

EX3DV4- SN:3846

September 24, 2014

Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

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Receiving Pattern (ϕ), $\vartheta = 0^{\circ}$

Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:3846

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	4
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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ANNEX HDipole Calibration Certificate

835 MHz Dipole Calibration Certificate

he Swiss Accreditation Servi ultilateral Agreement for the lient CTTL (Auden)	ce is one of the signatories recognition of calibration	s to the EA certificates	
lient CTTL (Auden)	recognition of calibration	certificates	
		Certificate No	: D835V2-4d069_Aug14
ALIBRATION	CERTIFICATE		
Dbject	D835V2 - SN: 4d	069	
Calibration procedure(s)	QA CAL-05.v9	dura for dipole validation kits abo	Wo 700 MHz
	Calibration proce		
Calibration date:	August 28, 2014		
This calibration certificate docu The measurements and the un All calibrations have been conc	ments the traceability to nati certainties with confidence p lucted in the closed laborato	onal standards, which realize the physical un robability are given on the following pages an ry facility: environment temperature $(22 \pm 3)^{\circ}$	its of measurements (SI). Id are part of the certificate. C and humidity < 70%.
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Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



SWISS

BRP

S

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

Accreditation No.: SCS 108

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

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%.

Certificate No: D835V2-4d069_Aug14

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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	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	42.0 ± 6 %	0.94 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	2.43 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.43 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured	condition 250 mW input power	1.58 W/kg

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	55.2 ± 6 %	1.01 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	2.46 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.55 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.62 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.33 W/kg ± 16.5 % (k=2)

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Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.3 Ω + 0.8 jΩ	
Return Loss	- 29.7 dB	_

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.8 Ω - 1.4 jΩ	
Return Loss	- 34.5 dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.393 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	November 09, 2007

Certificate No: D835V2-4d069_Aug14

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DASY5 Validation Report for Head TSL

Date: 28.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d069

Communication System: UID 0 - CW; Frequency: 835 MHz Medium parameters used: f = 835 MHz; $\sigma = 0.94$ S/m; $\epsilon_r = 42$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.22, 6.22, 6.22); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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 = 56.74 V/m; Power Drift = 0.00 dB Peak SAR (extrapolated) = 3.61 W/kg SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.58 W/kg Maximum value of SAR (measured) = 2.85 W/kg



0 dB = 2.85 W/kg = 4.55 dBW/kg

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Impedance Measurement Plot for Head TSL



Certificate No: D835V2-4d069_Aug14

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DASY5 Validation Report for Body TSL

Date: 27.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d069

Communication System: UID 0 - CW; Frequency: 835 MHz Medium parameters used: f = 835 MHz; $\sigma = 1.01$ S/m; $\epsilon_r = 55.2$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.09, 6.09, 6.09); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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 = 54.97 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 3.60 W/kg SAR(1 g) = 2.46 W/kg; SAR(10 g) = 1.62 W/kg Maximum value of SAR (measured) = 2.87 W/kg



0 dB = 2.87 W/kg = 4.58 dBW/kg

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Impedance Measurement Plot for Body TSL



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1900 MHz Dipole Calibration Certificate

aughausstrasse 43, 8004 Zurio	h, Switzerland	CRUTERING C	Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service
ccredited by the Swiss Accredit he Swiss Accreditation Servic	ation Service (SAS) e is one of the signatorie	Accreditation	n No.: SCS 108
ultilateral Agreement for the r	ecognition of calibration	certificates	
lient CTTL (Auden)		Certificate N	o: D1900V2-50101_Jul14
CALIBRATION C	CERTIFICATE		
bject	D1900V2 - SN: 5	id101	
Calibration procedure(s)	QA CAL-05.v9 Calibration proce	dure for dipole validation kits abo	ove 700 MHz
Softworthere also	hub: 02, 0014		
his calibration certificate docurr	ients the traceability to nati	ional standards, which realize the physical ur	nits of measurements (SI).
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Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



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- C Service suisse d'étalonnage Servizio svizzero di taratura
- Servizio svizzero di taratu S Swiss Calibration Service

Accreditation No.: SCS 108

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

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%.

