APPENDIX F: RELEVANT PAGES FROM DIPOLE VALIDATION KIT REPORTS

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

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Accreditation No.: SCS 108

Client **Nokia Salo TCC**

Certificate No: D835V2-480_Dec12

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 480
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	December 03, 2012

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 EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: December 3, 2012

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Engineering AG
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Accreditation No.: SCS 108

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 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

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	V52.8.3
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.4 ± 6 %	0.92 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	2.39 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.40 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.56 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.16 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	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.5 ± 6 %	0.99 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	2.42 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.51 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.27 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.8 Ω - 3.3 jΩ
Return Loss	- 29.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.7 Ω - 4.9 jΩ
Return Loss	- 24.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.391 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	January 28, 2003

DASY5 Validation Report for Head TSL

Date: 03.12.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 480

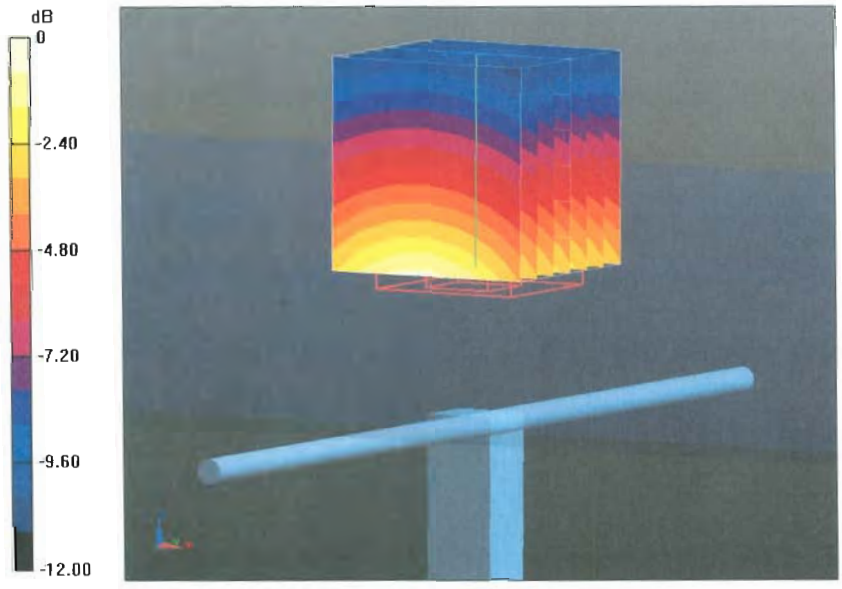
Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.92 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

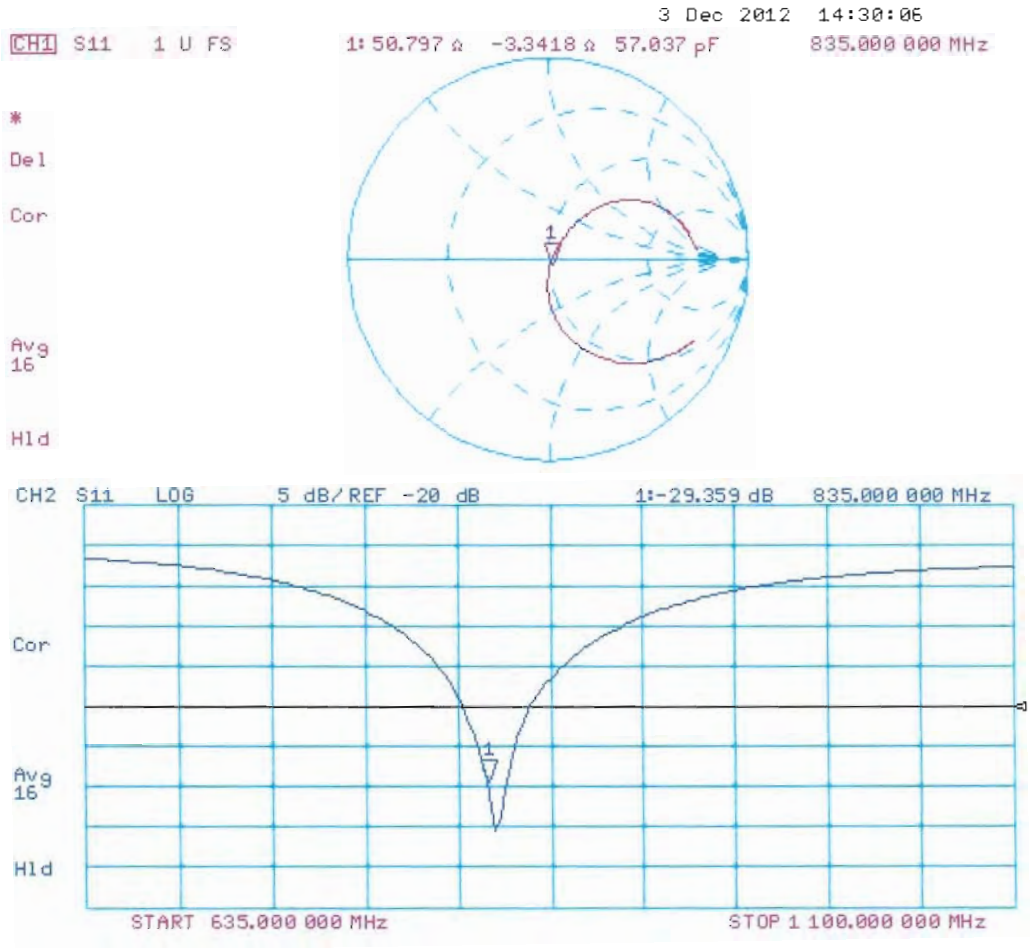
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.814 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.60 W/kg
SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.56 W/kg
Maximum value of SAR (measured) = 2.80 W/kg



0 dB = 2.80 W/kg = 4.47 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 03.12.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 480

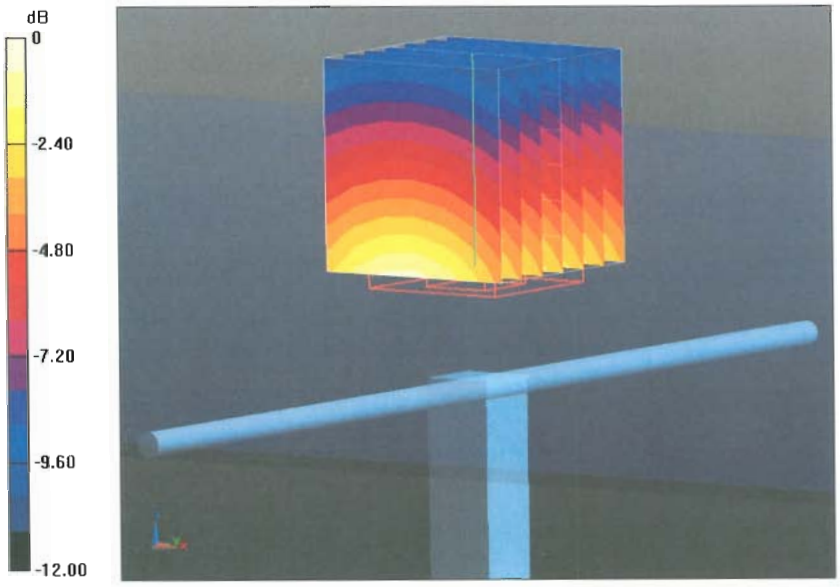
Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.99 mho/m; ε_r = 54.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

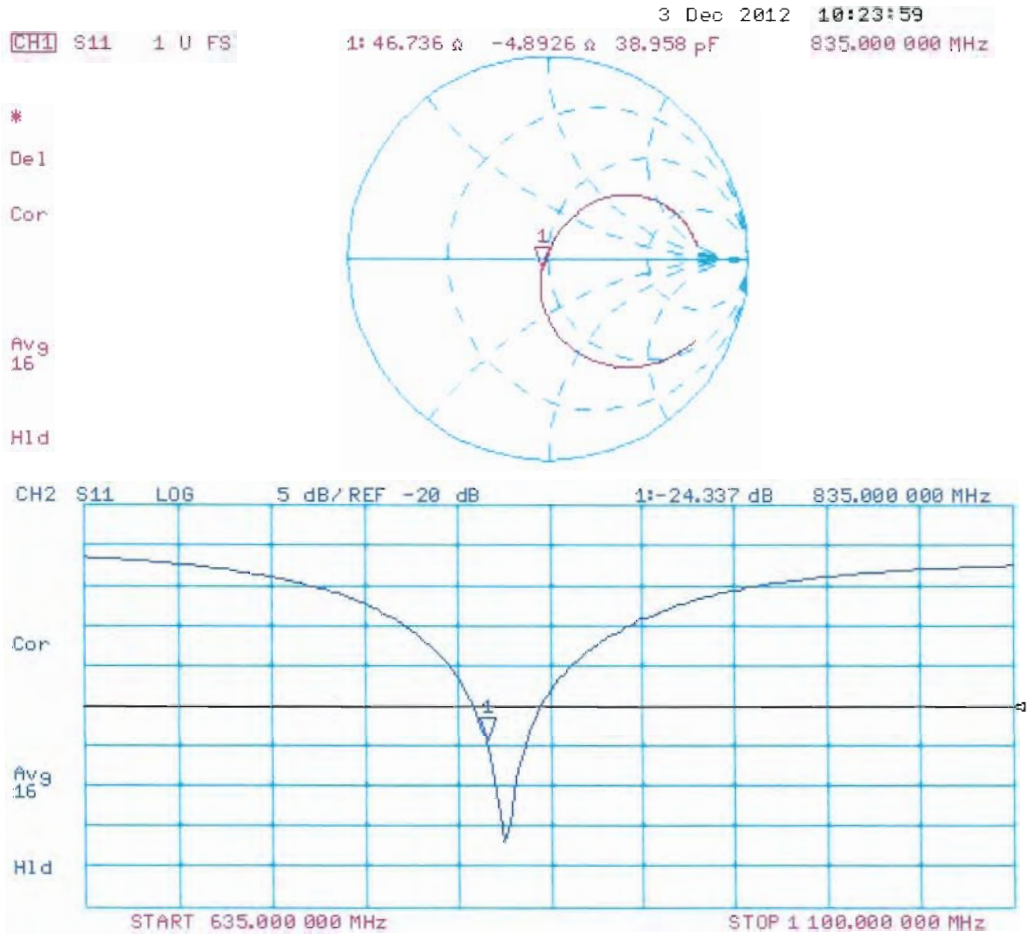
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.301 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.53 W/kg
SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.59 W/kg
Maximum value of SAR (measured) = 2.80 W/kg



0 dB = 2.80 W/kg = 4.47 dBW/kg

Impedance Measurement Plot for Body TSL



Dipole D835V2 – SN: 480 Antenna Parameters measured: 2014-01-31.

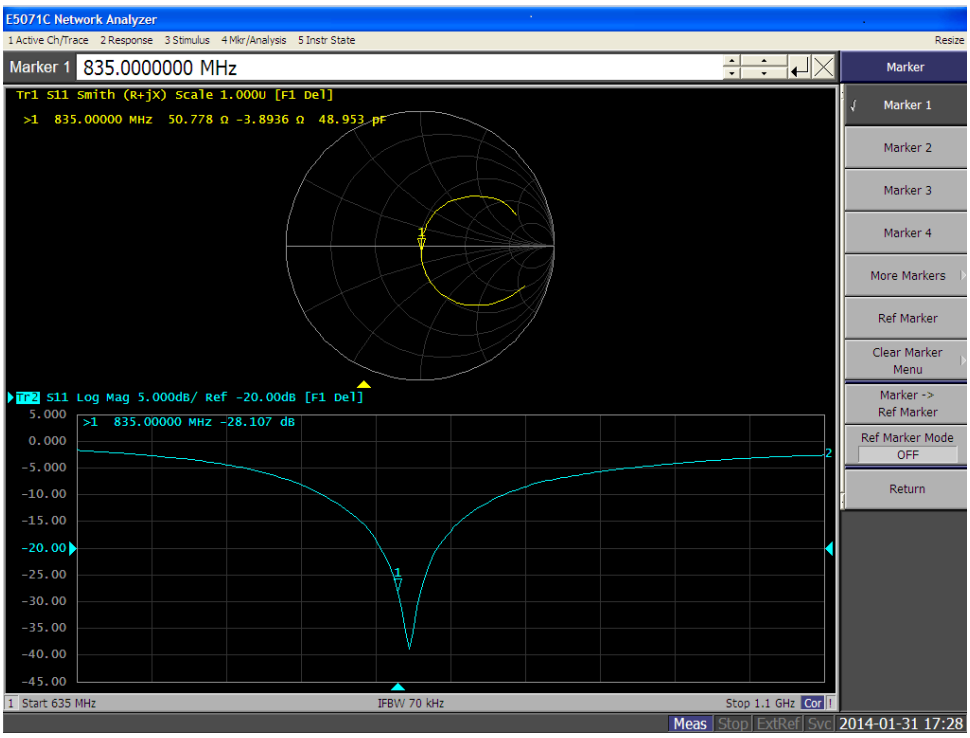
Antenna Parameters with Head TSL

	Calibration certificate	Annual measurement
Impedance, transformed to feed point	50.8 Ω - 3.3 jΩ	50.8 Ω -3.9 jΩ
Return loss	-29.4 dB	-28.1 dB

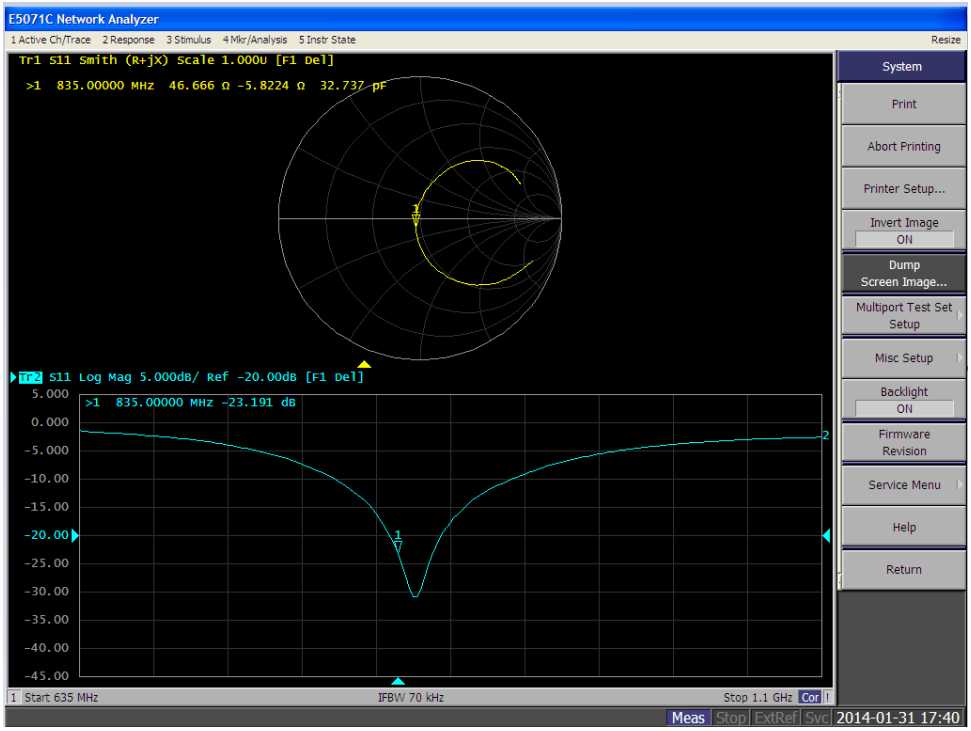
Antenna Parameters with Body TSL

	Calibration certificate	Annual measurement
Impedance, transformed to feed point	47.4 Ω - 3.8 jΩ	46.7 Ω -5.8 jΩ
Return loss	-26.5 dB	-23.2 dB

Impedance Measurement Plot for Head TSL 83



Impedance Measurement Plot for Body TSL 835



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Accreditation No.: **SCS 108**

Client **Nokia Salo TCC**

Certificate No: **D1900V2-5d030_May14**

CALIBRATION CERTIFICATE

Object D1900V2 - SN: 5d030

Calibration procedure(s) QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: May 14, 2014

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 EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	30-Apr-14 (No. DAE4-601_Apr14)	Apr-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

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

Issued: May 15, 2014

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 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
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	
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	39.3 ± 6 %	1.37 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	9.83 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.7 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	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.5 ± 6 %	1.52 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	10.1 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**40.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.34 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.3 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.6 Ω + 4.3 jΩ
Return Loss	- 27.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω + 4.4 jΩ
Return Loss	- 24.8 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	December 17, 2002

Date: 14.05.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d030

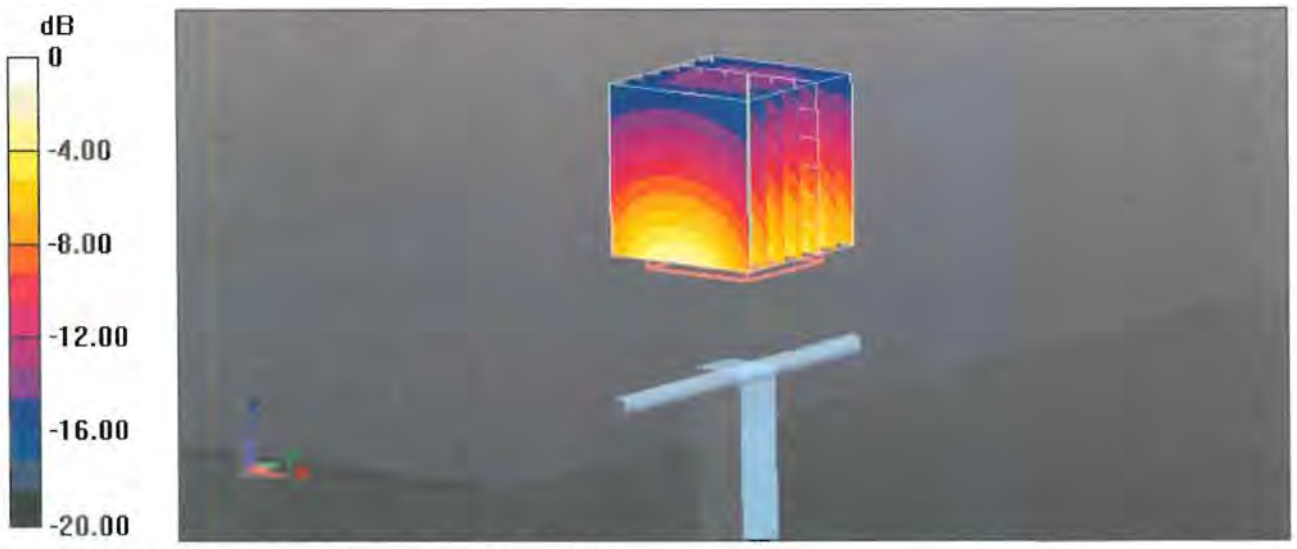
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.37 S/m; ε_r = 39.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.06, 5.06, 5.06); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

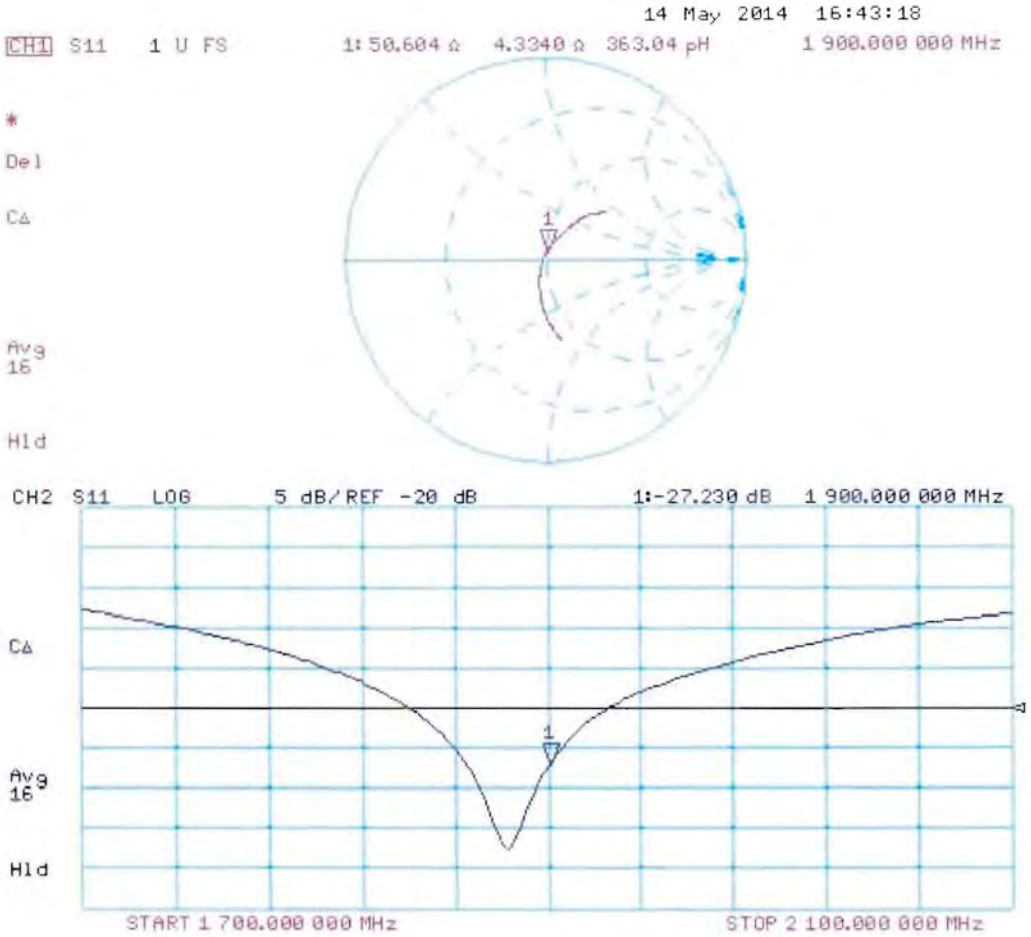
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.75 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 18.0 W/kg
SAR(1 g) = 9.83 W/kg; SAR(10 g) = 5.15 W/kg
Maximum value of SAR (measured) = 12.3 W/kg



0 dB = 12.3 W/kg = 10.90 dBW/kg

Impedance Measurement Plot for Head TSL



Date: 14.05.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d030

Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.52 S/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

