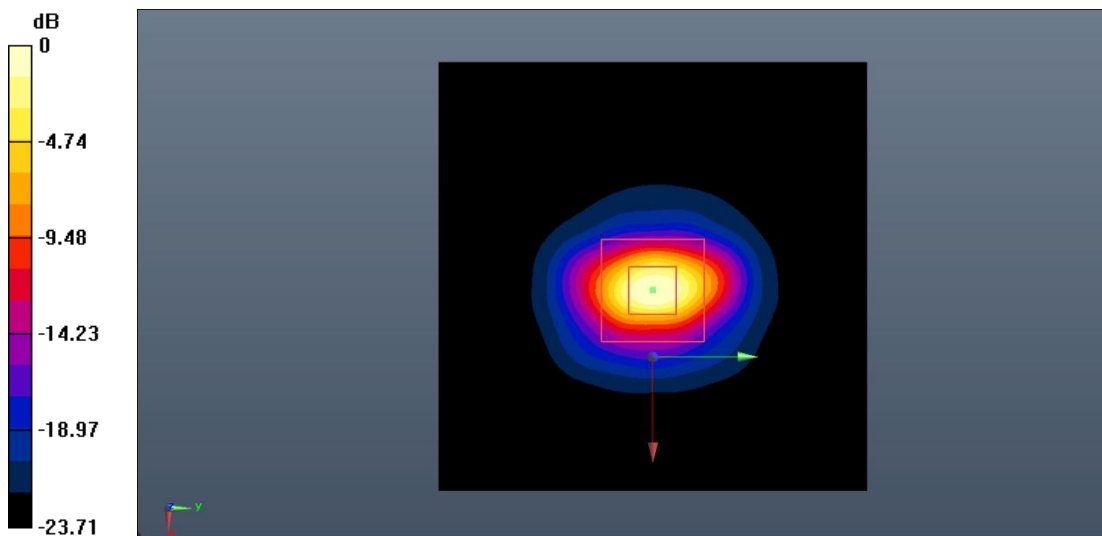
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.915 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 39.2 W/kg

SAR(1 g) = 14.6 W/kg; SAR(10 g) = 6.48 W/kg

Maximum value of SAR (measured) = 16.6 W/kg



0 dB = 16.6 W/kg = 12.20 dB W/kg

*****END OF REPORT*****