Certificate No: D1900V2-5d101_Jul14

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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	$39.5\pm6~\%$	1.38 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	10.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.6 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured	condition 250 mW input power	5.25 W/kg

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 %	1.51 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	40.4 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Body TSL SAR measured	condition 250 mW input power	5.35 W/kg

Certificate No: D1900V2-5d101_Jul14



Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.7 Ω + 6.3 jΩ	
Return Loss	- 24.1 dB	

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω + 6.5 jΩ	
Return Loss	- 22.4 dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.203 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	March 28, 2008

Certificate No: D1900V2-5d101_Jul14

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DASY5 Validation Report for Head TSL

Date: 23.07.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d101

Communication System: UID 0 - CW; Frequency: 1900 MHz Medium parameters used: f = 1900 MHz; σ = 1.38 S/m; ϵ_r = 39.5; ρ = 1000 kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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 = 99.04 V/m; Power Drift = 0.01 dB Peak SAR (extrapolated) = 18.5 W/kg SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.25 W/kg Maximum value of SAR (measured) = 12.8 W/kg



0 dB = 12.8 W/kg = 11.07 dBW/kg

Certificate No: D1900V2-5d101_Jul14

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Impedance Measurement Plot for Head TSL



Certificate No: D1900V2-5d101_Jul14

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DASY5 Validation Report for Body TSL

Date: 23.07.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d101

Communication System: UID 0 - CW; Frequency: 1900 MHz Medium parameters used: f = 1900 MHz; σ = 1.51 S/m; ϵ_r = 52.5; p = 1000 kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

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 = 95.79 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 17.7 W/kg SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.35 W/kg Maximum value of SAR (measured) = 12.8 W/kg



0 dB = 12.8 W/kg = 11.07 dBW/kg

Certificate No: D1900V2-5d101_Jul14

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Impedance Measurement Plot for Body TSL



Certificate No: D1900V2-5d101_Jul14

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2450 MHz Dipole Calibration Certificate

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



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Accreditation No.: SCS 108

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

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

Certificate No: D2450V2-853_Jul14

Dbject	D2450V2 - SN: 85	3	
Calibration procedure(s)	QA CAL-05.v9 Calibration proces	lure for dipole validation kits abov	ve 700 MHz
Calibration date:	July 24, 2014		
All calibrations have been conduct Calibration Equipment used (M&T	TE critical for calibration)	y facility: environment temperature $(22 \pm 3)^{\circ}$ C Cal Date (Certificate No.)	and humidity < 70%.
Primary Standards	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
ALVERT THEFTER PRODUCES AND	0001400704	20 0 1 40 (No. 017 01007)	0-144
Power neter LP 8481A	US37292783	()9-()ct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783 MY41092317	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828)	Oct-14 Oct-14
Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator	US37292783 MY41092317 SN: 5058 (20k)	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 03-Apr-14 (No. 217-01918)	Oct-14 Oct-14 Apr-15
Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination	US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921)	Oct-14 Oct-14 Apr-15 Apr-15
Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	U\$37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921) 30-Dec-13 (No. ES3-3205_Dec13)	Oct-14 Oct-14 Apr-15 Apr-15 Dec-14
Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921) 30-Dec-13 (No. ES3-3205_Dec13) 30-Apr-14 (No. DAE4-601_Apr14)	Oct-14 Oct-14 Apr-15 Apr-15 Døc-14 Apr-15
Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921) 30-Dec-13 (No. ES3-3205_Dec13) 30-Apr-14 (No. DAE4-601_Apr14) Check Date (in house)	Oct-14 Oct-14 Apr-15 Dec-15 Dec-14 Apr-15 Scheduled Check
Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards BE generator B&S SMT-06	US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921) 30-Dec-13 (No. ES3-3205_Dec13) 30-Apr-14 (No. DAE4-601_Apr14) Check Date (in house) 04-Aug-99 (in house check Oct-13)	Oct-14 Oct-14 Apr-15 Dec-15 Dec-14 Apr-15 Scheduled Check In house check: Oct-16
Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R&S SMT-06 Network Analyzer HP 8753E	US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921) 30-Dec-13 (No. ES3-3205_Dec13) 30-Apr-14 (No. DAE4-601_Apr14) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-13)	Oct-14 Oct-14 Apr-15 Dec-14 Apr-15 Scheduled Check In house check: Oct-16 In house check; Oct-14
Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R&S SMT-06 Network Analyzer HP 8753E	US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	09-Oct-13 (No. 217-01827) 09-Oct-13 (No. 217-01828) 03-Apr-14 (No. 217-01918) 03-Apr-14 (No. 217-01921) 30-Dec-13 (No. ES3-3205_Dec13) 30-Apr-14 (No. DAE4-601_Apr14) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-13)	Oct-14 Oct-14 Apr-15 Dec-14 Apr-15 Scheduled Check In house check: Oct-16 In house check: Oct-14
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Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



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

Accreditation No.: SCS 108

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

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%.