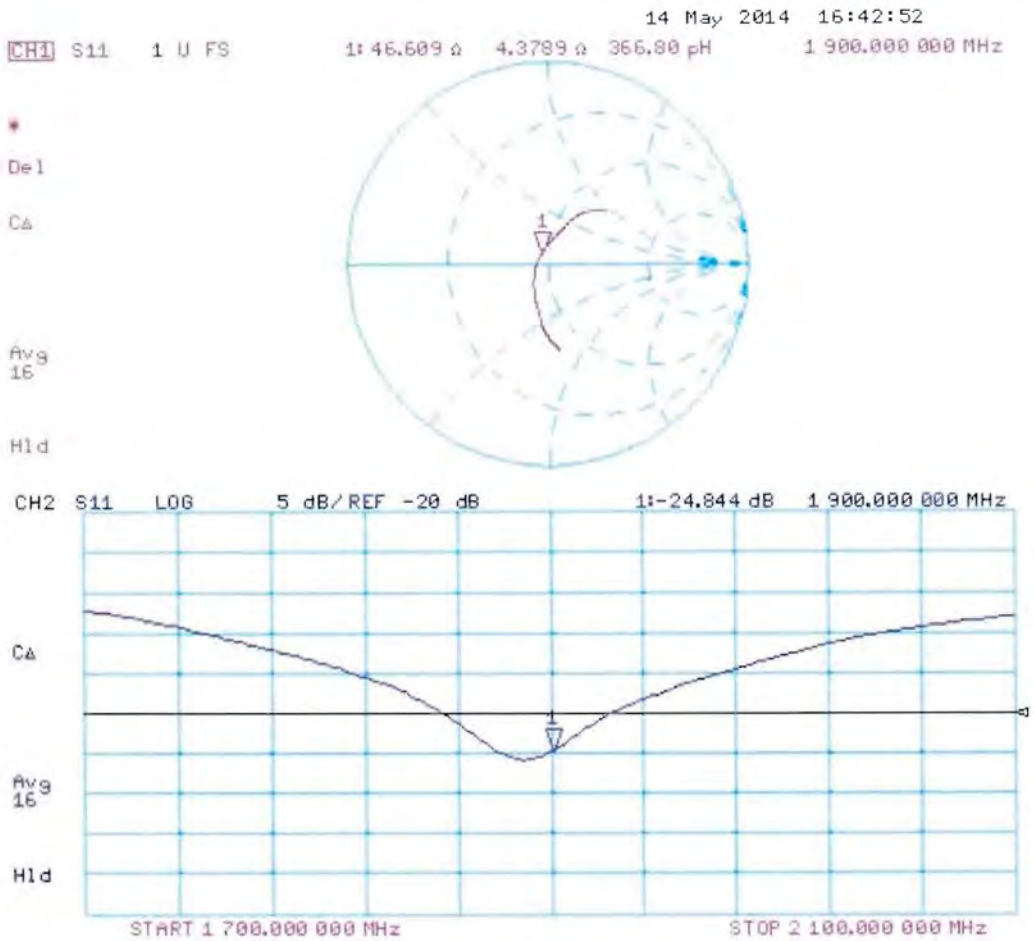
- Probe: ES3DV3 - SN3205; ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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 = 94.65 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 17.6 W/kg
SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.34 W/kg
Maximum value of SAR (measured) = 12.6 W/kg

0 dB = 12.6 W/kg = 11.00 dBW/kg

Impedance Measurement Plot for Body TSL



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S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
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Accreditation No.: SCS 108

Client Nokia Salo TCC

Certificate No: D2450V2-749_Dec12

CALIBRATION CERTIFICATE

Object: D2450V2 - SN: 749

Calibration procedure(s): QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: December 07, 2012

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 EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
oproved by:	Katja Pokovic	Technical Manager	

Issued: December 7, 2012

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 108

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 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

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	V52.8.3
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
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	38.2 ± 6 %	1.84 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**53.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.35 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	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.7 ± 6 %	2.02 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.2 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**51.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.08 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.0 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.6 Ω + 3.4 jΩ
Return Loss	- 27.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.5 Ω + 4.3 jΩ
Return Loss	- 27.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.163 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	December 01, 2003

DASY5 Validation Report for Head TSL

Date: 07.12.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 749

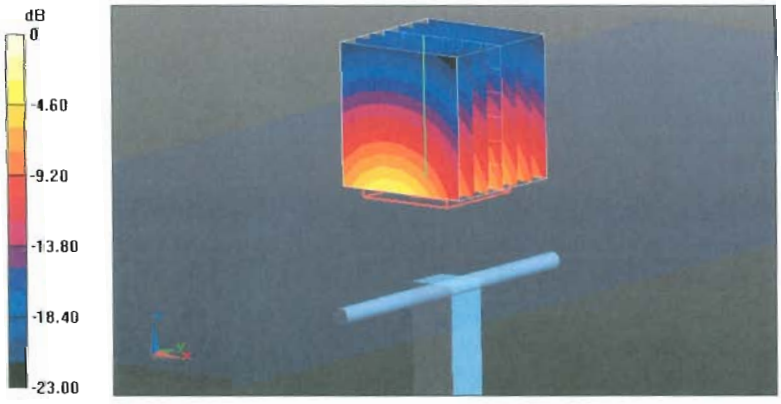
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.84 mho/m; ε_r = 38.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

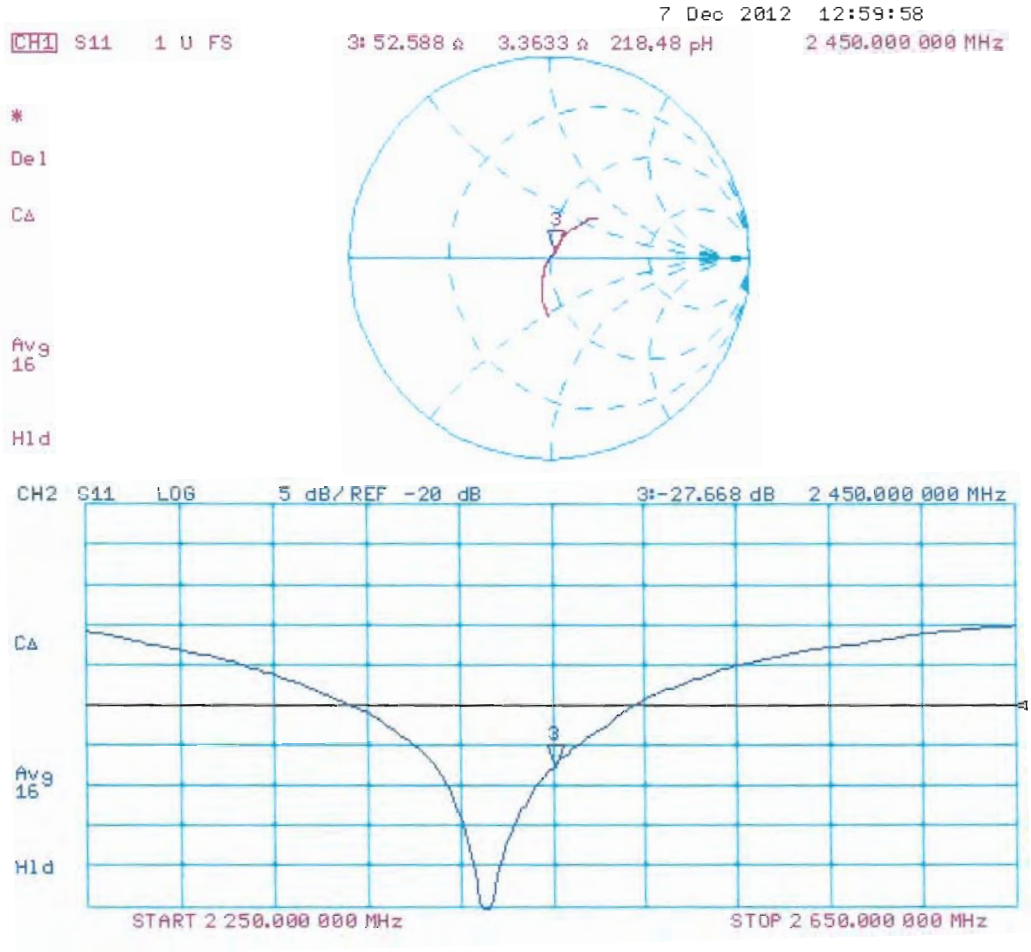
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.608 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 28.2 W/kg
SAR(1 g) = 13.7 W/kg; SAR(10 g) = 6.35 W/kg
Maximum value of SAR (measured) = 17.3 W/kg



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

Impedance Measurement Plot for Head TSL



Date: 07.12.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 749

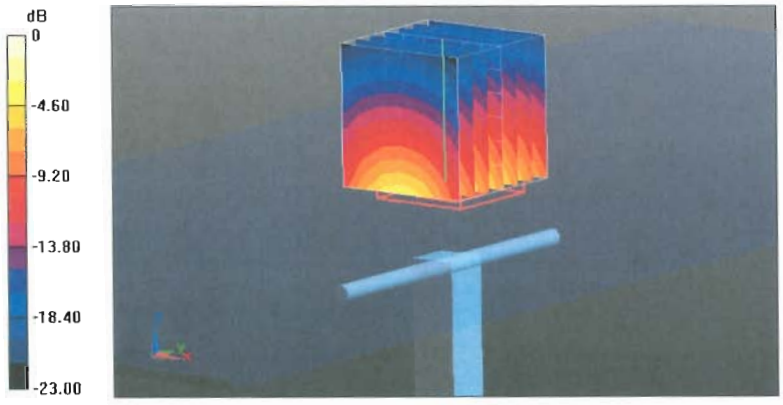
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.02 mho/m; ε_r = 50.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

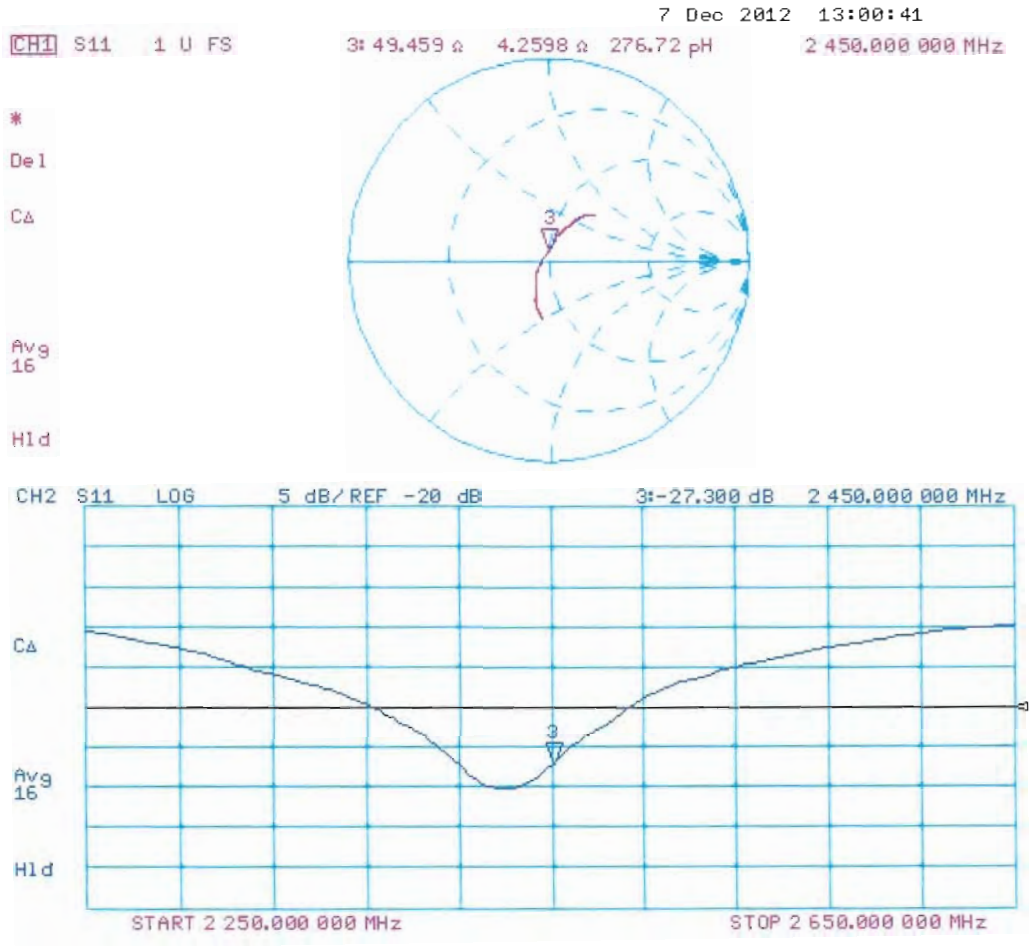
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm 2/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.139 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 27.4 W/kg
SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.08 W/kg
Maximum value of SAR (measured) = 17.4 W/kg



0 dB = 17.4 W/kg = 12.41 dBW/kg

Impedance Measurement Plot for Body TSL



Dipole D2450V2 – SN:749 Antenna Parameters measured: 2014-01-14.

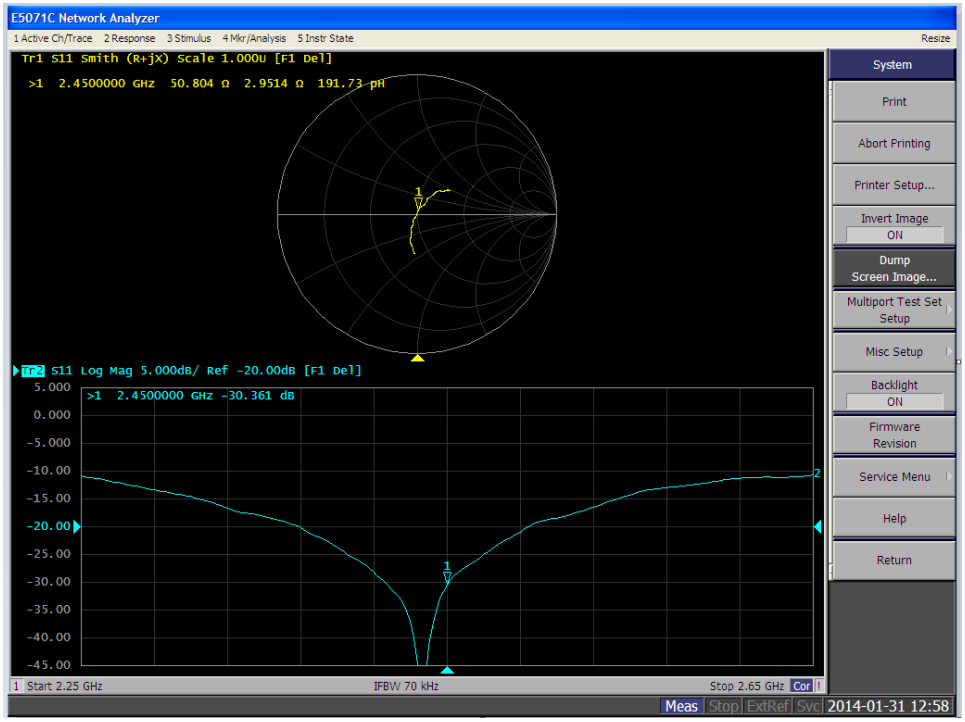
Antenna Parameters with Head TSL

	Calibration certificate	Annual measurement
Impedance, transformed to feed point	52.6 Ω - 3.4 jΩ	50.8 Ω - 3.0 jΩ
Return loss	-27.7 dB	-30.4 dB

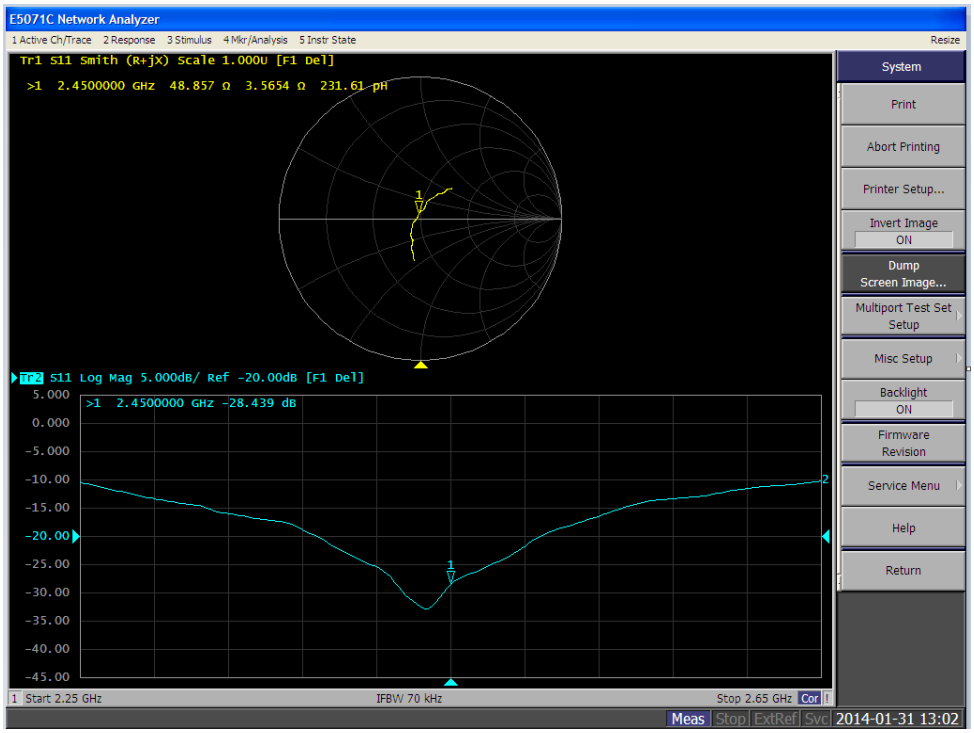
Antenna Parameters with Body TSL

	Calibration certificate	Annual measurement
Impedance, transformed to feed point	49.5 Ω - 4.3 jΩ	48.9 Ω - 3.6 jΩ
Return loss	-27.3 dB	-28.4 dB

Impedance Measurement Plot for Head TSL 2450



Impedance Measurement Plot for Body TSL 2450



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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 108

Client Nokia Salo TCC

Certificate No: D2600V2-1056_Nov12

CALIBRATION CERTIFICATE

Object	D2600V2 - SN: 1056
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	November 07, 2012

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 EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.2 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 7, 2012

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 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

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	V52.8.3
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.1 ± 6 %	2.01 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	14.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**57.8 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.9 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	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.8 ± 6 %	2.19 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	14.1 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**55.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.26 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.8 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.3 Ω - 5.1 jΩ
Return Loss	- 25.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.0 Ω - 4.4 jΩ
Return Loss	- 24.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.149 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 14, 2012

Date: 07.11.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1056

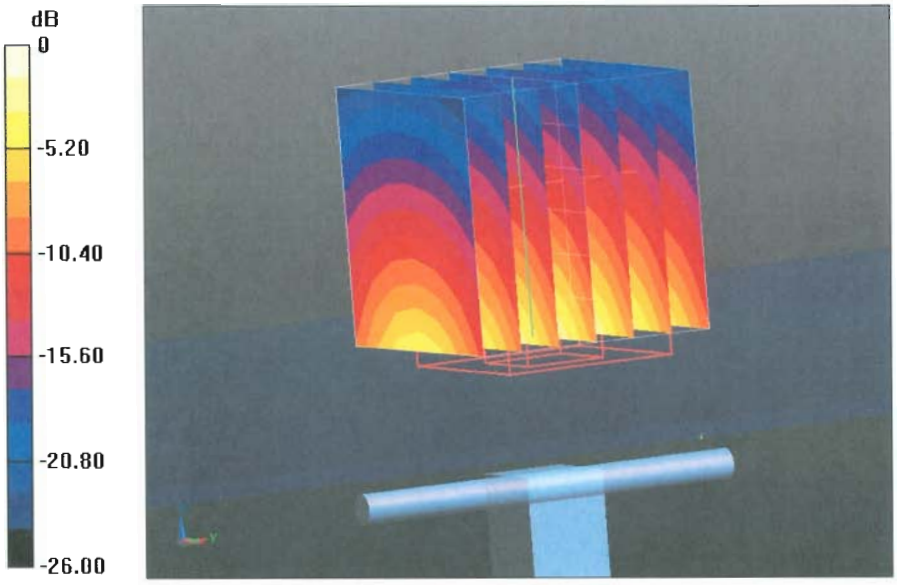
Communication System: CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.01 mho/m; ε_r = 38.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.39, 4.39, 4.39); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

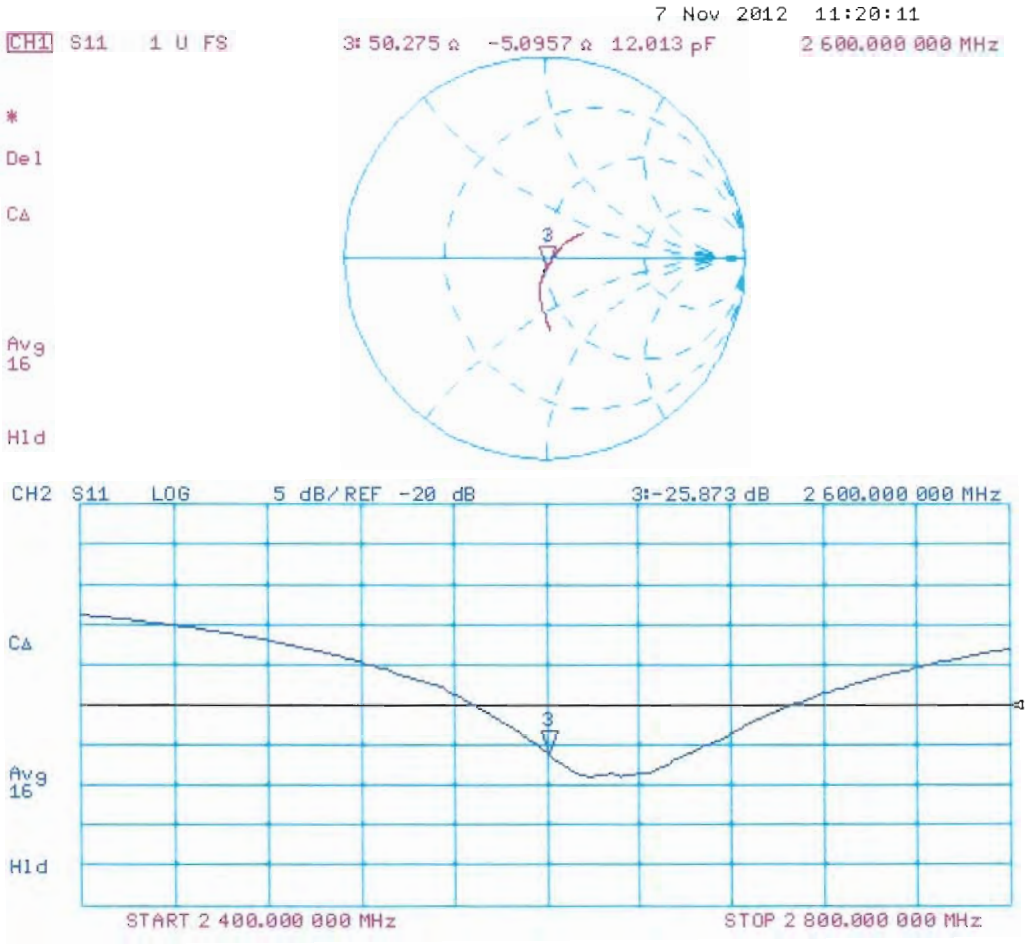
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.2 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 31.3 W/kg
SAR(1 g) = 14.7 W/kg; SAR(10 g) = 6.54 W/kg
Maximum value of SAR (measured) = 18.7 W/kg