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Measurement Conditions

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

Aor system comiguration, as in a		VEO 9 9
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	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	37.8 ± 6 %	1.85 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	
SAB measured	250 mW input power	13.6 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	53.2 W/kg ± 17.0 % (k=2)
	condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured	condition 250 mW input power	6.26 W/kg

Body TSL parameters

The following parameters and calculations were applied.

0.1	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	50.6 ± 6 %	2.03 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		and a

SAR result with Body TSL

SAR averaged over 1 cm ³ (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	51.3 W/kg ± 17.0 % (k=2)
SAB averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Body TSL	condition 250 mW input power	6.08 W/kg

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Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.9 Ω + 3.3 jΩ	
Return Loss	- 27.3 dB	

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.4 Ω + 5.0 jΩ	
Return Loss	- 26.0 dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.162 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	November 10, 2009

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DASY5 Validation Report for Head TSL

Date: 24.07.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 853

Communication System: UID 0 - CW; Frequency: 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.85 S/m; ϵ_r = 37.8; ρ = 1000 kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.53, 4.53, 4.53); 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 = 102.2 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 28.2 W/kg SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.26 W/kg Maximum value of SAR (measured) = 18.0 W/kg



0 dB = 18.0 W/kg = 12.55 dBW/kg

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Impedance Measurement Plot for Head TSL



Certificate No: D2450V2-853_Jul14

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DASY5 Validation Report for Body TSL

Date: 16.07.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 853

Communication System: UID 0 - CW; Frequency: 2450 MHz Medium parameters used: f = 2450 MHz; σ = 2.03 S/m; ϵ_r = 50.6; ρ = 1000 kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.35, 4.35, 4.35); 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 = 96.00 V/m; Power Drift = 0.00 dB Peak SAR (extrapolated) = 27.9 W/kg SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.08 W/kg Maximum value of SAR (measured) = 17.6 W/kg



0 dB = 17.6 W/kg = 12.46 dBW/kg

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Impedance Measurement Plot for Body TSL



Certificate No: D2450V2-853_Jul14

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2600 MHz Dipole Calibration Certificate

chmid & Partner Engineering AG ughausstrasse 43, 8004 Zuric	y of h, Switzerland	ACCIMITAL SHIESS S	Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service
ccredited by the Swiss Accredita he Swiss Accreditation Service	tion Service (SAS) e is one of the signatories	Accreditatio	n No.: SCS 108
lient CTTL (Auden)		Certificate N	lo: D2600V2-1012_Jul14
CALIBRATION C	ERTIFICATE		
Dbject	D2600V2 - SN: 1	012	
Calibration procedure(s)	QA CAL-05.v9 Calibration proces	dure for dipole validation kits ab	pove 700 MHz
Collibration data:	July 16, 2014		
This calibration certificate docurr The measurements and the unce All calibrations have been condu	ents the traceability to nati artainties with confidence p cted in the closed laborator	onal standards, which realize the physical trobability are given on the following pages of γ facility: environment temperature (22 ± 3)	units of measurements (SI). and are part of the certificate.)°C and humidity < 70%.
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Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



SWISS C. W. NO S Schweizerischer Kalibrierdienst Service suisse d'étalonnage

- C Servizio svizzero di taratura
- S Swiss Calibration Service

Accreditation No.: SCS 108

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

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%.

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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	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	37.3 ± 6 %	2.02 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	14.8 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 averaged over 10 cm ³ (10 g) of Head TSL	condition 250 mW input power	6.58 W/kg

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	50.1 ± 6 %	2.21 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	14.6 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	57.2 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Body TSL SAR measured	condition 250 mW input power	6.43 W/kg

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Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.7 Ω - 5.0 jΩ	
Return Loss	- 25.6 dB	

Antenna Parameters with Body TSL

Impedance, transformed to feed point	44.9 Ω - 3.8 jΩ	
Return Loss	- 23.6 dB	

General Antenna Parameters and Design

I	
Electrical Delay (one direction)	1.152 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	October 30, 2007

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DASY5 Validation Report for Head TSL

Date: 16.07.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1012

 $\begin{array}{l} \mbox{Communication System: UID 0 - CW; Frequency: 2600 MHz} \\ \mbox{Medium parameters used: } f = 2600 MHz; \mbox{σ} = 2.02 \mbox{ S/m}; \mbox{ϵ}_r = 37.3; \mbox{ρ} = 1000 \mbox{ kg/m}^3 \\ \mbox{Phantom section: Flat Section} \\ \mbox{Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)} \\ \end{array}$

DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.46, 4.46, 4.46); 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 = 101.5 V/m; Power Drift = 0.07 dB Peak SAR (extrapolated) = 31.9 W/kg SAR(1 g) = 14.8 W/kg; SAR(10 g) = 6.58 W/kg Maximum value of SAR (measured) = 19.5 W/kg



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

Certificate No: D2600V2-1012_Jul14

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Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 16.07.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1012

Communication System: UID 0 - CW; Frequency: 2600 MHz Medium parameters used: f = 2600 MHz; σ = 2.21 S/m; ϵ_r = 50.1; ρ = 1000 kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.24, 4.24, 4.24); 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 = 97.59 V/m; Power Drift = 0.00 dB Peak SAR (extrapolated) = 31.9 W/kg SAR(1 g) = 14.6 W/kg; SAR(10 g) = 6.43 W/kg Maximum value of SAR (measured) = 19.7 W/kg



0 dB = 19.7 W/kg = 12.94 dBW/kg

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Impedance Measurement Plot for Body TSL



Certificate No: D2600V2-1012_Jul14

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ANNEX I SPOT CHECK TEST

As the test lab for 5042G from TCL Communication Ltd., we, CTTL(Shouxiang), declare on our sole responsibility that, according to "Declaration of changes" provided by applicant, only the Spot check test should be performed. The test results are as below.

I.1 Conducted power of selected case

COM		Conducted Power (dBm)	
950MH-7	Channel 251(848.8MHz)	Channel 190(836.6MHz)	Channel 128(824.2MHz)
ODUNITZ	1	1	32.52
COM		Conducted Power(dBm)	
	Channel 810(1909.8MHz)	Channel 661(1880MHz)	Channel 512(1850.2MHz)
	29.08	1	1

Table I.1: The conducted power results for GSM850/1900

Table I.2: The conducted power results for GPRS

GSM 850	Measured Power (dBm)		
GPRS (GMSK)	251 190 128		
4 Txslot	/	/	28.23
PCS1900	Measured Power (dBm)		
GPRS (GMSK)	810	661	512
4 Txslots	/	29.23	/

Table I.3: The conducted power results for WCDMA

Itom	band		FDD V result	
item	ARFCN	4233 (846.6MHz)	4182 (836.4MHz)	4132 (826.4MHz)
WCDMA	١	1	1	22.54
ltono	band		FDD II result	
item	ARFCN	9538 (1907.6MHz)	9400 (1880MHz)	9262 (1852.4MHz)
WCDMA	١	1	1	22.45



I.2Spot Check test results

Table I.4: SAR Values (GSM 850 MHz Band - Head)

				Ambient	Temperature	: 22.4 °C L	iquid Tempera	ature: 22.0 °C			
Freque	ency		Teet	Figure	Conducted	Max tune-un	Measured	Reported	Measured	Reported	Power
	-	Side	Desition	No	Power	Nax. ture-up	SAR(10g)	SAR(10g)	SAR(1g)	SAR(1g)(Drift
MHz	Ch.		FUSILION	INU.	(dBm)	rowei (abiii)	(W/kg)	(W/kg)	(W/kg)	W/kg)	(dB)
824.2	128	Left	Touch	Fig.I.1	32.52	33.5	0.313	0.39	0.414	0.52	-0.09

Table I.5: SAR Values (GSM 850 MHz Band-Body)

			An	nbient Ter	mperature: 22	.4 °C Liqui	d Temperature	e: 22.0 °C			
Freau	encv	Mode	Toet	Figuro	Conducted	Max tupo up	Measured	Reported	Measured	Reported	Power
- 1-	,	(number of	Desition	Figure	Power	Nax. tune-up	SAR(10g)	SAR(10g)	SAR(1g)	SAR(1g)(Drift
MHz	Ch.	timeslots)	Position	INO.	(dBm)	Power (dBm)	(W/kg)	(W/kg)	(W/kg)	W/kg)	(dB)
824.2	128	GPRS (4)	Rear	Fig.I.2	28.23	28.5	0.768	0.82	1.01	1.07	-0.09

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

Table I.6: SAR Values(GSM1900 MHz Band - Head)