0 dB = 18.7 W/kg = 12.72 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 07.11.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1056

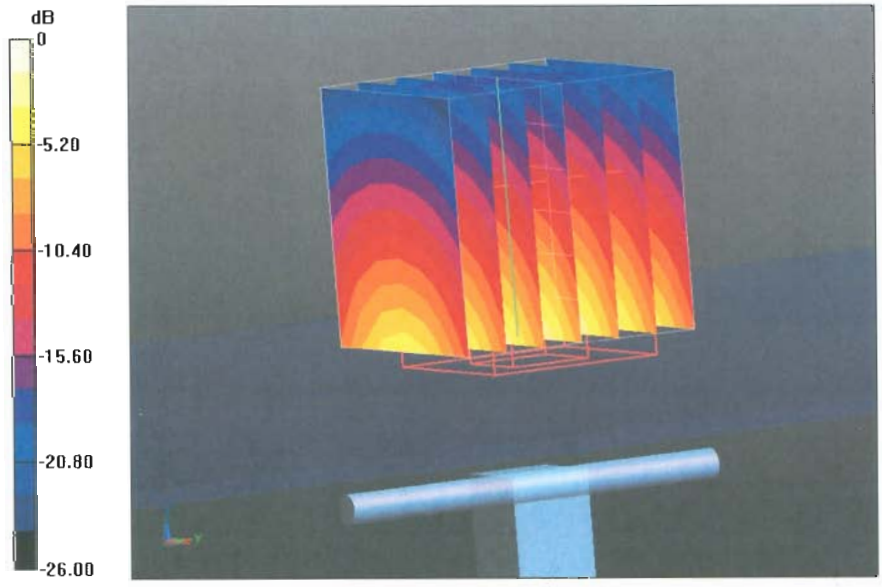
Communication System: CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.19 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.16, 4.16, 4.16); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

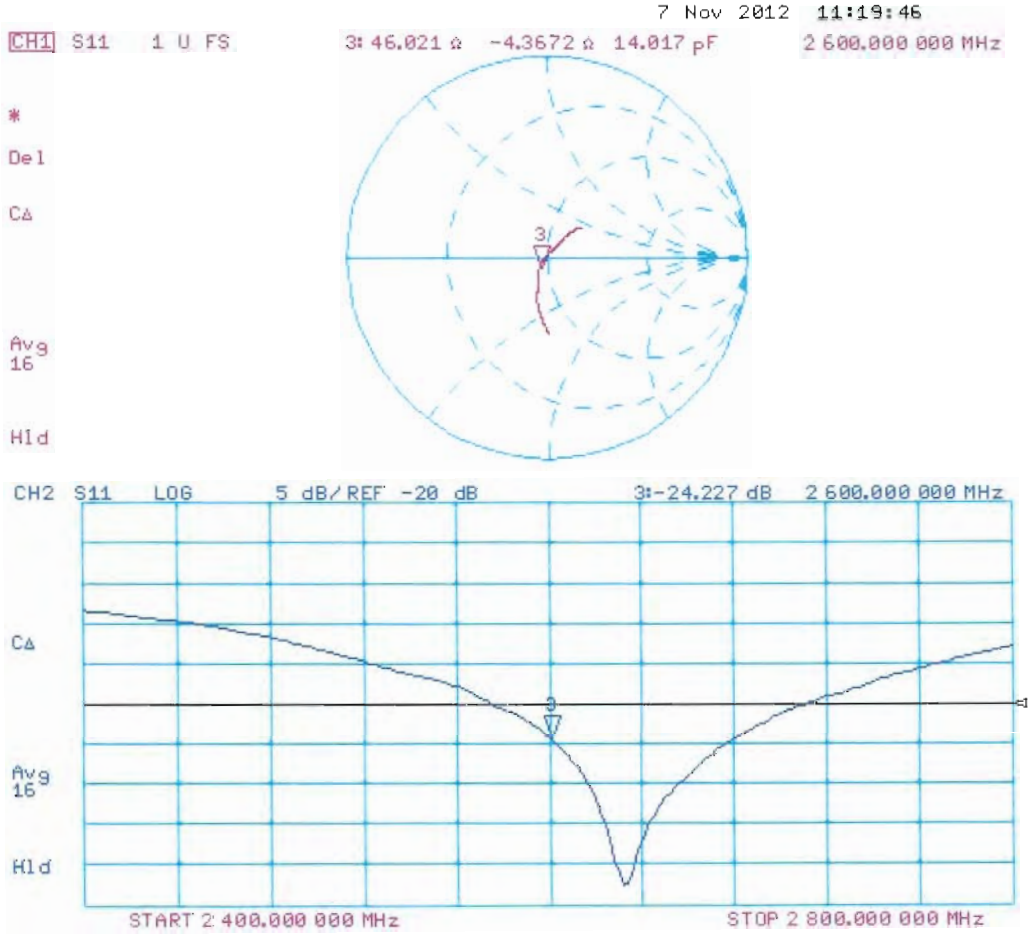
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.2 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 30.0 W/kg
SAR(1 g) = 14.1 W/kg; SAR(10 g) = 6.26 W/kg
Maximum value of SAR (measured) = 18.8 W/kg



0 dB = 18.8 W/kg = 12.74 dBW/kg

Impedance Measurement Plot for Body TSL



Dipole D2600V2 – SN:1056 Antenna Parameters measured: 2014-01-31.

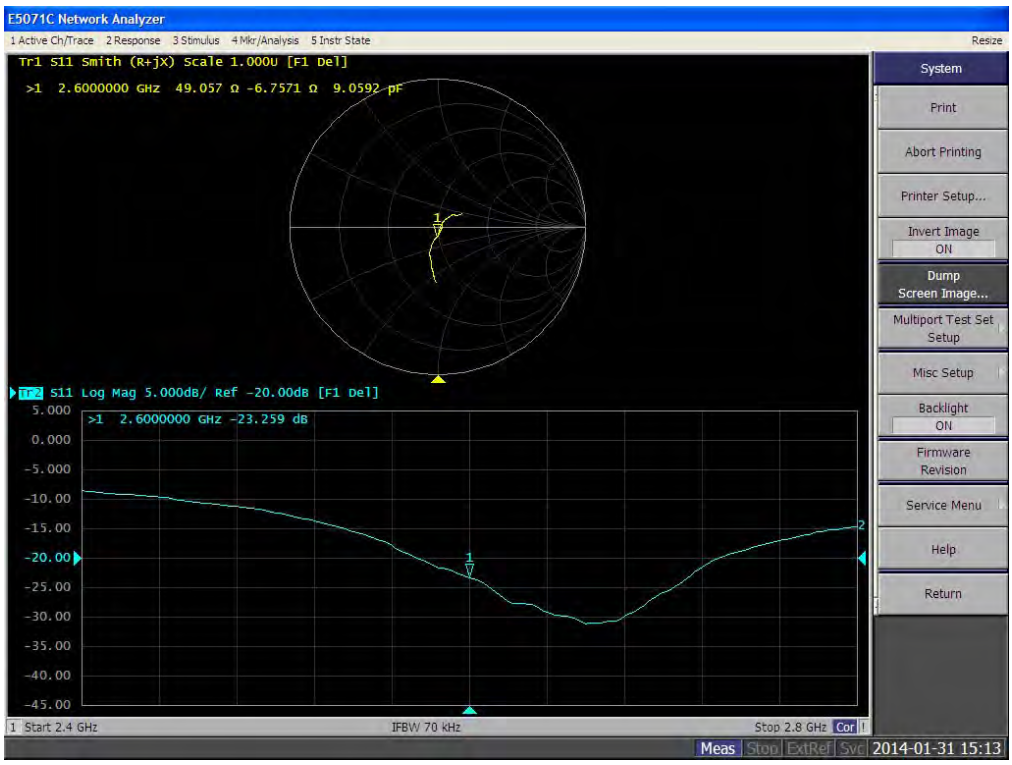
Antenna Parameters with Head TSL

	Calibration certificate	Annual measurement
Impedance, transformed to feed point	50.3 Ω - 5.1 jΩ	49.1 Ω - 6.8 jΩ
Return loss	-25.9 dB	-23.3 dB

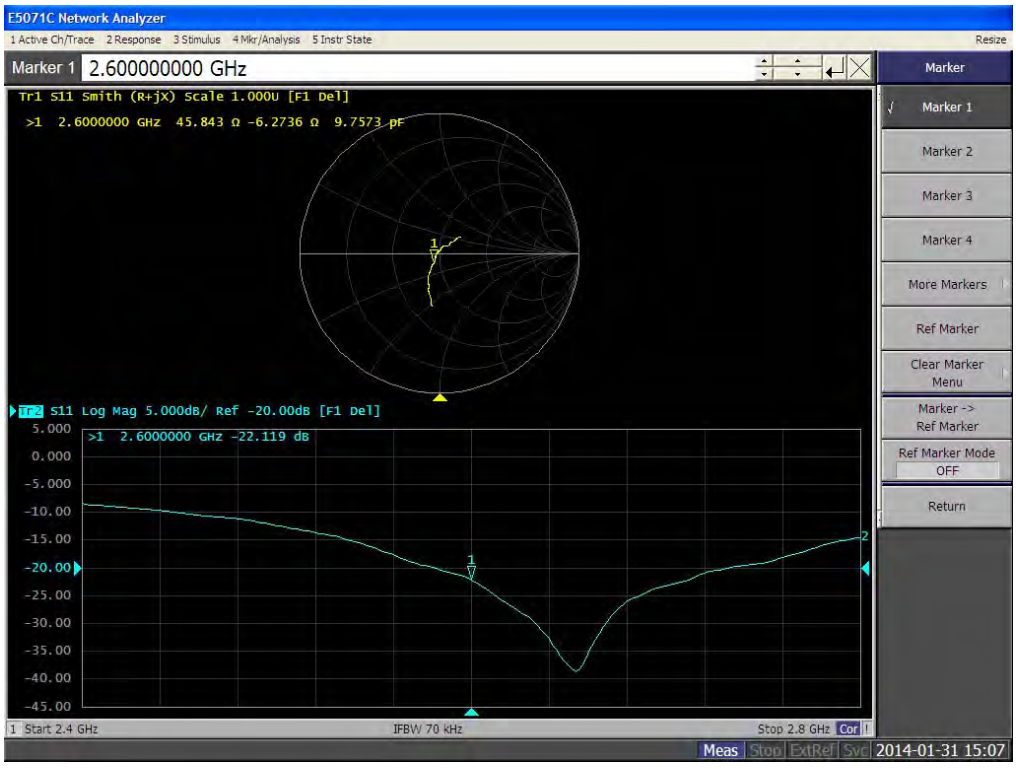
Antenna Parameters with Body TSL

	Calibration certificate	Annual measurement
Impedance, transformed to feed point	46.0 Ω - 4.4 jΩ	45.8 Ω - 6.3 jΩ
Return loss	-24.2 dB	-22.1 dB

Impedance Measurement Plot for Head TSL 2600



Impedance Measurement Plot for Body TSL 2600



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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 108

Client Nokia Salo TCC

Certificate No: D5GHzV2-1048_Dec12

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN: 1048
Calibration procedure(s)	QA CAL-22.v1 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date:	December 11, 2012

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 EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe EX3DV4	SN: 3503	30-Dec-11 (No. EX3-3503_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: December 11, 2012

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 108

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) IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010

b) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

c) 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	V52.8.3
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 %	4.46 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	8.04 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.8 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 %	4.55 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	8.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**82.6 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 %	4.72 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	8.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**82.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.4 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 %	4.81 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**83.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (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 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	33.8 ± 6 %	5.04 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**78.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (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	47.1 ± 6 %	5.40 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	7.20 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**71.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.02 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.0 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	46.9 ± 6 %	5.51 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	7.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**73.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.7 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	46.6 ± 6 %	5.76 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	7.62 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.6 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.12 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.0 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	46.4 ± 6 %	5.88 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	7.73 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**76.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.2 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	46.1 ± 6 %	6.17 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	7.25 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**71.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.00 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.8 W/kg ± 19.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	54.0 Ω - 7.1 jΩ
Return Loss	- 22.1 dB

Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	49.0 Ω - 4.5 jΩ
Return Loss	- 26.7 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	59.1 Ω - 8.8 jΩ
Return Loss	- 18.8 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	59.7 Ω - 1.7 jΩ
Return Loss	- 21.0 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	55.8 Ω - 8.9 jΩ
Return Loss	- 20.0 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	53.7 Ω - 6.3 jΩ
Return Loss	- 23.0 dB

Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to feed point	50.3 Ω - 4.2 jΩ
Return Loss	- 27.5 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	58.7 Ω - 6.9 jΩ
Return Loss	- 19.8 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	60.7 Ω - 0.7 jΩ
Return Loss	- 20.3 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	56.7 Ω - 7.2 jΩ
Return Loss	- 20.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.192 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	June 09, 2006

DASY5 Validation Report for Head TSL

Date: 11.12.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1048

Communication System: CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.46 mho/m; ε_r = 34.6; ρ = 1000 kg/m^3 , Medium parameters used: f = 5300 MHz; σ = 4.55 mho/m; ε_r = 34.4; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 4.72 mho/m; ε_r = 34.2; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 4.81 mho/m; ε_r = 34; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 5.04 mho/m; ε_r = 33.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41); Calibrated: 30.12.2011, ConvF(5.1, 5.1, 5.1); Calibrated: 30.12.2011, ConvF(4.91, 4.91, 4.91); Calibrated: 30.12.2011, ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2011, ConvF(4.81, 4.81, 4.81); Calibrated: 30.12.2011;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

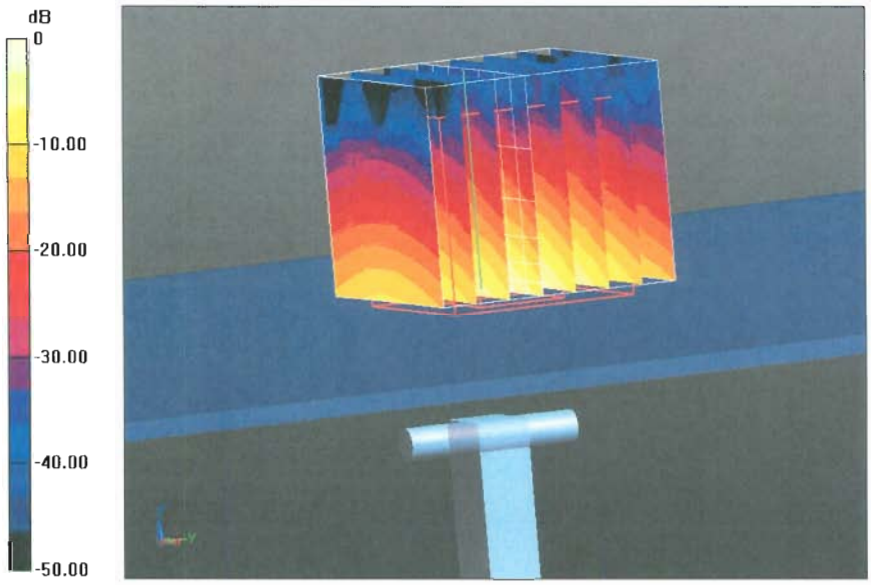
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.551 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 29.4 W/kg
SAR(1 g) = 8.04 W/kg; SAR(10 g) = 2.31 W/kg
Maximum value of SAR (measured) = 18.7 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 = 64.266 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 31.3 W/kg
SAR(1 g) = 8.34 W/kg; SAR(10 g) = 2.4 W/kg
Maximum value of SAR (measured) = 19.6 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 = 63.310 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 32.5 W/kg
SAR(1 g) = 8.31 W/kg; SAR(10 g) = 2.37 W/kg
Maximum value of SAR (measured) = 19.8 W/kg

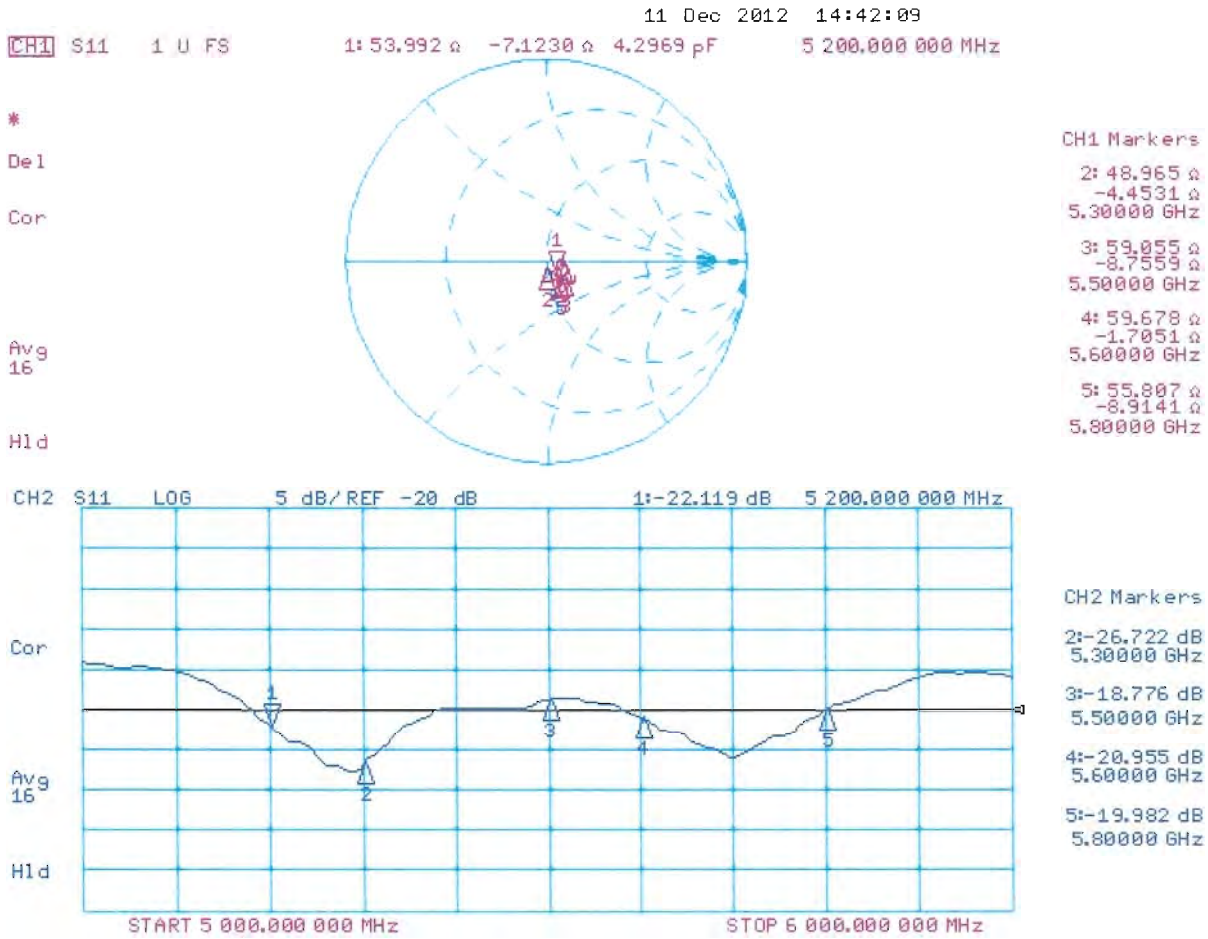
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.574 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 33.1 W/kg
SAR(1 g) = 8.41 W/kg; SAR(10 g) = 2.4 W/kg
Maximum value of SAR (measured) = 20.1 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 = 60.570 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 32.7 W/kg
SAR(1 g) = 7.93 W/kg; SAR(10 g) = 2.26 W/kg
Maximum value of SAR (measured) = 19.3 W/kg



0 dB = 19.3 W/kg = 12.86 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 10.12.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1048

Communication System: CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 5.4 mho/m; ε_r = 47.1; ρ = 1000 kg/m^3 , Medium parameters used: f = 5300 MHz; σ = 5.51 mho/m; ε_r = 46.9; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 5.76 mho/m; ε_r = 46.6; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 5.88 mho/m; ε_r = 46.4; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 6.17 mho/m; ε_r = 46.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91); Calibrated: 30.12.2011, ConvF(4.67, 4.67, 4.67); Calibrated: 30.12.2011, ConvF(4.43, 4.43, 4.43); Calibrated: 30.12.2011, ConvF(4.22, 4.22, 4.22); Calibrated: 30.12.2011, ConvF(4.38, 4.38, 4.38); Calibrated: 30.12.2011;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

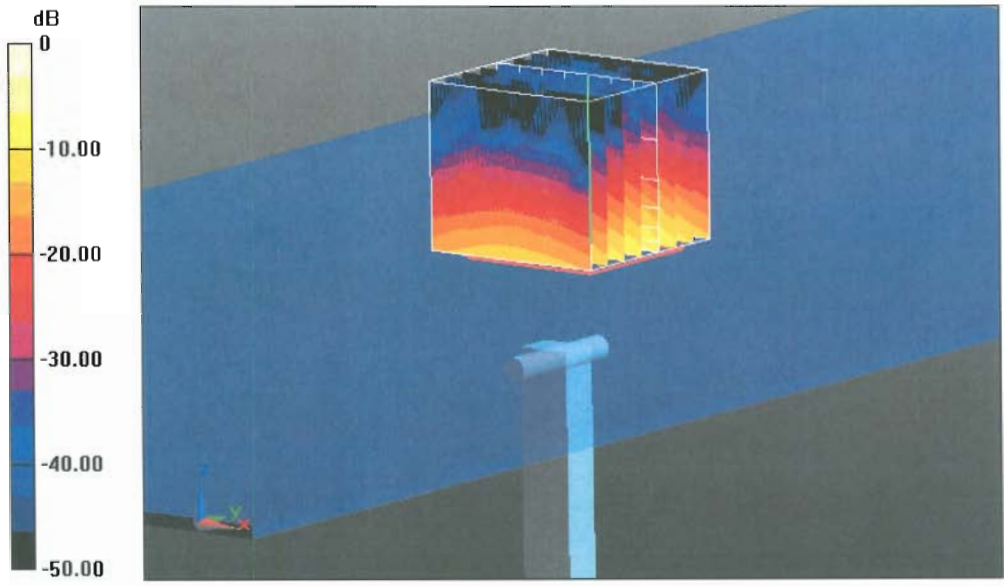
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 55.320 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 28.3 W/kg
SAR(1 g) = 7.2 W/kg; SAR(10 g) = 2.02 W/kg
Maximum value of SAR (measured) = 17.2 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 = 55.849 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 30.1 W/kg
SAR(1 g) = 7.45 W/kg; SAR(10 g) = 2.09 W/kg
Maximum value of SAR (measured) = 17.9 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 = 55.354 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 32.8 W/kg
SAR(1 g) = 7.62 W/kg; SAR(10 g) = 2.12 W/kg
Maximum value of SAR (measured) = 18.7 W/kg

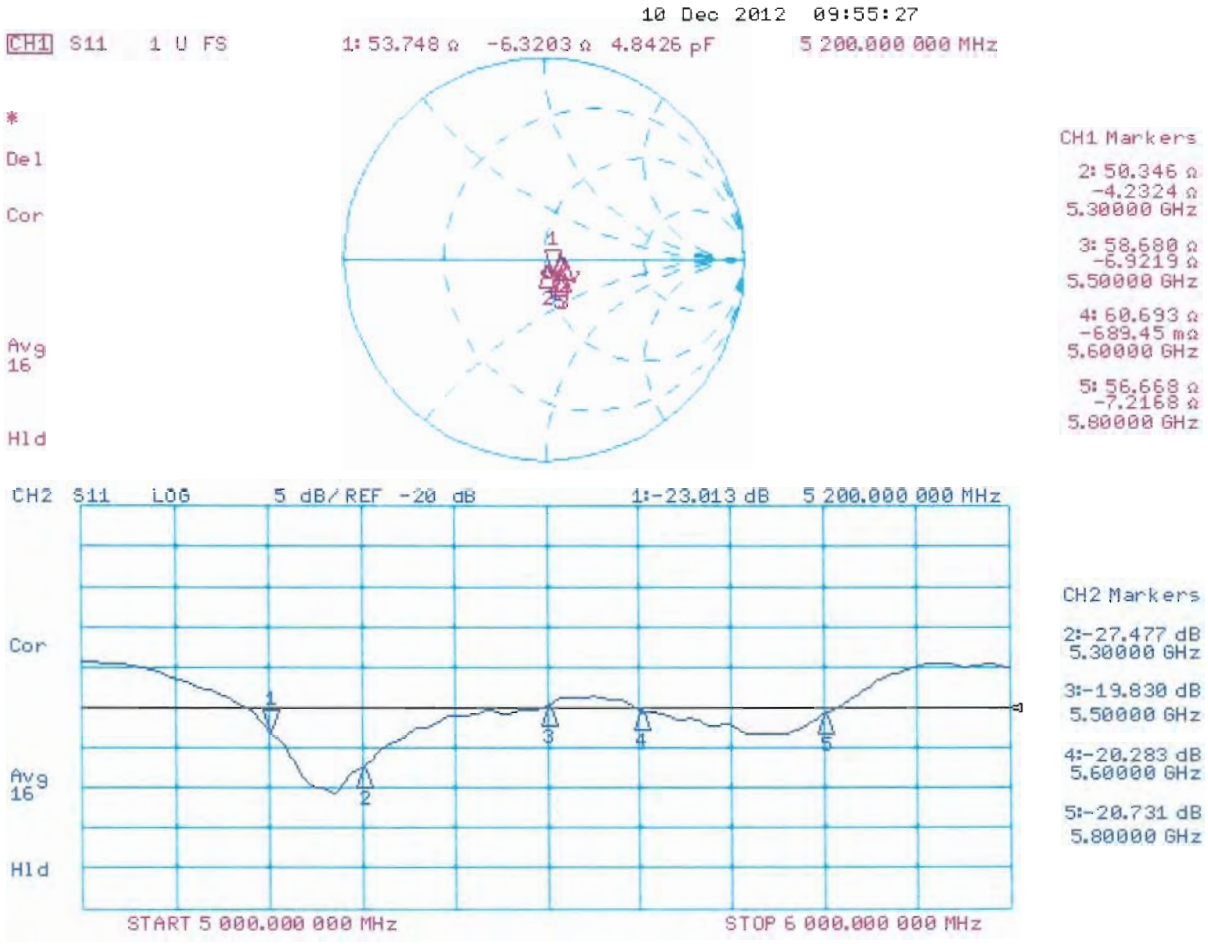
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 55.041 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 34.3 W/kg
SAR(1 g) = 7.73 W/kg; SAR(10 g) = 2.14 W/kg
Maximum value of SAR (measured) = 19.2 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 = 52.474 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 33.8 W/kg
SAR(1 g) = 7.25 W/kg; SAR(10 g) = 2 W/kg
Maximum value of SAR (measured) = 18.2 W/kg



0 dB = 18.2 W/kg = 12.60 dBW/kg

Impedance Measurement Plot for Body TSL



Dipole D5000V2 – SN:1048 Antenna Parameters measured: 2014-04-07.

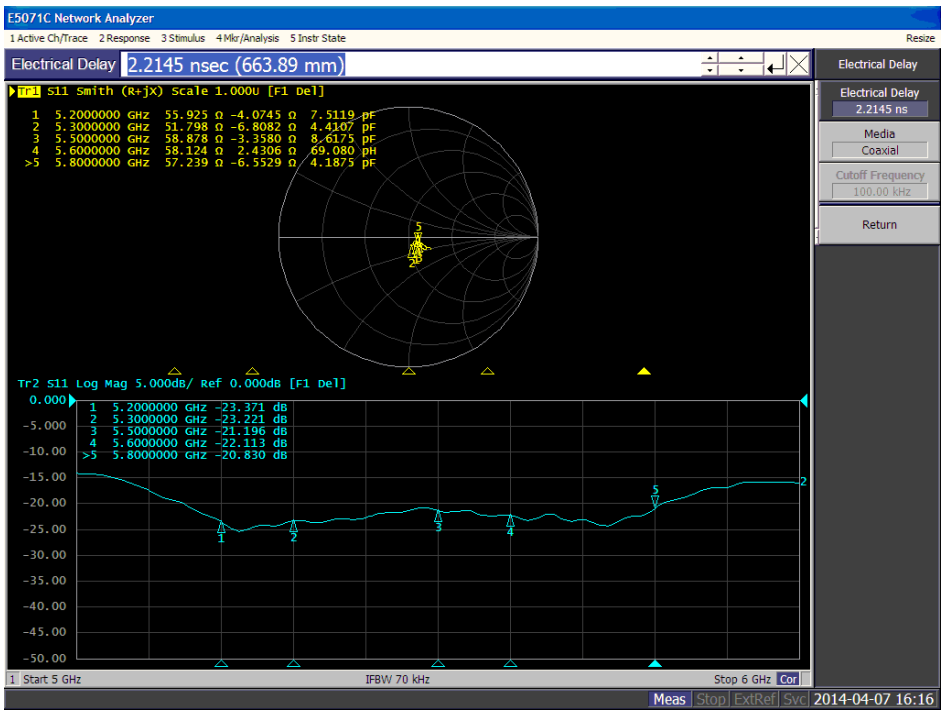
Antenna Parameters with Head TSL

MHz		Calibration certificate	Annual measurement
5200	Impedance, transformed to feed point	54.0 Ω - 7.1 jΩ	55.9 Ω - 4.1 jΩ
	Return loss	-22.0 dB	-23.4 dB
5300	Impedance, transformed to feed point	49.0 Ω - 4.5 jΩ	51.8 Ω - 6.8 jΩ
	Return loss	-26.7 dB	-23.2 dB
5500	Impedance, transformed to feed point	59.1 Ω - 8.8 jΩ	58.9 Ω - 3.4 jΩ
	Return loss	-18.8 dB	-21.2 dB
5600	Impedance, transformed to feed point	59.7 Ω - 1.7 jΩ	58.1 Ω 2.4 jΩ
	Return loss	-21.0 dB	-22.1 dB
5800	Impedance, transformed to feed point	55.8 Ω - 8.9 jΩ	57.2 Ω - 6.6 jΩ
	Return loss	-20.0dB	-20.8 dB

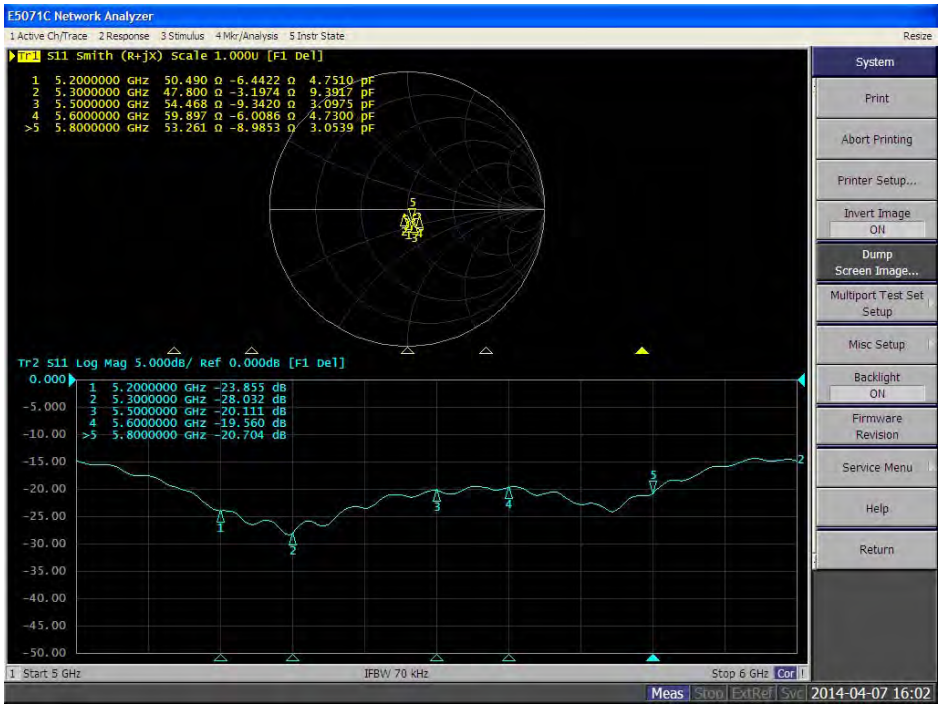
Antenna Parameters with Body TSL

MHz		Calibration certificate	Annual measurement
5200	Impedance, transformed to feed point	53.7 Ω - 6.3 jΩ	50.5 Ω - 6.4 jΩ
	Return loss	-23.0 dB	-23.9 dB
5300	Impedance, transformed to feed point	50.3 Ω - 4.2 jΩ	47.8 Ω - 3.2 jΩ
	Return loss	-27.5 dB	-28.0 dB
5500	Impedance, transformed to feed point	58.7 Ω - 6.9 jΩ	54.5 Ω - 9.3 jΩ
	Return loss	-19.8 dB	-20.1 dB
5600	Impedance, transformed to feed point	60.7 Ω - 0.7 jΩ	59.9 Ω -6.0 jΩ
	Return loss	-20.3 dB	-19.6 dB
5800	Impedance, transformed to feed point	56.7 Ω - 7.2 jΩ	53.3 Ω - 9.0 jΩ
	Return loss	-20.7dB	-20.7 dB

Impedance Measurement Plot for Head TSL 5000



Impedance Measurement Plot for Body TSL 5000



APPENDIX G: CONDUCTED POWER MEASUREMENTS FOR SUPPORTED LTE TRANSMISSION MODES

G.1 Power Tuning Targets

Band	Modulation	Target Tuning Power in Head and Body-worn					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
LTE2500 (Band 7)	QPSK	N/A	N/A	23.5	23.5	23.5	23.5
	16QAM	N/A	N/A	22.5	22.5	22.5	22.5

Band	Modulation	Target Tuning Power in Wireless Router measurements					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
LTE2500 (Band 7)	QPSK	N/A	N/A	18.5	18.5	18.5	18.5
	16QAM	N/A	N/A	18.5	18.5	18.5	18.5

G.2 Conducted Power from the Samples used in the Testing

Type: RM-984; Serial number: 004402/47/822206/4, HW:0200 SW: 02028.00000.14224.06001 used for LTE2500 (Band7) for Head and Body-worn.

"Max Average Power (dBm)" column lists measured powers with MPR active. The "Reduced Power (dBm)" column lists measured powers with MPR and A-MPR active (as defined by 3GPP TS 36.101). A-MPR is not specified for LTE2500 (Band 7) in this specification (Table 6.2.4-1).

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
2511.7	20867	5	1	0	QPSK	23.4	-
2511.7	20867	5	1	12	QPSK	23.4	-
2511.7	20867	5	1	24	QPSK	23.4	-
2511.7	20867	5	12	0	QPSK	22.5	-
2511.7	20867	5	12	6	QPSK	22.5	-
2511.7	20867	5	12	13	QPSK	22.4	-
2511.7	20867	5	25	0	QPSK	22.4	-
2511.7	20867	5	1	0	16QAM	22.5	-
2511.7	20867	5	1	12	16QAM	22.5	-
2511.7	20867	5	1	24	16QAM	22.5	-
2511.7	20867	5	12	0	16QAM	21.3	-
2511.7	20867	5	12	6	16QAM	21.4	-
2511.7	20867	5	12	13	16QAM	21.4	-
2511.7	20867	5	25	0	16QAM	21.4	-

(Table continues)

(Table continues)

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
2535.0	21100	5	1	0	QPSK	23.3	-
2535.0	21100	5	1	12	QPSK	23.2	-
2535.0	21100	5	1	24	QPSK	23.2	-
2535.0	21100	5	12	0	QPSK	22.2	-
2535.0	21100	5	12	6	QPSK	22.2	-
2535.0	21100	5	12	13	QPSK	22.2	-
2535.0	21100	5	25	0	QPSK	22.3	-
2535.0	21100	5	1	0	16QAM	22.3	-
2535.0	21100	5	1	12	16QAM	22.3	-
2535.0	21100	5	1	24	16QAM	22.2	-
2535.0	21100	5	12	0	16QAM	21.2	-
2535.0	21100	5	12	6	16QAM	21.1	-
2535.0	21100	5	12	13	16QAM	21.1	-
2535.0	21100	5	25	0	16QAM	21.1	-
2558.3	21333	5	1	0	QPSK	23.7	-
2558.3	21333	5	1	12	QPSK	23.6	-
2558.3	21333	5	1	24	QPSK	23.6	-
2558.3	21333	5	12	0	QPSK	22.6	-
2558.3	21333	5	12	6	QPSK	22.6	-
2558.3	21333	5	12	13	QPSK	22.6	-
2558.3	21333	5	25	0	QPSK	22.6	-
2558.3	21333	5	1	0	16QAM	22.7	-
2558.3	21333	5	1	12	16QAM	22.7	-
2558.3	21333	5	1	24	16QAM	22.6	-
2558.3	21333	5	12	0	16QAM	21.5	-
2558.3	21333	5	12	6	16QAM	21.4	-
2558.3	21333	5	12	13	16QAM	21.4	-
2558.3	21333	5	25	0	16QAM	21.5	-
2511.7	20867	10	1	0	QPSK	23.5	-
2511.7	20867	10	1	24	QPSK	23.5	-
2511.7	20867	10	1	49	QPSK	23.4	-
2511.7	20867	10	25	0	QPSK	22.5	-
2511.7	20867	10	25	12	QPSK	22.5	-
2511.7	20867	10	25	25	QPSK	22.5	-
2511.7	20867	10	50	0	QPSK	22.5	-
2511.7	20867	10	1	0	16QAM	22.3	-
2511.7	20867	10	1	24	16QAM	22.2	-
2511.7	20867	10	1	49	16QAM	22.2	-
2511.7	20867	10	25	0	16QAM	21.4	-
2511.7	20867	10	25	12	16QAM	21.3	-
2511.7	20867	10	25	25	16QAM	21.3	-
2511.7	20867	10	50	0	16QAM	21.3	-

(Table continues)

(Table continues)

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
2535.0	21100	10	1	0	QPSK	23.3	-
2535.0	21100	10	1	24	QPSK	23.2	-
2535.0	21100	10	1	49	QPSK	23.3	-
2535.0	21100	10	25	0	QPSK	22.3	-
2535.0	21100	10	25	12	QPSK	22.3	-
2535.0	21100	10	25	25	QPSK	22.2	-
2535.0	21100	10	50	0	QPSK	22.3	-
2535.0	21100	10	1	0	16QAM	22.1	-
2535.0	21100	10	1	24	16QAM	22.0	-
2535.0	21100	10	1	49	16QAM	22.1	-
2535.0	21100	10	25	0	16QAM	21.1	-
2535.0	21100	10	25	12	16QAM	21.1	-
2535.0	21100	10	25	25	16QAM	21.1	-
2535.0	21100	10	50	0	16QAM	21.1	-
2558.3	21333	10	1	0	QPSK	23.5	-
2558.3	21333	10	1	24	QPSK	23.6	-
2558.3	21333	10	1	49	QPSK	23.7	-
2558.3	21333	10	25	0	QPSK	22.7	-
2558.3	21333	10	25	12	QPSK	22.6	-
2558.3	21333	10	25	25	QPSK	22.6	-
2558.3	21333	10	50	0	QPSK	22.6	-
2558.3	21333	10	1	0	16QAM	22.4	-
2558.3	21333	10	1	24	16QAM	22.4	-
2558.3	21333	10	1	49	16QAM	22.6	-
2558.3	21333	10	25	0	16QAM	21.5	-
2558.3	21333	10	25	12	16QAM	21.5	-
2558.3	21333	10	25	25	16QAM	21.4	-
2558.3	21333	10	50	0	16QAM	21.5	-
2511.7	20867	15	1	0	QPSK	23.5	-
2511.7	20867	15	1	36	QPSK	23.5	-
2511.7	20867	15	1	74	QPSK	23.4	-
2511.7	20867	15	37	0	QPSK	22.5	-
2511.7	20867	15	37	18	QPSK	22.5	-
2511.7	20867	15	37	38	QPSK	22.4	-
2511.7	20867	15	75	0	QPSK	22.5	-
2511.7	20867	15	1	0	16QAM	22.7	-
2511.7	20867	15	1	36	16QAM	22.6	-
2511.7	20867	15	1	74	16QAM	22.6	-
2511.7	20867	15	37	0	16QAM	21.4	-
2511.7	20867	15	37	18	16QAM	21.4	-
2511.7	20867	15	37	38	16QAM	21.2	-
2511.7	20867	15	75	0	16QAM	21.4	-

(Table continues)

(Table continues)

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
2535.0	21100	15	1	0	QPSK	23.3	-
2535.0	21100	15	1	36	QPSK	23.2	-
2535.0	21100	15	1	74	QPSK	23.4	-
2535.0	21100	15	37	0	QPSK	22.3	-
2535.0	21100	15	37	18	QPSK	22.2	-
2535.0	21100	15	37	38	QPSK	22.3	-
2535.0	21100	15	75	0	QPSK	22.3	-
2535.0	21100	15	1	0	16QAM	22.4	-
2535.0	21100	15	1	36	16QAM	22.4	-
2535.0	21100	15	1	74	16QAM	22.4	-
2535.0	21100	15	37	0	16QAM	21.2	-
2535.0	21100	15	37	18	16QAM	21.1	-
2535.0	21100	15	37	38	16QAM	21.1	-
2535.0	21100	15	75	0	16QAM	21.1	-
2558.3	21333	15	1	0	QPSK	23.5	-
2558.3	21333	15	1	36	QPSK	23.6	-
2558.3	21333	15	1	74	QPSK	23.8	-
2558.3	21333	15	37	0	QPSK	22.6	-
2558.3	21333	15	37	18	QPSK	22.6	-
2558.3	21333	15	37	38	QPSK	22.6	-
2558.3	21333	15	75	0	QPSK	22.6	-
2558.3	21333	15	1	0	16QAM	22.4	-
2558.3	21333	15	1	36	16QAM	22.4	-
2558.3	21333	15	1	74	16QAM	22.6	-
2558.3	21333	15	37	0	16QAM	21.5	-
2558.3	21333	15	37	18	16QAM	21.4	-
2558.3	21333	15	37	38	16QAM	21.5	-
2558.3	21333	15	75	0	16QAM	21.5	-
2511.7	20867	20	1	0	QPSK	23.6	-
2511.7	20867	20	1	49	QPSK	23.5	-
2511.7	20867	20	1	99	QPSK	23.5	-
2511.7	20867	20	50	0	QPSK	22.6	-
2511.7	20867	20	50	24	QPSK	22.5	-
2511.7	20867	20	50	50	QPSK	22.4	-
2511.7	20867	20	100	0	QPSK	22.6	-
2511.7	20867	20	1	0	16QAM	22.4	-
2511.7	20867	20	1	49	16QAM	22.4	-
2511.7	20867	20	1	99	16QAM	22.4	-
2511.7	20867	20	50	0	16QAM	21.5	-
2511.7	20867	20	50	24	16QAM	21.4	-
2511.7	20867	20	50	50	16QAM	21.3	-
2511.7	20867	20	100	0	16QAM	21.4	-

(Table continues)

(Table continues)

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
2535.0	21100	20	1	0	QPSK	23.4	-
2535.0	21100	20	1	49	QPSK	23.3	-
2535.0	21100	20	1	99	QPSK	23.4	-
2535.0	21100	20	50	0	QPSK	22.3	-
2535.0	21100	20	50	24	QPSK	22.3	-
2535.0	21100	20	50	50	QPSK	22.2	-
2535.0	21100	20	100	0	QPSK	22.3	-
2535.0	21100	20	1	0	16QAM	22.4	-
2535.0	21100	20	1	49	16QAM	22.3	-
2535.0	21100	20	1	99	16QAM	22.3	-
2535.0	21100	20	50	0	16QAM	21.2	-
2535.0	21100	20	50	24	16QAM	21.1	-
2535.0	21100	20	50	50	16QAM	21.0	-
2535.0	21100	20	100	0	16QAM	21.2	-
2558.3	21333	20	1	0	QPSK	23.5	-
2558.3	21333	20	1	49	QPSK	23.6	-
2558.3	21333	20	1	99	QPSK	23.8	-
2558.3	21333	20	50	0	QPSK	22.5	-
2558.3	21333	20	50	24	QPSK	22.6	-
2558.3	21333	20	50	50	QPSK	22.6	-
2558.3	21333	20	100	0	QPSK	22.6	-
2558.3	21333	20	1	0	16QAM	22.6	-
2558.3	21333	20	1	49	16QAM	22.6	-
2558.3	21333	20	1	99	16QAM	22.8	-
2558.3	21333	20	50	0	16QAM	21.3	-
2558.3	21333	20	50	24	16QAM	21.5	-
2558.3	21333	20	50	50	16QAM	21.5	-
2558.3	21333	20	100	0	16QAM	21.5	-

Type: RM-984; Serial number: 004402/47/822229/6, HW:0200 SW: 02028.00000.14224.06001 used for LTE2500 (Band7) for Wireless Router SAR measurements.