				Ambient	Temperature:	22.4 °C L	iquid Tempera	ture: 22.0 °C			
Freque	ency	0.1	Test	Figure	Conducted	Max. tune-up	Measured	Reported	Measured	Reported	Power
MHz	Ch.	Side	Position	No.	Power (dBm)	Power (dBm)	(W/kg)	SAR(10g) (W/kg)	SAR(1g) (W/kg)	SAR(1g)(W/kg)	Driπ (dB)
1909.8	810	Left	Touch	Fig.I.3	30.01	30.5	0.226	0.25	0.393	0.44	0.17

Table I.7: SAR Values (GSM 1900 MHz Band-Body)

			Ambi	ent Temp	erature: 22.4 °	C Liquid To	emperature:	22.0°C			
Freque	encv	Mode	Teat	Figuro	Conducted	Max tupo up	Measured	Reported	Measured	Reported	Power
		(number of	Test	Figure	Power	wax. tune-up	SAR(10g)	SAR(10g)	SAR(1g)	SAR(1g)	Drift
MHz	Ch.	timeslots)	Position	No.	(dBm)	Power (dBm)	(W/kg)	(W/kg)	(W/kg)	(W/kg)	(dB)
1880	661	GPRS (4)	Front	Fig.I.4	25.56	26.5	0.341	0.42	0.555	0.69	-0.15

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

Table I.8: SAR Values(WCDMA 850 MHz Band - Head)

				Ambient	Temperature:	22.4 °C Li	quid Tempera	ature: 22.0 °C			
Frequ	uency	Cide	Test	Figure	Conducted	Max. tune-up	Measured	Reported	Measured	Reported	Power
MHz	Ch.	Side	Position	No.	(dBm)	Power (dBm)	(W/kg)	(W/kg)	(W/kg)	W/kg)	Driπ (dB)
846.6	4233	Left	Touch	Fig.I.5	22.59	23.5	0.197	0.24	0.261	0.32	0.09



	Ambient Temperature: 22.4 °C Liquid Temperature: 22.0 °C											
Freau	Jencv	Teet	Figuro	Conducted	Max tuno un	Measured	Reported	Measured	Reported	Power		
	1	Desition	Figure	Power	Nax. turie-up	SAR(10g)	SAR(10g)	SAR(1g)	SAR(1g)(Drift		
MHz	Ch.	Position	INO.	(dBm)	Power (dBill)	(W/kg)	(W/kg)	(W/kg)	W/kg)	(dB)		
836.4	4182	Rear	Fig.I.6	22.51	23.5	0.230	0.29	0.301	0.38	0.04		

Table I.9: SAR Values (WCDMA 850 MHz Band-Body)

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

Table I.10: SAR Values(WCDMA1900 MHz Band - Head)

				Ambient	Temperature:	22.4 °C Li	quid Tempera	ture: 22.0 °C			
Frequ	ency		Test	Figure	Conducted	Max tune-un	Measured	Reported	Measured	Reported	Power
-	-	Side	Desition	Na	Power		SAR(10g)	SAR(10g)	SAR(1g)	SAR(1g)(Drift
MHz	Ch.		Position	INO.	(dBm)	Power (dBm)	(W/kg)	(W/kg)	(W/kg)	W/kg)	(dB)
1852.4	9262	Right	Touch	Fig.I.7	22.45	23.5	0.339	0.43	0.553	0.70	0.16

Table I.11: SAR Values (WCDMA1900 MHz Band-Body)

			Ambie	nt Temperature	e: 22.4 °C	Liquid Tempe	rature: 22.0 °	С		
Frequ	iency	Test	Figure	Conducted	Max. tune-up	Measured	Reported	Measured	Reported	Power
		Desition	No	Power	Dowor (dPm)	SAR(10g)	SAR(10g)	SAR(1g)	SAR(1g)(Drift
MHz	Ch.	FUSILION	NO.	(dBm)	Fower (ubili)	(W/kg)	(W/kg)	(W/kg)	W/kg)	(dB)
1852.4	9262	Rear	Fig.I.8	22.45	23.5	0.461	0.59	0.756	0.96	0.06

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

Table I.12: SAR Values (LTEBand7 - Head)

			Am	ibient Ten	nperatur	e: 22.2 °C	C L	iquid Tempe	rature: 21.7	^o C		
Frequ	uency	Mada	Cide	Test	Figure	Condu cted	Max. tune-up	Measured	Reported	Measured	Reported	Powe
MHz	Ch.	Mode	Side	Position	No.	Power (dBm)	Power (dBm)	(W/kg))(W/kg)	(W/kg)	W/kg)	r Driπ (dB)
2535	21100	1RB_ Mid	Right	Touch	Fig.I.9	22.93	23.0	0.293	0.30	0.546	0.55	-0.07

Note1: The LTE mode is QPSK_20MHz.