"Max Average Power (dBm)" column lists measured powers with MPR active. The "Reduced Power (dBm)" column lists measured powers with MPR and A-MPR active (as defined by 3GPP TS 36.101). A-MPR is not specified for LTE2500 (Band 7) in this specification (Table 6.2.4-1).

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
2511.7	20867	5	1	0	QPSK	18.6	-
2511.7	20867	5	1	12	QPSK	18.6	-
2511.7	20867	5	1	24	QPSK	18.5	-
2511.7	20867	5	12	0	QPSK	18.7	-
2511.7	20867	5	12	6	QPSK	18.6	-
2511.7	20867	5	12	13	QPSK	18.5	-
2511.7	20867	5	25	0	QPSK	18.6	-
2511.7	20867	5	1	0	16QAM	18.5	-
2511.7	20867	5	1	12	16QAM	18.7	-
2511.7	20867	5	1	24	16QAM	18.4	-
2511.7	20867	5	12	0	16QAM	18.6	-
2511.7	20867	5	12	6	16QAM	18.6	-
2511.7	20867	5	12	13	16QAM	18.5	-
2511.7	20867	5	25	0	16QAM	18.7	-

(Table continues)

(Table continues)

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
2535.0	21100	5	1	0	QPSK	18.5	-
2535.0	21100	5	1	12	QPSK	18.4	-
2535.0	21100	5	1	24	QPSK	18.4	-
2535.0	21100	5	12	0	QPSK	18.4	-
2535.0	21100	5	12	6	QPSK	18.3	-
2535.0	21100	5	12	13	QPSK	18.4	-
2535.0	21100	5	25	0	QPSK	18.4	-
2535.0	21100	5	1	0	16QAM	18.2	-
2535.0	21100	5	1	12	16QAM	18.2	-
2535.0	21100	5	1	24	16QAM	18.2	-
2535.0	21100	5	12	0	16QAM	18.4	-
2535.0	21100	5	12	6	16QAM	18.4	-
2535.0	21100	5	12	13	16QAM	18.4	-
2535.0	21100	5	25	0	16QAM	18.5	-
2558.3	21333	5	1	0	QPSK	18.8	-
2558.3	21333	5	1	12	QPSK	18.8	-
2558.3	21333	5	1	24	QPSK	18.7	-
2558.3	21333	5	12	0	QPSK	18.8	-
2558.3	21333	5	12	6	QPSK	18.7	-
2558.3	21333	5	12	13	QPSK	18.7	-
2558.3	21333	5	25	0	QPSK	18.7	-
2558.3	21333	5	1	0	16QAM	18.6	-
2558.3	21333	5	1	12	16QAM	18.6	-
2558.3	21333	5	1	24	16QAM	18.6	-
2558.3	21333	5	12	0	16QAM	18.8	-
2558.3	21333	5	12	6	16QAM	18.8	-
2558.3	21333	5	12	13	16QAM	18.8	-
2558.3	21333	5	25	0	16QAM	18.8	-
2511.7	20867	10	1	0	QPSK	18.7	-
2511.7	20867	10	1	24	QPSK	18.6	-
2511.7	20867	10	1	49	QPSK	18.6	-
2511.7	20867	10	25	0	QPSK	18.6	-
2511.7	20867	10	25	12	QPSK	18.6	-
2511.7	20867	10	25	25	QPSK	18.6	-
2511.7	20867	10	50	0	QPSK	18.6	-
2511.7	20867	10	1	0	16QAM	18.8	-
2511.7	20867	10	1	24	16QAM	18.7	-
2511.7	20867	10	1	49	16QAM	18.6	-
2511.7	20867	10	25	0	16QAM	18.6	-
2511.7	20867	10	25	12	16QAM	18.6	-
2511.7	20867	10	25	25	16QAM	18.5	-
2511.7	20867	10	50	0	16QAM	18.7	-

(Table continues)

(Table continues)

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
2535.0	21100	10	1	0	QPSK	18.5	-
2535.0	21100	10	1	24	QPSK	18.4	-
2535.0	21100	10	1	49	QPSK	18.4	-
2535.0	21100	10	25	0	QPSK	18.4	-
2535.0	21100	10	25	12	QPSK	18.4	-
2535.0	21100	10	25	25	QPSK	18.4	-
2535.0	21100	10	50	0	QPSK	18.4	-
2535.0	21100	10	1	0	16QAM	18.5	-
2535.0	21100	10	1	24	16QAM	18.5	-
2535.0	21100	10	1	49	16QAM	18.4	-
2535.0	21100	10	25	0	16QAM	18.4	-
2535.0	21100	10	25	12	16QAM	18.3	-
2535.0	21100	10	25	25	16QAM	18.3	-
2535.0	21100	10	50	0	16QAM	18.4	-
2558.3	21333	10	1	0	QPSK	18.7	-
2558.3	21333	10	1	24	QPSK	18.8	-
2558.3	21333	10	1	49	QPSK	18.7	-
2558.3	21333	10	25	0	QPSK	18.7	-
2558.3	21333	10	25	12	QPSK	18.7	-
2558.3	21333	10	25	25	QPSK	18.7	-
2558.3	21333	10	50	0	QPSK	18.7	-
2558.3	21333	10	1	0	16QAM	18.8	-
2558.3	21333	10	1	24	16QAM	18.8	-
2558.3	21333	10	1	49	16QAM	18.8	-
2558.3	21333	10	25	0	16QAM	18.8	-
2558.3	21333	10	25	12	16QAM	18.7	-
2558.3	21333	10	25	25	16QAM	18.7	-
2558.3	21333	10	50	0	16QAM	18.7	-
2511.7	20867	15	1	0	QPSK	18.6	-
2511.7	20867	15	1	36	QPSK	18.6	-
2511.7	20867	15	1	74	QPSK	18.5	-
2511.7	20867	15	37	0	QPSK	18.6	-
2511.7	20867	15	37	18	QPSK	18.6	-
2511.7	20867	15	37	38	QPSK	18.6	-
2511.7	20867	15	75	0	QPSK	18.6	-
2511.7	20867	15	1	0	16QAM	18.3	-
2511.7	20867	15	1	36	16QAM	18.2	-
2511.7	20867	15	1	74	16QAM	18.1	-
2511.7	20867	15	37	0	16QAM	18.6	-
2511.7	20867	15	37	18	16QAM	18.6	-
2511.7	20867	15	37	38	16QAM	18.6	-
2511.7	20867	15	75	0	16QAM	18.6	-

(Table continues)

(Table continues)

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
2535.0	21100	15	1	0	QPSK	18.4	-
2535.0	21100	15	1	36	QPSK	18.3	-
2535.0	21100	15	1	74	QPSK	18.3	-
2535.0	21100	15	37	0	QPSK	18.4	-
2535.0	21100	15	37	18	QPSK	18.4	-
2535.0	21100	15	37	38	QPSK	18.3	-
2535.0	21100	15	75	0	QPSK	18.3	-
2535.0	21100	15	1	0	16QAM	18.0	-
2535.0	21100	15	1	36	16QAM	18.0	-
2535.0	21100	15	1	74	16QAM	18.0	-
2535.0	21100	15	37	0	16QAM	18.4	-
2535.0	21100	15	37	18	16QAM	18.4	-
2535.0	21100	15	37	38	16QAM	18.3	-
2535.0	21100	15	75	0	16QAM	18.4	-
2558.3	21333	15	1	0	QPSK	18.7	-
2558.3	21333	15	1	36	QPSK	18.7	-
2558.3	21333	15	1	74	QPSK	18.7	-
2558.3	21333	15	37	0	QPSK	18.8	-
2558.3	21333	15	37	18	QPSK	18.7	-
2558.3	21333	15	37	38	QPSK	18.7	-
2558.3	21333	15	75	0	QPSK	18.7	-
2558.3	21333	15	1	0	16QAM	18.4	-
2558.3	21333	15	1	36	16QAM	18.4	-
2558.3	21333	15	1	74	16QAM	18.3	-
2558.3	21333	15	37	0	16QAM	18.7	-
2558.3	21333	15	37	18	16QAM	18.7	-
2558.3	21333	15	37	38	16QAM	18.7	-
2558.3	21333	15	75	0	16QAM	18.7	-
2511.7	20867	20	1	0	QPSK	18.7	-
2511.7	20867	20	1	49	QPSK	18.6	-
2511.7	20867	20	1	99	QPSK	18.5	-
2511.7	20867	20	50	0	QPSK	18.7	-
2511.7	20867	20	50	24	QPSK	18.6	-
2511.7	20867	20	50	50	QPSK	18.6	-
2511.7	20867	20	100	0	QPSK	18.6	-
2511.7	20867	20	1	0	16QAM	18.5	-
2511.7	20867	20	1	49	16QAM	18.5	-
2511.7	20867	20	1	99	16QAM	18.4	-
2511.7	20867	20	50	0	16QAM	18.7	-
2511.7	20867	20	50	24	16QAM	18.6	-
2511.7	20867	20	50	50	16QAM	18.5	-
2511.7	20867	20	100	0	16QAM	18.5	-

(Table continues)

(Table continues)

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
2535.0	21100	20	1	0	QPSK	18.4	-
2535.0	21100	20	1	49	QPSK	18.3	-
2535.0	21100	20	1	99	QPSK	18.4	-
2535.0	21100	20	50	0	QPSK	18.4	-
2535.0	21100	20	50	24	QPSK	18.4	-
2535.0	21100	20	50	50	QPSK	18.4	-
2535.0	21100	20	100	0	QPSK	18.3	-
2535.0	21100	20	1	0	16QAM	18.6	-
2535.0	21100	20	1	49	16QAM	18.4	-
2535.0	21100	20	1	99	16QAM	18.5	-
2535.0	21100	20	50	0	16QAM	18.4	-
2535.0	21100	20	50	24	16QAM	18.4	-
2535.0	21100	20	50	50	16QAM	18.3	-
2535.0	21100	20	100	0	16QAM	18.3	-
2558.3	21333	20	1	0	QPSK	18.6	-
2558.3	21333	20	1	49	QPSK	18.7	-
2558.3	21333	20	1	99	QPSK	18.7	-
2558.3	21333	20	50	0	QPSK	18.8	-
2558.3	21333	20	50	24	QPSK	18.7	-
2558.3	21333	20	50	50	QPSK	18.7	-
2558.3	21333	20	100	0	QPSK	18.7	-
2558.3	21333	20	1	0	16QAM	18.8	-
2558.3	21333	20	1	49	16QAM	18.8	-
2558.3	21333	20	1	99	16QAM	18.8	-
2558.3	21333	20	50	0	16QAM	18.8	-
2558.3	21333	20	50	24	16QAM	18.7	-
2558.3	21333	20	50	50	16QAM	18.6	-
2558.3	21333	20	100	0	16QAM	18.7	-

APPENDIX H: CONDUCTED POWER MEASUREMENTS FOR SUPPORTED GSM/GPRS/EGPRS TRANSMISSION MODES

H.1 Power Tuning Targets

GSM/GPRS/EGPRS 850 Head, Body-worn and Wireless Router Body			
Slot configuration	Low channel	Mid channel	High channel
GSM 1-slot	32.5	32.5	32.5
GPRS 2-slot	30.5	30.5	30.5
GPRS 3-slot	28.0	28.0	28.0
GPRS 4-slot	27.0	27.0	27.0
EGRPS 1-slot	27.0	27.0	27.0
EGPRS 2-slot	27.0	27.0	27.0
EGPRS 3-slot	25.0	25.0	25.0
EGPRS 4-slot	24.0	24.0	24.0

GSM/GPRS/EGPRS 1900 Head and Body-worn			
Slot configuration	Low channel	Mid channel	High channel
GSM 1-slot	30.0	30.0	30.0
GPRS 2-slot	27.5	27.5	27.5
GPRS 3-slot	26.5	26.5	26.5
GPRS 4-slot	25.0	25.0	25.0
EGRPS 1-slot	26.0	26.0	26.0
EGPRS 2-slot	26.0	26.0	26.0
EGPRS 3-slot	24.0	24.0	24.0
EGPRS 4-slot	23.0	23.0	23.0

GSM/GPRS/EGPRS 1900 Wireless Router Body			
Slot configuration	Low channel	Mid channel	High channel
GSM 1-slot	28.0	28.0	28.0
GPRS 2-slot	24.5	24.5	24.5
GPRS 3-slot	22.7	22.7	22.7
GPRS 4-slot	21.5	21.5	21.5
EGRPS 1-slot	26.0	26.0	26.0
EGPRS 2-slot	24.5	24.5	24.5
EGPRS 3-slot	22.7	22.7	22.7
EGPRS 4-slot	21.5	21.5	21.5

H.2 Conducted Power from the Samples used in the Testing

Type: RM-984; Serial number: 004402/47/822208/0, HW:0200 used for GSM/GPRS/EGPRS850 Head, Body-worn and Wireless Router SAR measurements.

GSM/GPRS/EGPRS 850 Head, Body-worn and Wireless Router			
Slot configuration	CH 128 824.2 MHz	CH 190 836.6 MHz	CH 251 848.8 MHz
GSM 1-slot	32.3	32.5	32.6
GPRS 2-slot	30.7	30.0	30.7
GPRS 3-slot	28.1	27.5	28.2
GPRS 4-slot	27.1	26.5	27.2
EGRPS 1-slot	27.4	26.7	27.3
EGPRS 2-slot	27.4	26.6	27.3
EGPRS 3-slot	25.2	24.5	25.2
EGPRS 4-slot	24.1	23.6	24.2

Type: RM-984; Serial number: 004402/47/822204/9, HW:0200 used for GSM/GPRS/EGPRS1900 Head and Body-worn.

GSM/GPRS/EGPRS 1900 Head and Body-worn			
Slot configuration	CH 512 1850.2 MHz	CH 661 1880.0 MHz	CH 810 1909.8 MHz
GSM 1-slot	30.0	30.1	30.2
GPRS 2-slot	27.6	27.9	27.7
GPRS 3-slot	26.5	26.8	26.7
GPRS 4-slot	25.1	25.2	25.2
EGRPS 1-slot	26.2	26.3	26.2
EGPRS 2-slot	26.2	26.2	26.1
EGPRS 3-slot	24.0	24.2	24.0
EGPRS 4-slot	23.2	23.3	23.2

Type: RM-984; Serial number: 004402/47/822229/6, HW:0200 used for GSM/GPRS/EGPRS1900 Wireless Router SAR measurements.

GSM/GPRS/EGPRS 1900 Wireless Router			
Slot configuration	CH 512 1850.2 MHz	CH 661 1880.0 MHz	CH 810 1909.8 MHz
GSM 1-slot	27.8	28.0	27.9
GPRS 2-slot	24.3	24.5	24.3
GPRS 3-slot	22.5	22.6	22.6
GPRS 4-slot	21.1	21.4	21.2
EGRPS 1-slot	25.9	26.0	25.9
EGPRS 2-slot	24.8	24.9	24.8
EGPRS 3-slot	22.9	23.1	22.9
EGPRS 4-slot	21.5	21.7	21.5

APPENDIX I: CONDUCTED POWER MEASUREMENTS FOR SUPPORTED WCDMA TRANSMISSION MODES

I.1 Power Tuning Targets

WCDMA 850 (Band 5) Head, Body-worn and Wireless Router			
Mode	Low channel	Mid channel	High channel
WCDMA	23.5	23.5	23.5

WCDMA1900 (Band 2) Head and Body-worn			
Mode	Low channel	Mid channel	High channel
WCDMA	23.5	23.5	23.5

WCDMA1900 (Band 2) Wireless Router			
Mode	Low channel	Mid channel	High channel
WCDMA	18.0	18.0	18.0

I.2 Conducted Power from the Samples used in the Testing

Type: RM-984; Serial number: 004402/47/822208/0, HW: 0200 used for WCDMA850 (Band 5) Head, Body-worn and Wireless router SAR measurements

WCDMA850 (Band 5)			
Mode	Low channel	Mid channel	High channel
WCDMA	23.4	23.4	23.4

Type: RM-984; Serial number: 004402/47/822204/9, HW: 0200 used for WCDMA1900 (Band 2) Head and Body-worn measurements

WCDMA1900 (Band 2)			
Mode	Low channel	Mid channel	High channel

WCDMA	23.4	23.6	23.5

Type: RM-984; Serial number: 004402/47/822229/6, HW: 0200 used for WCDMA1900 (Band 2) Wireless Router measurements

WCDMA1900 (Band 2)			
Mode	Low channel	Mid channel	High channel
WCDMA	18.0	18.2	18.0

WCDMA and HSUPA Subtest mode conducted powers, measured from a separate, fully representative sample are presented in Appendix D.

APPENDIX J: CONDUCTED POWER RESULTS FOR WLAN2450 AND WLAN5000

J.1 Power Tuning Targets

WLAN 2.4 GHz: 20 MHz channel bandwidth								
Standard	Modulation	Data speed [MBPS]	CH 1	CH 2	CH 6	CH 7	CH 10	CH 11
802.11b	BPSK	1	18.0	18.0	18.0	18.0	18.0	18.0
802.11b	QPSK	2	18.0	18.0	18.0	18.0	18.0	18.0
802.11b	QPSK	5.5	18.0	18.0	18.0	18.0	18.0	18.0
802.11b	QPSK	11	18.0	18.0	18.0	18.0	18.0	18.0
802.11g	BPSK	6	16.0	16.0	16.0	16.0	16.0	16.0
802.11g	BPSK	9	16.0	16.0	16.0	16.0	16.0	16.0
802.11g	QPSK	12	15.0	15.0	15.0	15.0	15.0	15.0
802.11g	QPSK	18	15.0	15.0	15.0	15.0	15.0	15.0
802.11g	16QAM	24	14.0	14.0	14.0	14.0	14.0	14.0
802.11g	16QAM	36	14.0	14.0	14.0	14.0	14.0	14.0
802.11g	64QAM	48	13.0	13.0	13.0	13.0	13.0	13.0
802.11g	64QAM	54	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	BPSK	6.5 / 7.25	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	QPSK	13.0 / 14.4	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	QPSK	19.5 / 21.7	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	16QAM	26.0 / 28.9	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	16QAM	39.0 / 43.3	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	52.0 / 57.8	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	58.5 / 65.0	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	65.0 / 72.2	13.0	13.0	13.0	13.0	13.0	13.0

Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 20 MHz Tuning Targets					
			36	40	44	48	52	56
802.11a	BPSK	6	16.0	16.0	16.0	16.0	16.0	16.0
802.11a	BPSK	9	16.0	16.0	16.0	16.0	16.0	16.0
802.11a	QPSK	12	15.0	15.0	15.0	15.0	15.0	15.0
802.11a	QPSK	18	15.0	15.0	15.0	15.0	15.0	15.0
802.11a	16QAM	24	14.0	14.0	14.0	14.0	14.0	14.0
802.11a	16QAM	36	14.0	14.0	14.0	14.0	14.0	14.0
802.11a	64QAM	48	13.0	13.0	13.0	13.0	13.0	13.0
802.11a	64QAM	54	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	BPSK	6.5 / 7.25	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	QPSK	13.0 / 14.4	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	QPSK	19.5 / 21.7	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	16QAM	26.0 / 28.9	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	16QAM	39.0 / 43.3	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	52.0 / 57.8	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	58.5 / 65.0	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	65.0 / 72.2	13.0	13.0	13.0	13.0	13.0	13.0
Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 20 MHz Tuning Targets					
			60	64	100	104	108	112
802.11a	BPSK	6	16.0	16.0	16.0	16.0	16.0	16.0
802.11a	BPSK	9	16.0	16.0	16.0	16.0	16.0	16.0
802.11a	QPSK	12	15.0	15.0	15.0	15.0	15.0	15.0
802.11a	QPSK	18	15.0	15.0	15.0	15.0	15.0	15.0
802.11a	16QAM	24	14.0	14.0	14.0	14.0	14.0	14.0
802.11a	16QAM	36	14.0	14.0	14.0	14.0	14.0	14.0
802.11a	64QAM	48	13.0	13.0	13.0	13.0	13.0	13.0
802.11a	64QAM	54	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	BPSK	6.5 / 7.25	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	QPSK	13.0 / 14.4	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	QPSK	19.5 / 21.7	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	16QAM	26.0 / 28.9	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	16QAM	39.0 / 43.3	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	52.0 / 57.8	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	58.5 / 65.0	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	65.0 / 72.2	13.0	13.0	13.0	13.0	13.0	13.0

(Table continues)

(Table continues)

Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 20 MHz Tuning Targets					
			116	120	124	128	132	136
802.11a	BPSK	6	16.0	16.0	16.0	16.0	16.0	16.0
802.11a	BPSK	9	16.0	16.0	16.0	16.0	16.0	16.0
802.11a	QPSK	12	15.0	15.0	15.0	15.0	15.0	15.0
802.11a	QPSK	18	15.0	15.0	15.0	15.0	15.0	15.0
802.11a	16QAM	24	14.0	14.0	14.0	14.0	14.0	14.0
802.11a	16QAM	36	14.0	14.0	14.0	14.0	14.0	14.0
802.11a	64QAM	48	13.0	13.0	13.0	13.0	13.0	13.0
802.11a	64QAM	54	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	BPSK	6.5 / 7.25	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	QPSK	13.0 / 14.4	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	QPSK	19.5 / 21.7	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	16QAM	26.0 / 28.9	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	16QAM	39.0 / 43.3	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	52.0 / 57.8	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	58.5 / 65.0	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	65.0 / 72.2	13.0	13.0	13.0	13.0	13.0	13.0
Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 20 MHz Tuning Targets					
			140	149	153	157	161	165
802.11a	BPSK	6	16.0	16.0	16.0	16.0	16.0	16.0
802.11a	BPSK	9	16.0	16.0	16.0	16.0	16.0	16.0
802.11a	QPSK	12	15.0	15.0	15.0	15.0	15.0	15.0
802.11a	QPSK	18	15.0	15.0	15.0	15.0	15.0	15.0
802.11a	16QAM	24	14.0	14.0	14.0	14.0	14.0	14.0
802.11a	16QAM	36	14.0	14.0	14.0	14.0	14.0	14.0
802.11a	64QAM	48	13.0	13.0	13.0	13.0	13.0	13.0
802.11a	64QAM	54	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	BPSK	6.5 / 7.25	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	QPSK	13.0 / 14.4	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	QPSK	19.5 / 21.7	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	16QAM	26.0 / 28.9	14.0	14.0	14.0	14.0	14.0	14.0
802.11n	16QAM	39.0 / 43.3	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	52.0 / 57.8	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	58.5 / 65.0	13.0	13.0	13.0	13.0	13.0	13.0
802.11n	64QAM	65.0 / 72.2	13.0	13.0	13.0	13.0	13.0	13.0

(Table continues)

(Table continues)

Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 40 MHz Tuning Targets						
			38 (36+40)	42 (40+44)	46 (44+48)	50 (48+52)	54 (52+56)	58 (56+60)	62 (60+64)
802.11n	BPSK	13.5 / 15.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
802.11n	QPSK	27.0 / 30.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
802.11n	QPSK	40.5 / 45.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
802.11n	16QAM	54.0 / 60.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
802.11n	16QAM	81.0 / 90.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
802.11n	64QAM	108.0 / 120.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
802.11n	64QAM	121.5 / 135.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
802.11n	64QAM	135.0 / 150.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 40 MHz Tuning Targets					
			102 (100+104)	106 (104+108)	110 (108+112)	114 (112+116)	118 (116+120)	122 (120+124)
802.11n	BPSK	13.5 / 15.0	10.0	10.0	10.0	10.0	10.0	10.0
802.11n	QPSK	27.0 / 30.0	10.0	10.0	10.0	10.0	10.0	10.0
802.11n	QPSK	40.5 / 45.0	10.0	10.0	10.0	10.0	10.0	10.0
802.11n	16QAM	54.0 / 60.0	10.0	10.0	10.0	10.0	10.0	10.0
802.11n	16QAM	81.0 / 90.0	10.0	10.0	10.0	10.0	10.0	10.0
802.11n	64QAM	108.0 / 120.0	10.0	10.0	10.0	10.0	10.0	10.0
802.11n	64QAM	121.5 / 135.0	10.0	10.0	10.0	10.0	10.0	10.0
802.11n	64QAM	135.0 / 150.0	10.0	10.0	10.0	10.0	10.0	10.0

Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 40 MHz Tuning Targets			
			126 (124+128)	130 (128+132)	134 (132+136)	138 (136+140)
802.11n	BPSK	13.5 / 15.0	10.0	10.0	10.0	10.0
802.11n	QPSK	27.0 / 30.0	10.0	10.0	10.0	10.0
802.11n	QPSK	40.5 / 45.0	10.0	10.0	10.0	10.0
802.11n	16QAM	54.0 / 60.0	10.0	10.0	10.0	10.0
802.11n	16QAM	81.0 / 90.0	10.0	10.0	10.0	10.0
802.11n	64QAM	108.0 / 120.0	10.0	10.0	10.0	10.0
802.11n	64QAM	121.5 / 135.0	10.0	10.0	10.0	10.0
802.11n	64QAM	135.0 / 150.0	10.0	10.0	10.0	10.0

(Table continues)

(Table continues)

Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 40 MHz Tuning Targets			
			151 (149+153)	155 (153+157)	159 (157+161)	163 (161+165)
802.11n	BPSK	13.5 / 15.0	10.0	10.0	10.0	10.0
802.11n	QPSK	27.0 / 30.0	10.0	10.0	10.0	10.0
802.11n	QPSK	40.5 / 45.0	10.0	10.0	10.0	10.0
802.11n	16QAM	54.0 / 60.0	10.0	10.0	10.0	10.0
802.11n	16QAM	81.0 / 90.0	10.0	10.0	10.0	10.0
802.11n	64QAM	108.0 / 120.0	10.0	10.0	10.0	10.0
802.11n	64QAM	121.5 / 135.0	10.0	10.0	10.0	10.0
802.11n	64QAM	135.0 / 150.0	10.0	10.0	10.0	10.0

J.2 Conducted Power from the Samples used in the Testing

Type: RM-984; SN: 004402/47/822255/1; HW:0200; SW: 02028.00000.14224.06001 used for WLAN2450 for SAR Head, Body-worn and Wireless Router measurements.

WLAN 2.4 GHz: 20 MHz channel bandwidth								
Standard	Modulation	Data speed [MBPS]	CH 1	CH 2	CH 6	CH 7	CH 10	CH 11
802.11b	BPSK	1	18.3	18.3	18.4	18.4	18.4	18.4
802.11b	QPSK	2	18.4	18.5	18.4	18.6	18.4	18.4
802.11b	QPSK	5.5	18.7	18.8	18.7	18.6	18.7	18.6
802.11b	QPSK	11	18.6	18.5	18.4	18.6	18.4	18.4
802.11g	BPSK	6	16.0	16.1	16.0	16.0	16.1	16.0
802.11g	BPSK	9	16.2	16.1	16.0	16.2	16.1	16.0
802.11g	QPSK	12	15.1	15.1	14.9	15.1	15.0	15.2
802.11g	QPSK	18	15.1	15.1	15.2	15.1	15.0	15.2
802.11g	16QAM	24	14.2	14.0	14.1	14.2	14.2	14.0
802.11g	16QAM	36	14.0	14.1	14.0	14.1	13.9	14.0
802.11g	64QAM	48	13.2	13.2	13.1	13.2	13.0	13.0
802.11g	64QAM	54	13.2	12.9	13.0	13.2	13.3	13.1
802.11n	BPSK	6.5 / 7.25	14.1	14.0	14.1	13.9	14.0	14.2
802.11n	QPSK	13.0 / 14.4	14.3	14.1	14.2	14.2	14.0	14.1
802.11n	QPSK	19.5 / 21.7	14.1	14.1	14.2	14.0	14.0	14.2
802.11n	16QAM	26.0 / 28.9	14.1	14.1	14.0	14.0	14.0	13.9
802.11n	16QAM	39.0 / 43.3	13.2	13.0	13.0	13.0	13.1	13.0
802.11n	64QAM	52.0 / 57.8	13.2	13.3	13.0	13.0	13.2	13.4
802.11n	64QAM	58.5 / 65.0	13.3	13.3	13.2	13.1	13.0	13.2
802.11n	64QAM	65.0 / 72.2	13.0	13.1	13.0	13.0	13.1	13.3

Type: RM-984; Serial number: 004402/47/822207/2; HW:0200; SW: 02028.00000.14224.06001 used for WLAN5000 Head and Body-worn measurements

Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 20 MHz channel bandwidth: Measured values					
			36	40	44	48	52	56
802.11a	BPSK	6	15.8	16.1	16.0	15.9	16.1	16.0
802.11a	BPSK	9	15.8	15.8	16.0	16.1	16.1	16.0
802.11a	QPSK	12	15.1	15.0	15.2	15.1	15.0	15.2
802.11a	QPSK	18	15.1	15.0	15.2	15.1	15.0	15.2
802.11a	16QAM	24	13.9	13.8	14.1	13.8	14.1	14.0
802.11a	16QAM	36	13.9	13.9	14.1	14.0	14.2	14.1
802.11a	64QAM	48	13.1	12.9	12.8	13.0	12.9	13.1
802.11a	64QAM	54	13.0	13.0	12.8	13.0	12.9	13.3
802.11n	BPSK	6.5 / 7.25	14.2	14.1	14.0	14.2	13.8	14.1
802.11n	QPSK	13.0 / 14.4	14.3	14.2	14.0	14.3	14.2	14.1
802.11n	QPSK	19.5 / 21.7	14.3	14.2	14.1	14.3	14.2	14.1
802.11n	16QAM	26.0 / 28.9	14.2	14.2	14.1	14.3	14.2	14.1
802.11n	16QAM	39.0 / 43.3	13.1	13.1	13.1	13.0	13.0	13.1
802.11n	64QAM	52.0 / 57.8	13.2	12.9	12.8	13.1	13.0	13.3
802.11n	64QAM	58.5 / 65.0	13.1	13.1	13.3	13.1	13.1	13.3
802.11n	64QAM	65.0 / 72.2	13.1	13.0	13.2	13.2	13.1	12.9

(Table continues)

Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 20 MHz channel bandwidth: Measured values					
			60	64	100	104	108	112
802.11a	BPSK	6	16.0	16.1	16.1	16.1	16.1	16.1
802.11a	BPSK	9	16.0	16.1	16.1	16.2	16.1	16.1
802.11a	QPSK	12	15.0	15.0	15.0	15.0	15.3	15.0
802.11a	QPSK	18	15.0	15.1	15.0	15.1	15.1	15.1
802.11a	16QAM	24	14.0	13.8	14.2	14.2	14.2	14.1
802.11a	16QAM	36	14.1	13.8	14.0	14.3	14.3	14.2
802.11a	64QAM	48	12.8	13.0	13.3	13.0	13.3	12.9
802.11a	64QAM	54	12.9	12.9	12.8	13.5	13.3	13.4
802.11n	BPSK	6.5 / 7.25	14.1	13.9	14.1	14.2	14.2	14.2
802.11n	QPSK	13.0 / 14.4	14.1	13.9	14.2	14.3	14.2	14.2
802.11n	QPSK	19.5 / 21.7	13.8	14.3	14.2	14.3	14.3	14.2
802.11n	16QAM	26.0 / 28.9	14.1	14.0	14.2	14.3	14.2	14.2
802.11n	16QAM	39.0 / 43.3	12.9	13.1	13.3	13.4	13.0	13.1
802.11n	64QAM	52.0 / 57.8	12.9	13.0	12.9	13.4	13.1	13.0
802.11n	64QAM	58.5 / 65.0	13.0	13.0	12.9	13.0	13.1	13.0
802.11n	64QAM	65.0 / 72.2	13.0	13.1	12.9	13.0	13.0	13.1

Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 20 MHz channel bandwidth: Measured values					
			116	120	124	128	132	136
802.11a	BPSK	6	16.1	16.1	16.1	16.0	15.9	16.2
802.11a	BPSK	9	16.1	16.1	16.1	16.0	15.9	16.1
802.11a	QPSK	12	15.3	15.0	15.0	15.3	15.2	15.1
802.11a	QPSK	18	15.3	15.1	15.1	15.0	15.2	15.2
802.11a	16QAM	24	14.1	14.2	14.2	14.1	14.0	14.0
802.11a	16QAM	36	14.2	14.2	13.8	14.1	14.0	14.0
802.11a	64QAM	48	13.3	13.0	13.0	12.8	13.2	13.1
802.11a	64QAM	54	12.9	13.3	12.9	13.3	13.2	13.1
802.11n	BPSK	6.5 / 7.25	14.1	14.2	14.2	14.1	14.4	14.0
802.11n	QPSK	13.0 / 14.4	14.2	14.3	14.2	14.2	14.0	14.0
802.11n	QPSK	19.5 / 21.7	14.2	14.3	14.3	14.2	14.1	14.0
802.11n	16QAM	26.0 / 28.9	14.2	14.2	14.3	14.2	14.1	14.1
802.11n	16QAM	39.0 / 43.3	12.9	12.9	13.0	13.3	13.2	13.2
802.11n	64QAM	52.0 / 57.8	13.7	13.0	13.1	13.0	12.8	13.2
802.11n	64QAM	58.5 / 65.0	12.9	13.0	13.1	13.0	13.3	12.8
802.11n	64QAM	65.0 / 72.2	13.4	13.0	13.1	13.4	12.9	13.2

(Table continues)

(Table continues)

Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 20 MHz channel bandwidth: Measured values					
			140	149	153	157	161	165
802.11a	BPSK	6	16.1	15.9	16.0	16.0	15.9	16.0
802.11a	BPSK	9	16.1	16.0	16.0	16.0	15.9	16.1
802.11a	QPSK	12	15.1	15.2	15.2	15.2	15.1	15.3
802.11a	QPSK	18	15.2	15.2	15.3	15.2	15.2	15.0
802.11a	16QAM	24	14.0	14.2	14.3	14.0	14.2	14.1
802.11a	16QAM	36	14.0	14.0	14.0	14.5	14.0	14.2
802.11a	64QAM	48	13.1	13.0	13.4	13.1	13.1	13.2
802.11a	64QAM	54	13.2	13.1	13.4	13.2	13.1	12.8
802.11n	BPSK	6.5 / 7.25	14.0	14.3	14.4	14.4	14.3	14.2
802.11n	QPSK	13.0 / 14.4	14.0	14.3	14.4	14.0	14.3	14.2
802.11n	QPSK	19.5 / 21.7	14.0	14.4	14.0	14.1	14.4	14.2
802.11n	16QAM	26.0 / 28.9	14.4	14.4	14.1	14.4	14.0	14.2
802.11n	16QAM	39.0 / 43.3	13.2	13.2	13.5	13.1	13.0	13.3
802.11n	64QAM	52.0 / 57.8	13.2	13.2	13.6	13.2	13.1	13.4
802.11n	64QAM	58.5 / 65.0	13.2	13.2	13.6	13.2	13.1	13.4
802.11n	64QAM	65.0 / 72.2	12.9	13.1	13.5	13.1	13.2	13.4

Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 40 MHz channel bandwidth: Measured values						
			38 (36+40)	42 (40+44)	46 (44+48)	50 (48+52)	54 (52+56)	58 (56+60)	62 (60+64)
802.11n	BPSK	13.5 / 15.0	8.9	8.9	8.8	8.9	8.8	8.8	8.9
802.11n	QPSK	27.0 / 30.0	8.9	9.0	8.9	8.9	9.2	9.1	8.9
802.11n	QPSK	40.5 / 45.0	8.9	9.0	8.9	9.0	8.9	8.9	8.9
802.11n	16QAM	54.0 / 60.0	9.0	8.7	8.9	8.9	8.9	10.0	9.0
802.11n	16QAM	81.0 / 90.0	8.9	9.0	8.9	9.0	8.9	8.9	8.9
802.11n	64QAM	108.0 / 120.0	8.9	9.0	8.9	9.0	8.9	8.9	8.6
802.11n	64QAM	121.5 / 135.0	8.9	9.1	9.0	9.0	8.9	8.9	8.9
802.11n	64QAM	135.0 / 150.0	8.7	8.7	9.0	9.0	8.9	9.0	9.0

(Table continues)

(Table continues)

Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 40 MHz channel bandwidth: Measured values					
			102 (100+104)	106 (104+108)	110 (108+112)	114 (112+116)	118 (116+120)	122 (120+124)
802.11n	BPSK	13.5 / 15.0	8.7	8.8	9.3	8.8	8.8	8.9
802.11n	QPSK	27.0 / 30.0	9.3	8.8	9.3	8.8	8.9	8.9
802.11n	QPSK	40.5 / 45.0	8.8	9.3	8.9	8.9	8.9	9.0
802.11n	16QAM	54.0 / 60.0	9.2	9.3	9.3	8.8	8.8	8.9
802.11n	16QAM	81.0 / 90.0	9.3	8.7	8.9	8.8	8.9	9.0
802.11n	64QAM	108.0 / 120.0	9.3	9.4	8.8	8.9	8.9	9.1
802.11n	64QAM	121.5 / 135.0	9.3	8.8	8.8	8.9	8.9	9.0
802.11n	64QAM	135.0 / 150.0	8.8	9.3	8.9	8.9	8.9	9.1

Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 40 MHz channel bandwidth: Measured values			
			126 (124+128)	130 (128+132)	134 (132+136)	138 (136+140)
802.11n	BPSK	13.5 / 15.0	8.9	9.1	9.1	9.0
802.11n	QPSK	27.0 / 30.0	8.9	8.9	9.1	9.1
802.11n	QPSK	40.5 / 45.0	8.9	8.9	9.1	8.8
802.11n	16QAM	54.0 / 60.0	8.9	8.9	9.1	8.8
802.11n	16QAM	81.0 / 90.0	9.0	8.9	9.1	8.8
802.11n	64QAM	108.0 / 120.0	9.0	8.9	8.9	8.8
802.11n	64QAM	121.5 / 135.0	9.0	9.0	8.8	8.8
802.11n	64QAM	135.0 / 150.0	9.1	8.9	8.9	8.8

Standard	Modulation	Data speed [MBPS]	RLAN 5 GHz / 40 MHz channel bandwidth: Measured values			
			151 (149+153)	155 (153+157)	159 (157+161)	163 (161+165)
802.11n	BPSK	13.5 / 15.0	8.9	9.0	9.0	8.9
802.11n	QPSK	27.0 / 30.0	9.0	9.1	9.0	8.9
802.11n	QPSK	40.5 / 45.0	9.1	9.1	8.7	8.9
802.11n	16QAM	54.0 / 60.0	8.7	8.8	8.7	8.9
802.11n	16QAM	81.0 / 90.0	8.7	9.1	8.7	8.9
802.11n	64QAM	108.0 / 120.0	8.6	9.1	8.7	8.9
802.11n	64QAM	121.5 / 135.0	9.1	8.7	8.7	9.0
802.11n	64QAM	135.0 / 150.0	9.1	9.1	8.8	9.0

APPENDIX K: DETAILS OF THE ANTENNA TUNER AND PRE-SCREENING SAR MEASUREMENTS

The device has antenna tuner. The details of Antenna Tuner can be found from document Antenna tuner theory of operation and SAR test proposal_v6.

K.1. System validation status

Probe Calibration Point f / MHz	Test System	DASY SW	Dipole Type / SN	Probe Type / SN	Calibrated signal types	DAE unit Type / SN	Validation done	
							Head tissue simulant	Body tissue simulant
2600	TCC Salo / SAR-4	V52.8	D2600V2 / 1056	EX3DV4 / 3960	CW	DAE4 / 1302	2014-02	2014-02

K.2. System checking

System checking, head tissue simulant

f [MHz]	Description	SAR 1g [W/kg]	Estimated SAR 1g [W/kg]	Estimated SAR 1g Deviation	Scaled 1W SAR 1g [W/kg]	Dielectric Parameters*		SAR 1g Deviation from target	Dielectric Parameters Deviation from target		Temp
				dSAR [%]		ε_r	σ [S/m]	dSAR [%]	$d\varepsilon_r$ [%]	$d\sigma$ [%]	[°C]
	Tolerances			±3%				±10 %	±5 %	±5 %	
	Reference result SN:1056	-	-	-	57.80	39.0	1.96	TCC Salo/SAR-4 EX3DV4 SN:3960 Head 2600MHz			
2600	2014-06-23	14.90	15.20	2.01	59.60	38.6	2.04	3.11	-1.03	4.08	21.1

* Dielectric parameter reference data taken from IEEE1528/IEC62209

System checking, body tissue simulant

f [MHz]	Description	SAR 1g [W/kg]	Estimated SAR 1g [W/kg]	Estimated SAR 1g Deviation	Scaled 1W SAR 1g [W/kg]	Dielectric Parameters*		SAR 1g Deviation from target	Dielectric Parameters Deviation from target		Temp
				dSAR [%]		ε_r	σ [S/m]	dSAR [%]	$d\varepsilon_r$ [%]	$d\sigma$ [%]	[°C]
	Tolerances			±3%				±10 %	±5 %	±5 %	
	Reference result SN: 1056	-	-	-	55.6	52.5	2.16	TCC Salo/SAR-4 ES3DV3 SN:3960 Body 2600MHz			
2600	2014-06-24	14.50	14.80	2.07	58.00	51.1	2.18	4.32	-2.67	0.93	21.0

* Dielectric parameter reference data taken from FCC Published RF Exposure KDB Procedures

K.3. Tissue Simulants

Head tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Dielectric Parameters Deviation from recommended value		Temp [°C]
		ε_r	σ [S/m]	$d\varepsilon_r$ [%]	$d\sigma$ [%]	
	Tolerances			±5 %	±5 %	
	Recommended value	39.1	1.89			
2535	2014-06-23	38.9	1.96	-0.51	3.70	21.1

Body tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Dielectric Parameters Deviation from recommended value		Temp [°C]
		ε_r	σ [S/m]	$d\varepsilon_r$ [%]	$d\sigma$ [%]	
	Tolerances			±5 %	±5 %	
	Recommended value	52.6	2.07			
2535	2014-06-24	51.3	2.09	-2.47	0.97	21.0

K.4. Description of the pre-screening procedure and results

For each test position, all supported sub-bands (Sub-1, Sub-2, Sub-3), and all tuning states (Scenario #0, #1, #2) for each sub-band are tested. Testing is performed only on the highest Channel BW and in QPSK modulation of the 1 RB offset having the highest conducted power result. Pre-screening was performed with DASY52. Control software was used to set the tuner state (Scenario) to the chosen value based on the screening measurements below.

The tuner configuration in each of the plots below is identified by a label, which is a pair of numbers “A | B”, where “A” is the sub-band, and “B” is the tuning scenario.

The selected tuning state for official certification is indicated with yellow.

= Selected state

LTE2500 (Band 7) Head SAR pre-screening results

20MHz Ch BW QPSK 1RB 100% offset - 1g												
Channel	Sub-band	Tuning Target + Tolerance [dBm]	Conducted Slot Average Power [dBm]	Time-averaged power [dBm]	Device Orientation	Screening results (DASY52)						Plot label
						Measured 1g SAR [W/kg]			Scaling factor* [dB]	Scaling factor* [Lin]	Max Reported* 1g SAR [W/kg]	
						Scenario #0	Scenario #1	Scenario #2			Max	
Ch 20867 | 2511,7 MHz	Sub-1	23.9	23.5	23.5	Left Cheek	0.172	0.180	0.174	0.4	1.10	0.197	[1|0] [1|1] [1|2]
Ch 21100 | 2535 MHz	Sub-2	23.9	23.4	23.4	Left Cheek	0.189	0.195	0.202	0.5	1.12	0.227	[2|0] [2|1] [2|2]
Ch 21333 | 2558,3 MHz	Sub-3	23.9	23.8	23.8	Left Cheek	0.182	0.191	0.189	0.1	1.02	0.195	[3|0] [3|1] [3|2]
Ch 20867 | 2511,7 MHz	Sub-1	23.9	23.5	23.5	Left Tilt	0.067	0.064	0.082	0.4	1.10	0.089	[1|0] [1|1] [1|2]
Ch 21100 | 2535 MHz	Sub-2	23.9	23.4	23.4	Left Tilt	0.083	0.090	0.084	0.5	1.12	0.101	[2|0] [2|1] [2|2]
Ch 21333 | 2558,3 MHz	Sub-3	23.9	23.8	23.8	Left Tilt	0.101	0.104	0.098	0.1	1.02	0.106	[3|0] [3|1] [3|2]
Ch 20867 | 2511,7 MHz	Sub-1	23.9	23.5	23.5	Right Cheek	0.121	0.118	0.114	0.4	1.10	0.133	[1|0] [1|1] [1|2]
Ch 21100 | 2535 MHz	Sub-2	23.9	23.4	23.4	Right Cheek	0.129	0.121	0.119	0.5	1.12	0.145	[2|0] [2|1] [2|2]
Ch 21333 | 2558,3 MHz	Sub-3	23.9	23.8	23.8	Right Cheek	0.128	0.123	0.122	0.1	1.02	0.131	[3|0] [3|1] [3|2]

(LTE2500 (Band 7) Table continues)

(LTE2500 (Band 7) Table continues)

20MHz Ch BW QPSK 1RB 100% offset - 1g												
Channel	Sub-band	Tuning Target + Tolerance [dBm]	Conducted Slot Average Power [dBm]	Time-averaged power [dBm]	Device Orientation	Screening results (DASY52)						Plot label
						Measured 1g SAR [W/kg]			Scaling factor* [dB]	Scaling factor* [Lin]	Max Reported* 1g SAR [W/kg]	
						Scenario #0	Scenario #1	Scenario #2			Max	
Ch 20867 | 2511,7 MHz	Sub-1	**23.9**	**23.5**	**23.5**	Right Tilt	0.051	0.048	0.048	**0.4**	**1.10**	0.056	[1|0] [1|1] [1|2]
Ch 21100 | 2535 MHz	Sub-2	**23.9**	**23.4**	**23.4**	Right Tilt	0.048	0.046	**0.052**	**0.5**	**1.12**	**0.058**	[2|0] [2|1] [2|2]
Ch 21333 | 2558,3 MHz	Sub-3	**23.9**	**23.8**	**23.8**	Right Tilt	0.048	0.049	0.042	**0.1**	**1.02**	0.051	[3|0] [3|1] [3|2]

LTE2500 (Band 7) Body SAR pre-screening results (15mm)

20MHz Ch BW QPSK 1RB 100% offset - 1g												
Channel	Sub-band	Tuning Target + Tolerance [dBm]	Conducted Slot Average Power [dBm]	Time-averaged power [dBm]	Device Orientation	Screening results (DASY52)						Plot label
						Measured 1g SAR [W/kg]			Scaling factor* [dB]	Scaling factor* [Lin]	Max Reported* 1g SAR [W/kg]	
						Scenario #0	Scenario #1	Scenario #2			Max	
Ch 20867 | 2511,7 MHz	Sub-1	23.9	23.5	23.5	Back facing phantom - Without headset	0.389	0.379	0.371	0.4	1.10	0.427	[1|0] [1|1] [1|2]
Ch 21100 | 2535 MHz	Sub-2	23.9	23.4	23.4	Back facing phantom - Without headset	0.407	0.392	0.386	0.5	1.12	0.457	[2|0] [2|1] [2|2]
Ch 21333 | 2558,3 MHz	Sub-3	23.9	23.8	23.8	Back facing phantom - Without headset	0.400	0.394	0.384	0.1	1.02	0.409	[3|0] [3|1] [3|2]
Ch 20867 | 2511,7 MHz	Sub-1	23.9	23.5	23.5	Display facing phantom - Without headset	0.607	0.543	0.567	0.4	1.10	0.666	[1|0] [1|1] [1|2]
Ch 21100 | 2535 MHz	Sub-2	23.9	23.4	23.4	Display facing phantom - Without headset	0.640	0.573	0.561	0.5	1.12	0.718	[2|0] [2|1] [2|2]
Ch 21333 | 2558,3 MHz	Sub-3	23.9	23.8	23.8	Display facing phantom - Without headset	0.632	0.563	0.553	0.1	1.02	0.647	[3|0] [3|1] [3|2]

LTE2500 (Band 7) Wireless Router pre-screening SAR result (10mm)

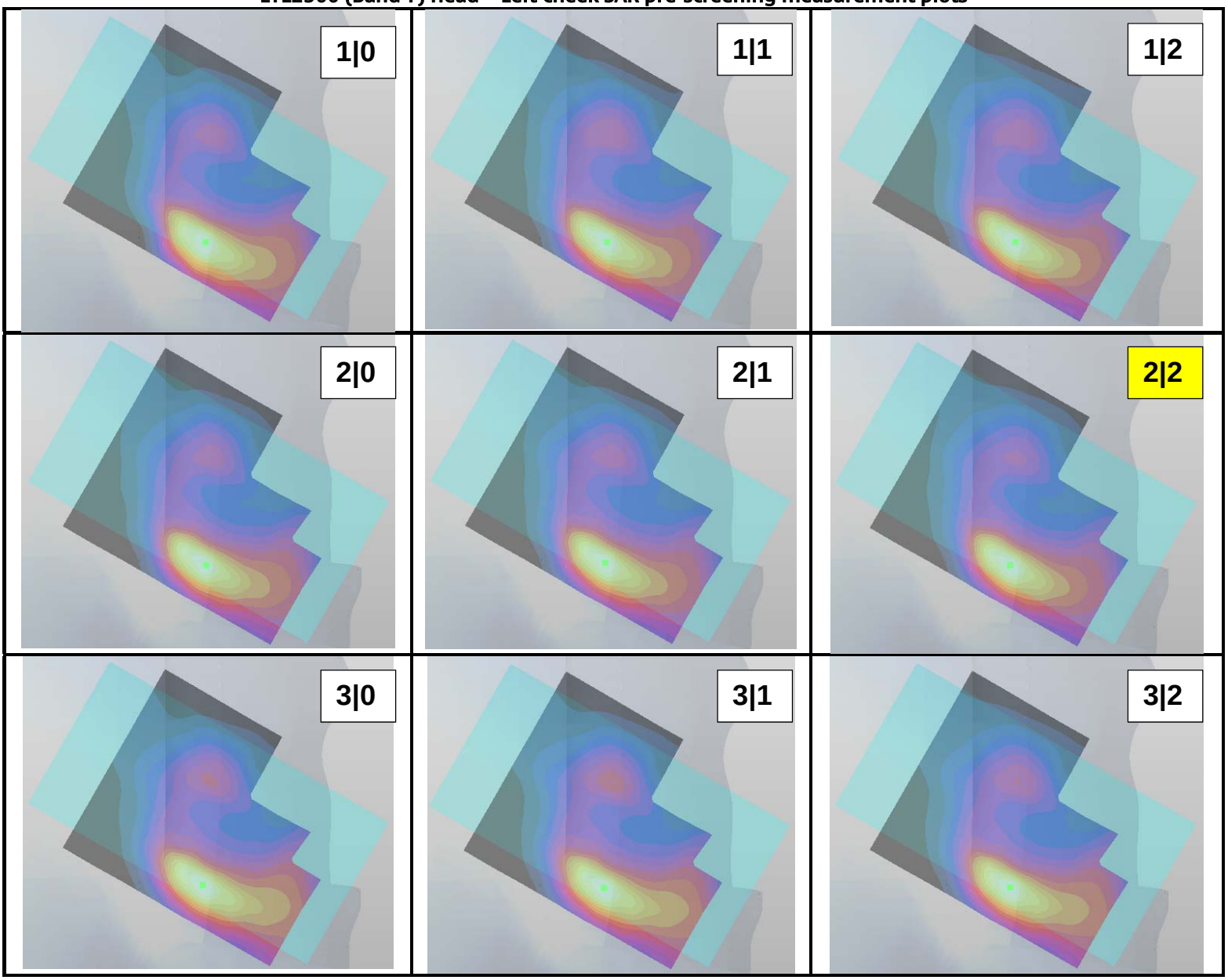
20MHz Ch BW QPSK 1RB 0% offset - 1g												
Channel	Sub-band	Tuning Target + Tolerance [dBm]	Conducted Slot Average Power [dBm]	Time-averaged power [dBm]	Device Orientation	Screening results (DASY52)						Plot label
						Measured 1g SAR [W/kg]			Scaling factor* [dB]	Scaling factor* [Lin]	Max Reported* 1g SAR [W/kg]	
						Scenario #0	Scenario #1	Scenario #2			Max	
Ch 20867 | 2511,7 MHz	Sub-1	**18.9**	**18.7**	**18.7**	Back facing phantom	0.213	0.207	0.208	**0.2**	**1.05**	0.223	[1|0] [1|1] [1|2]
Ch 21100 | 2535 MHz	Sub-2	**18.9**	**18.4**	**18.4**	Back facing phantom	0.213	0.214	**0.215**	**0.5**	**1.12**	**0.241**	[2|0] [2|1] [2|2]
Ch 21333 | 2558,3 MHz	Sub-3	**18.9**	**18.6**	**18.6**	Back facing phantom	0.213	0.212	0.204	**0.3**	**1.07**	0.228	[3|0] [3|1] [3|2]
Ch 20867 | 2511,7 MHz	Sub-1	**18.9**	**18.7**	**18.7**	Display facing phantom	0.289	0.293	0.302	**0.2**	**1.05**	0.316	[1|0] [1|1] [1|2]
Ch 21100 | 2535 MHz	Sub-2	**18.9**	**18.4**	**18.4**	Display facing phantom	**0.299**	0.296	0.297	**0.5**	**1.12**	**0.335**	[2|0] [2|1] [2|2]
Ch 21333 | 2558,3 MHz	Sub-3	**18.9**	**18.6**	**18.6**	Display facing phantom	0.290	0.289	0.302	**0.3**	**1.07**	0.324	[3|0] [3|1] [3|2]
Ch 20867 | 2511,7 MHz	Sub-1	**18.9**	**18.7**	**18.7**	Top edge facing phantom	Not tested for bottom antenna			**0.2**	**1.05**	-	[1|0] [1|1] [1|2]
Ch 21100 | 2535 MHz	Sub-2	**18.9**	**18.4**	**18.4**	Top edge facing phantom				**0.5**	**1.12**	-	[2|0] [2|1] [2|2]
Ch 21333 | 2558,3 MHz	Sub-3	**18.9**	**18.6**	**18.6**	Top edge facing phantom				**0.3**	**1.07**	-	[3|0] [3|1] [3|2]

(LTE2500 (Band 7) Table continues)

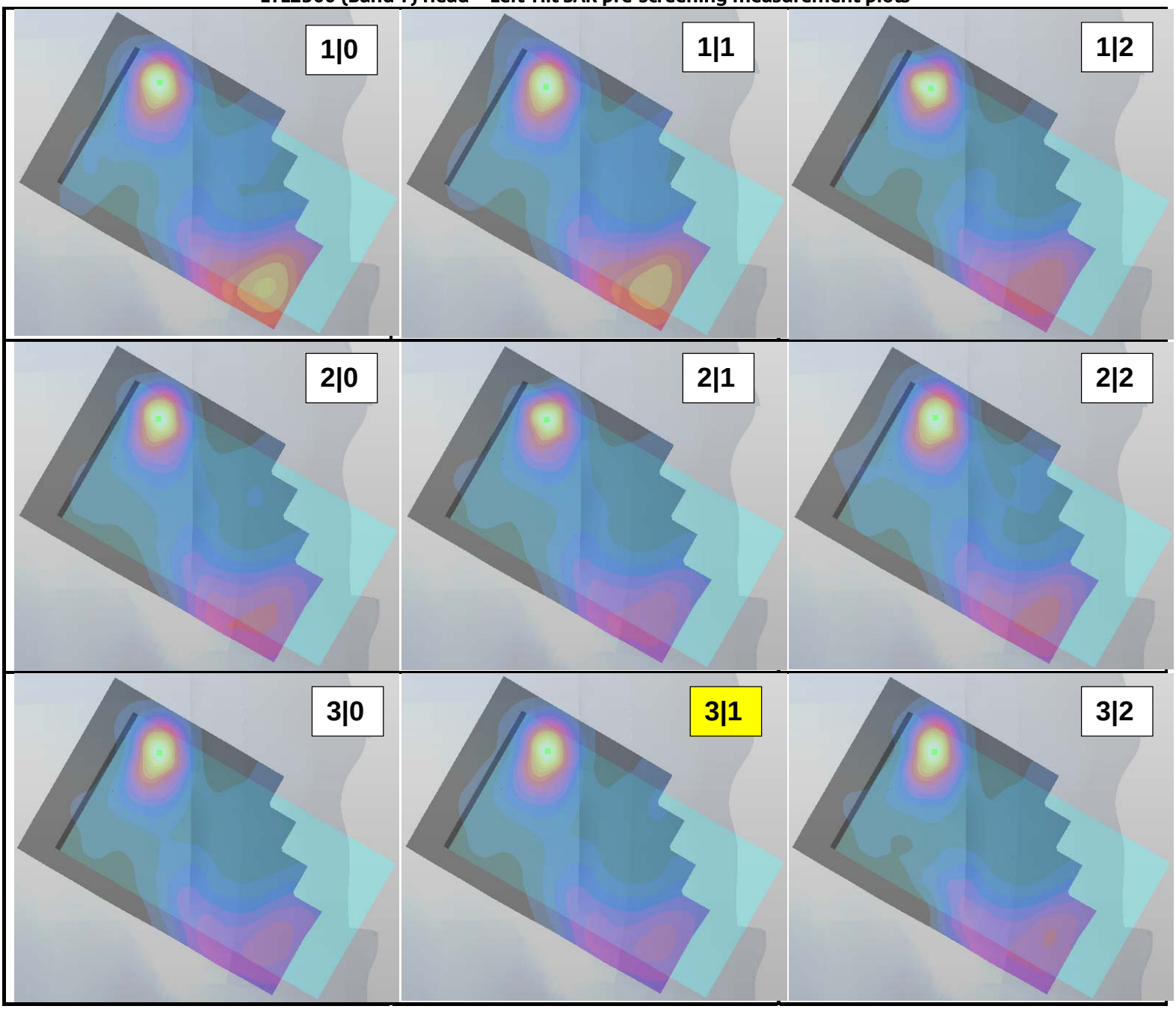
(LTE2500 (Band 7) Table continues)

20MHz Ch BW QPSK 1RB 0% offset - 1g												
Channel	Sub-band	Tuning Target + Tolerance [dBm]	Conducted Slot Average Power [dBm]	Time-averaged power [dBm]	Device Orientation	Screening results (DASY52)						Plot label
						Measured 1g SAR [W/kg]			Scaling factor* [dB]	Scaling factor* [Lin]	Max Reported* 1g SAR [W/kg]	
						Scenario #0	Scenario #1	Scenario #2			Max	
Ch 20867 | 2511,7 MHz	Sub-1	18.9	18.7	18.7	Bottom edge facing phantom	0.749	0.758	0.726	0.2	1.05	0.794	[1|0] [1|1] [1|2]
Ch 21100 | 2535 MHz	Sub-2	18.9	18.4	18.4	Bottom edge facing phantom	0.784	0.759	0.788	0.5	1.12	0.884	[2|0] [2|1] [2|2]
Ch 21333 | 2558,3 MHz	Sub-3	18.9	18.6	18.6	Bottom edge facing phantom	**0.837**	0.801	0.795	0.3	1.07	**0.897**	[3|0] [3|1] [3|2]
Ch 20867 | 2511,7 MHz	Sub-1	18.9	18.7	18.7	Left edge facing phantom	0.047	0.056	0.044	0.2	1.05	0.058	[1|0] [1|1] [1|2]
Ch 21100 | 2535 MHz	Sub-2	18.9	18.4	18.4	Left edge facing phantom	0.049	**0.055**	0.044	0.5	1.12	**0.062**	[2|0] [2|1] [2|2]
Ch 21333 | 2558,3 MHz	Sub-3	18.9	18.6	18.6	Left edge facing phantom	0.045	0.050	0.042	0.3	1.07	0.053	[3|0] [3|1] [3|2]
Ch 20867 | 2511,7 MHz	Sub-1	18.9	18.7	18.7	Right edge facing phantom	0.080	0.092	0.088	0.2	1.05	0.097	[1|0] [1|1] [1|2]
Ch 21100 | 2535 MHz	Sub-2	18.9	18.4	18.4	Right edge facing phantom	0.098	0.104	0.099	0.5	1.12	0.117	[2|0] [2|1] [2|2]
Ch 21333 | 2558,3 MHz	Sub-3	18.9	18.6	18.6	Right edge facing phantom	0.104	**0.115**	0.106	0.3	1.07	**0.123**	[3|0] [3|1] [3|2]

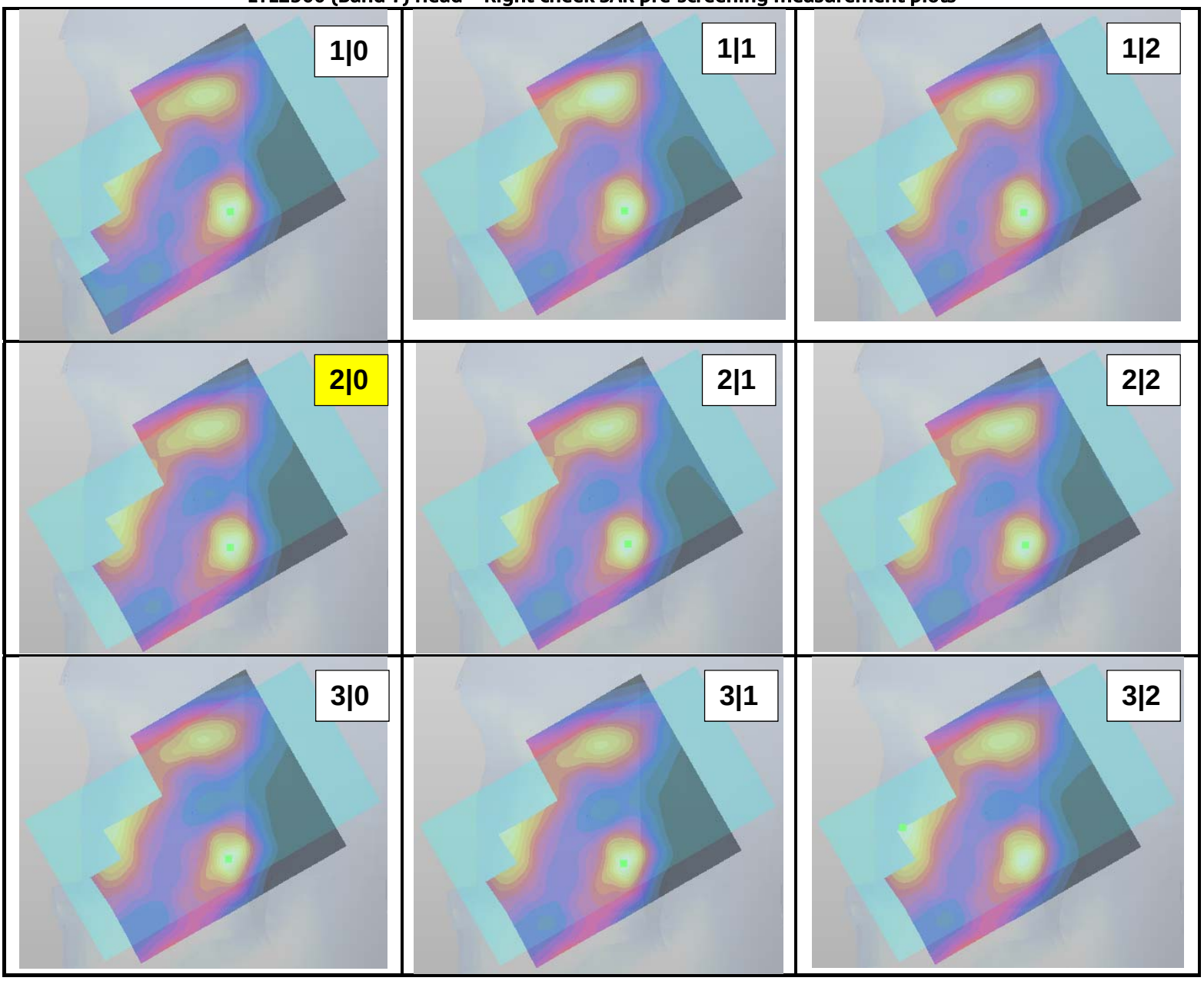
LTE2500 (Band 7) Head – Left Cheek SAR pre-screening measurement plots



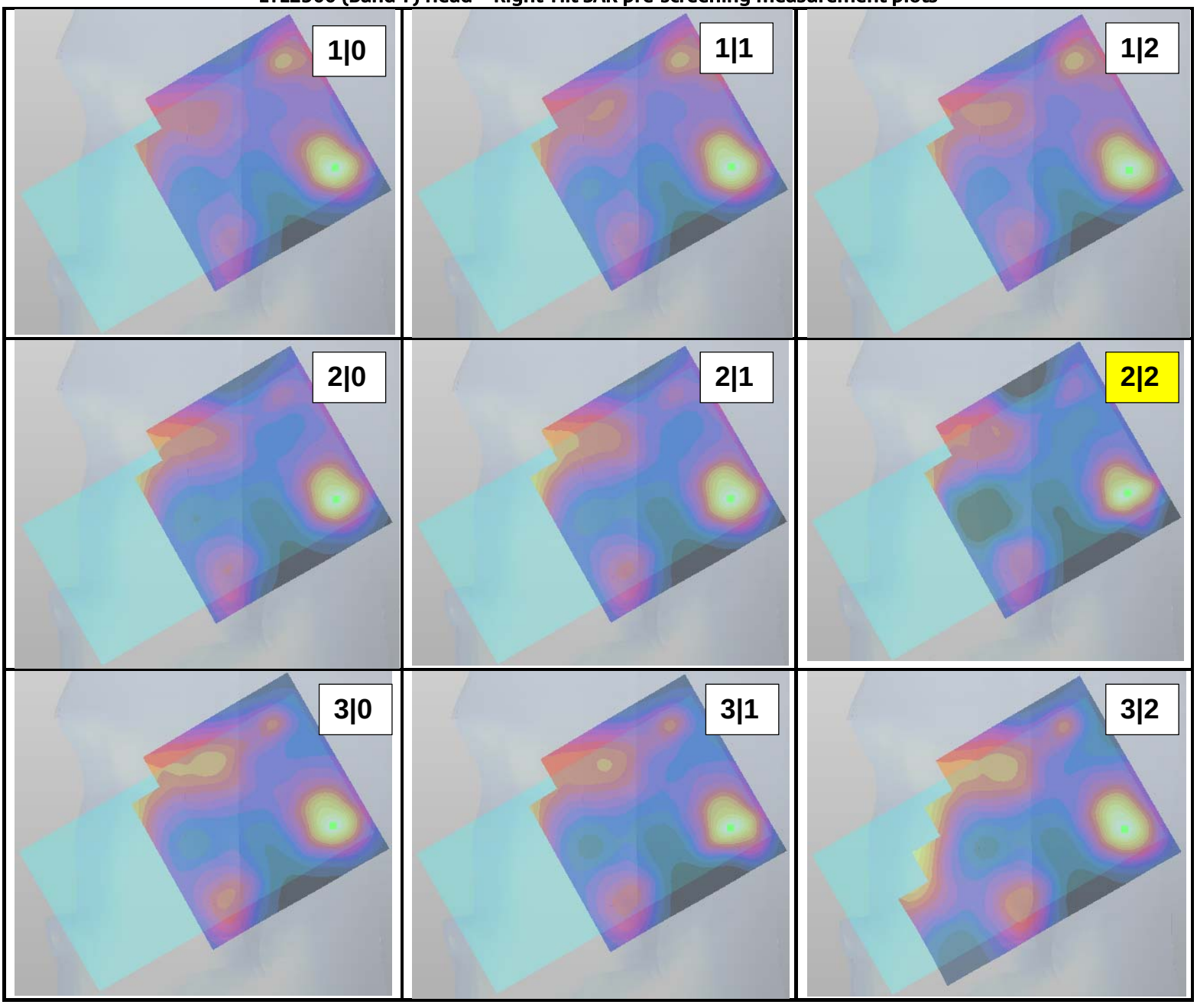
LTE2500 (Band 7) Head – Left Tilt SAR pre-screening measurement plots



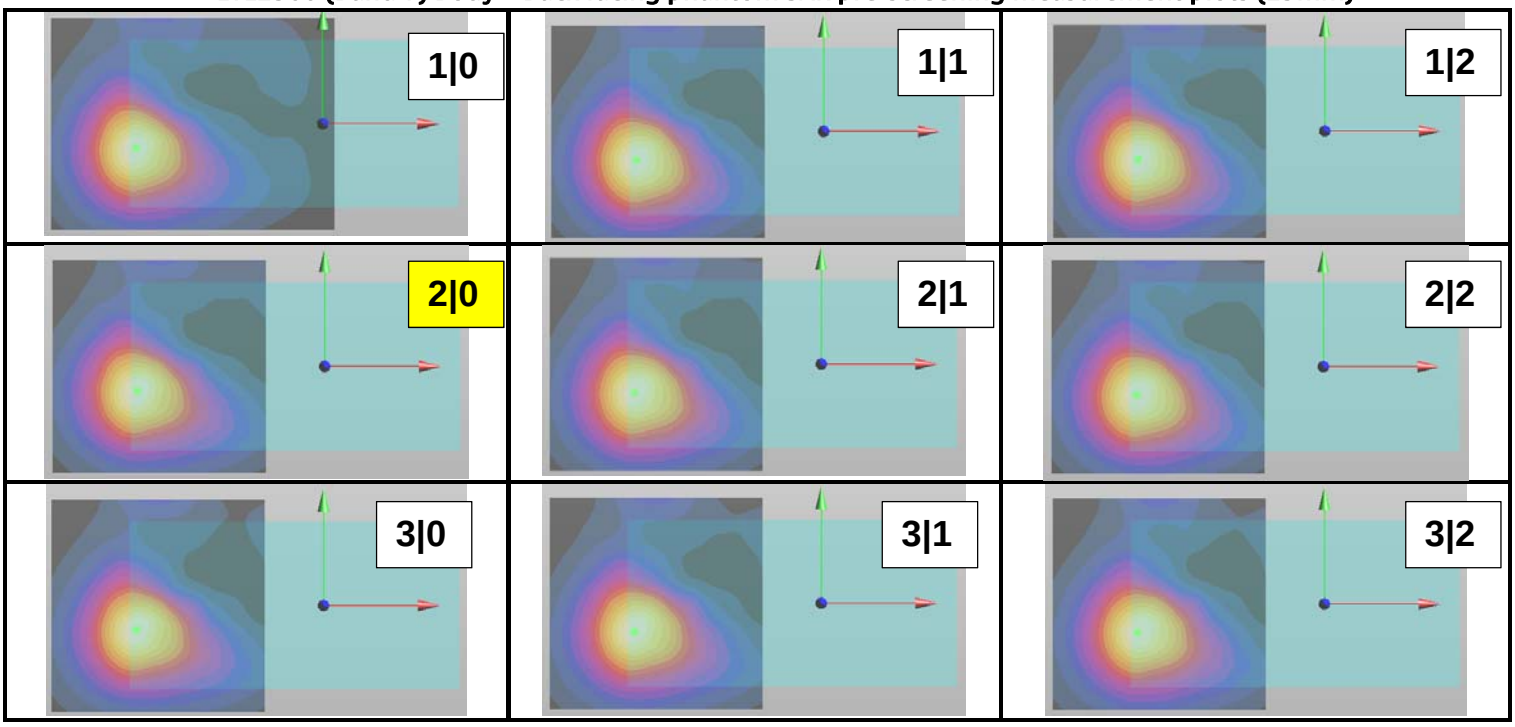
LTE2500 (Band 7) Head – Right Cheek SAR pre-screening measurement plots



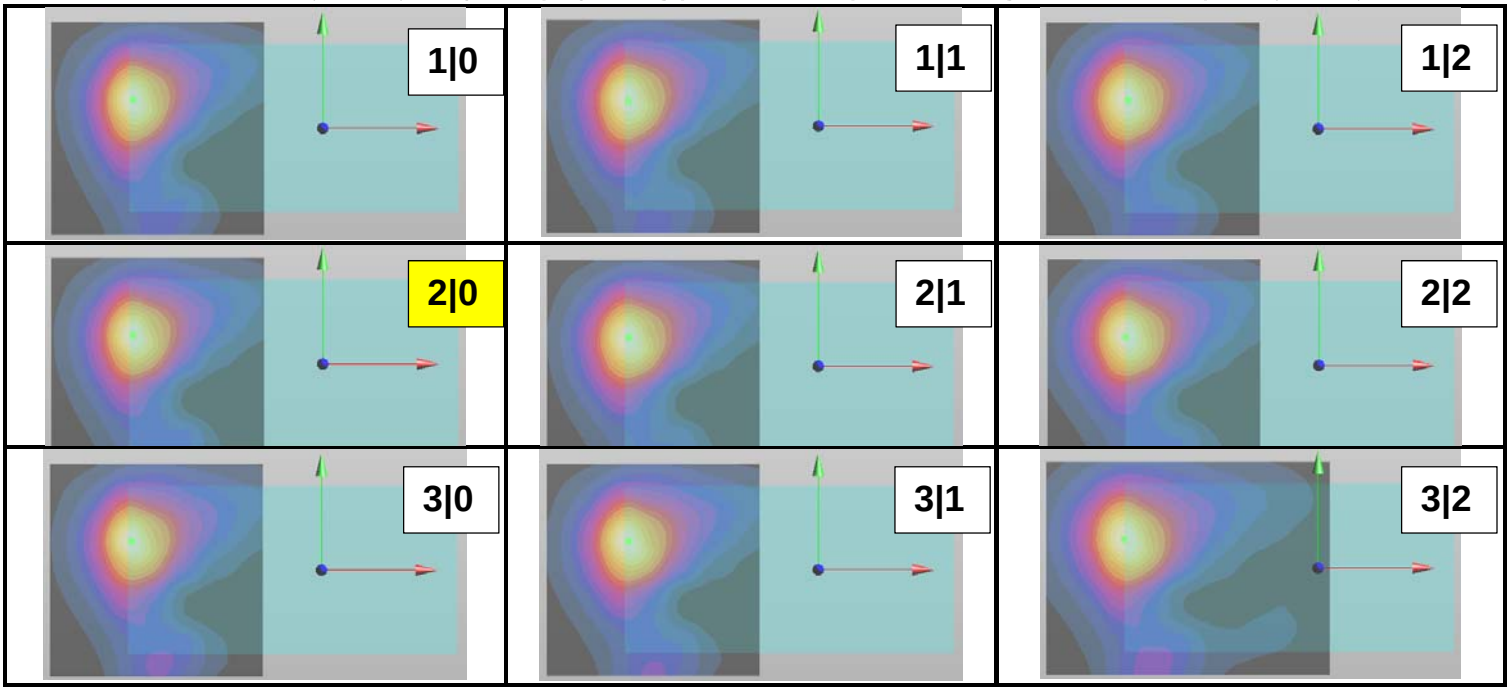
LTE2500 (Band 7) Head – Right Tilt SAR pre-screening measurement plots



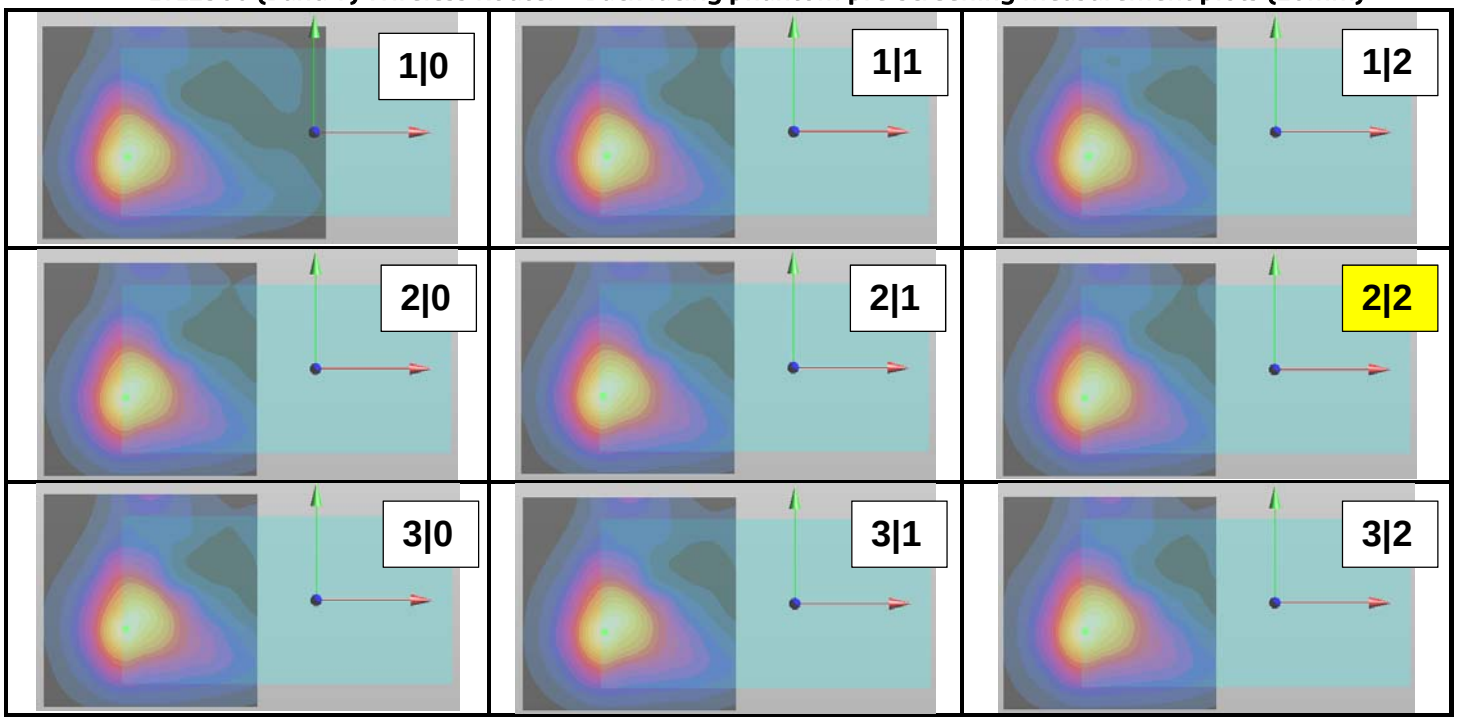
LTE2500 (Band 7) Body – Back facing phantom SAR pre-screening measurement plots (15mm)



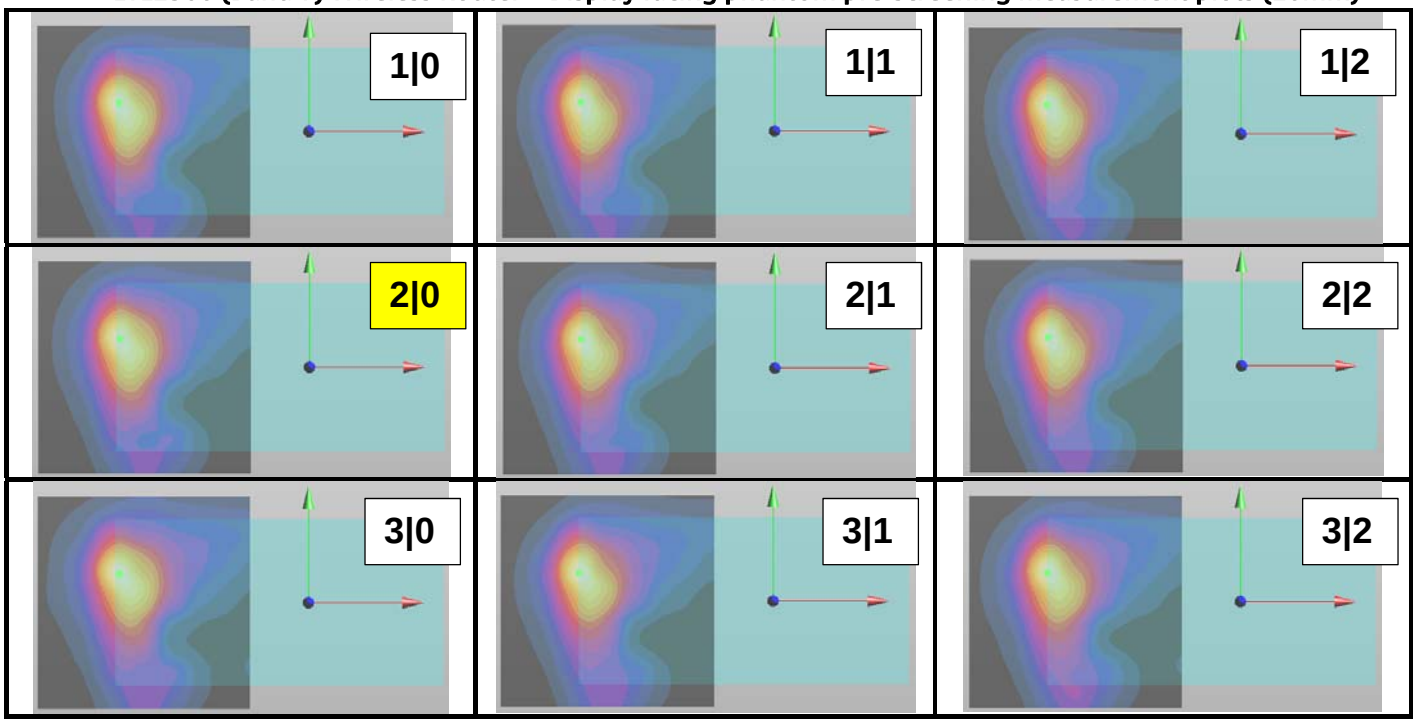
LTE2500 (Band 7) Body – Display facing phantom SAR pre-screening measurement plots (15mm)



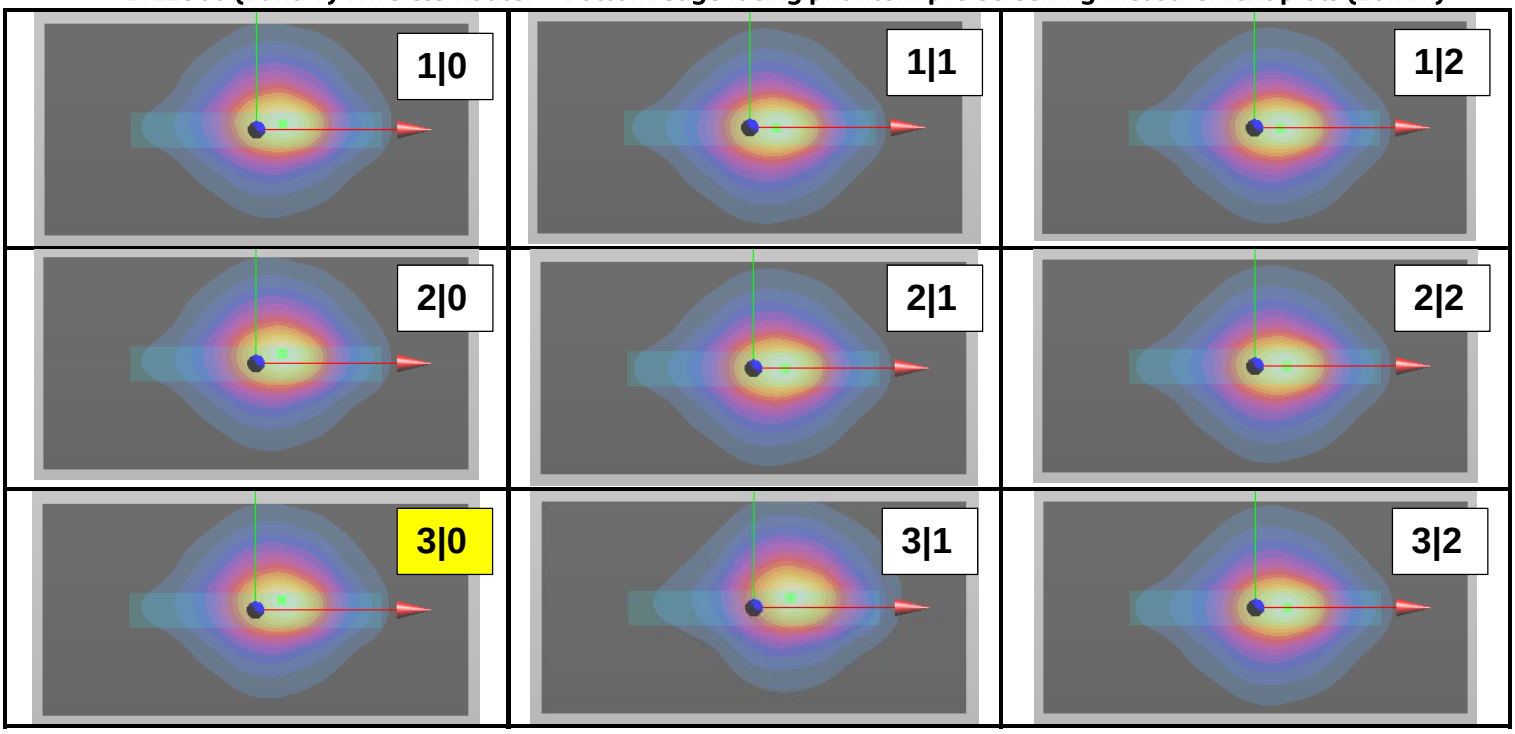
LTE2500 (Band 7) Wireless Router – Back facing phantom pre-screening measurement plots (10mm)



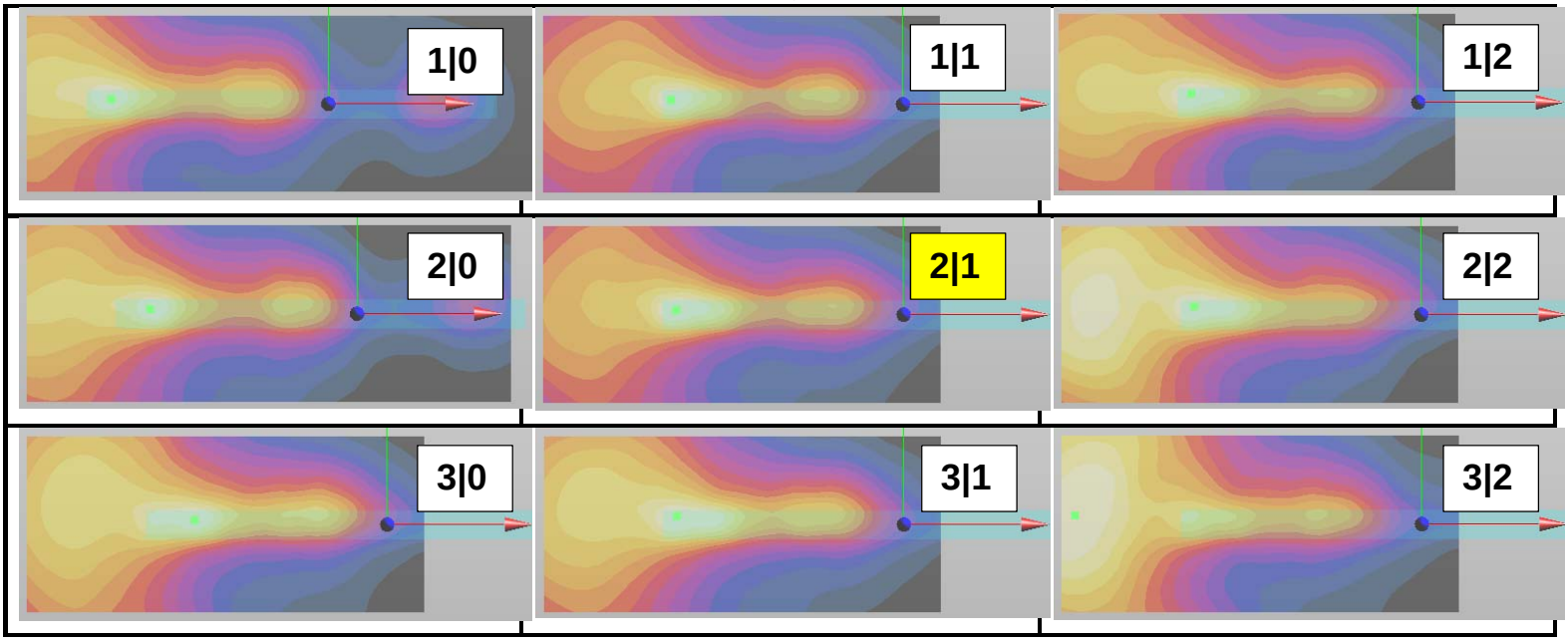
LTE2500 (Band 7) Wireless Router – Display facing phantom pre-screening measurement plots (10mm)



LTE2500 (Band 7) Wireless Router – Bottom edge facing phantom pre-screening measurement plots (10mm)



LTE2500 (Band 7) Wireless Router – Left edge facing phantom pre-screening measurement plots (10mm)



LTE2500 (Band 7) Wireless Router – Right edge facing phantom pre-screening measurement plots (10mm)