Table I.13: SAR Values (LTE Band7 -Body)

			Ambien	t Tempera	ture: 22.2 °	C Liq	uid Temper	ature: 21.7	°C		
Frequ	ency		Test	Figure	Conducte	Max.	Measured	Reported	Measured	Reported	Power
MHz	Ch.	Mode	Position	No.	d Power (dBm)	ower (dBm)	SAR(10g) (W/kg)	SAR(10g) (W/kg)	SAR(1g) (W/kg)	SAR(1g) (W/kg)	Drift (dB)
2535	21100	1RB_ Mid	Rear	Fig.I.10	22.93	23.0	0.518	0.53	0.268	0.27	0.03

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

Note2: The LTE mode is QPSK_20MHz.



I.3 Measured SAR Comparison

SAR Values (GSM 850 MHz Band - Head)

Freque	ency	Sido	Test	Battony Type	SAR(*	1g) (W/kg)
MHz	Ch.	Side	Position	Dattery Type	Original data	Spot check data
824.2	128	Left	Touch	CAB2000010C1	0.595	0.414

SAR Values (GSM 850 MHz Band - Body)

Frequency			Test Spacing			SAR(1g) (W/kg)	
MHz	Ch.	Mode/Band	Position	(mm)	Battery Type	Original data	Spot check data
824.2	128	GPRS	Rear	10	CAB2000010C1	1.02	1.01

SAR Values (PCS1900 MHz Band - Head)

Freque	Frequency		Test	Pottom Tuno	SAR(1g) (W/kg)		
MHz	Ch.	Side	Position	Ballery Type	Original data	Spot check data	
1909.8	810	Left	Touch	CAB2000010C1	0.414	0.393	

SAR Values (PCS1900 MHz Band - Body)

Frequency			Toot	Specing		SAR(1g) (W/kg)	
MHz	Ch.	Mode/Band	Position	(mm)	Battery Type	Original data	Spot check data
1880	661	GPRS	Bottom	10	CAB2000010C1	0.581	0.555

SAR Values (WCDMA850 MHz Band - Head)

Frequ	Frequency		Test	Pottom Tupo	SAR(1g) (W/kg)		
MHz	Ch.	Side	Position	Ballery Type	Original data	Spot check data	
846.6	4233	Left	Touch	CAB2000010C1	0.363	0.261	

SAR Values (WCDMA850 MHz Band - Body)

Frequency		Test	Spacing	Pattony Type	SAR(1g) (W/kg)		
MHz	Ch.	Position	(mm)	Dattery Type	Original data	Spot check data	
836.4	4182	Rear	10	CAB2000010C1	0.570	0.301	

SAR Values (WCDMA1900 MHz Band - Head)

Frequ	Frequency		Test	Bottony Type	SAR(1g) (W/kg)		
MHz	Ch.	Side	Position	Ballery Type	Original data	Spot check data	
1852.4	9262	Left	Touch	CAB2000010C1	0.662	0.553	

Frequ	ency	Test	Spacing	Pottom, Tupo	SAR(1	lg) (W/kg)
MHz	Ch.	Position	(mm)	Ballery Type	Original data	Spot check data
1852.4	9262	Bottom	10	CAB2000010C1	0.986	0.756

SAR Values (WCDMA1900 MHz Band - Body)



	SAN Values (LIE Danu / - Head)										
Frequ	uency						SAR(1g) (W/kg)			
MHz	Ch.	Mode	Side	Test Position	Spacing (mm)	Battery Type	Original data	Spot check data			
2535	21100	1RB_Mid	Right	Touch	0	CAB2000010C1	0.563	0.546			

SAR Values (LTE Band 7 - Head)

SAR Values (LTE Band 7 - Body)

Frequ	uency					SAR(1	g) (W/kg)
MHz	Ch.	Mode	Test Position	Spacing (mm)	Battery Type	Original data	Spot check data
2535	21100	1RB_Mid	Rear	10	CAB2000010C1	0.556	0.518

I.4 Reported SAR Comparison

	Technology Dond	Reported SAR	Reported SAR
	Technology Banu	1g (W/Kg): original	1g (W/Kg): spot check
	GSM 850	0.65	0.52
Head	PCS 1900	0.46	0.44
(Separation Distance	UMTS FDD 5	0.43	0.32
0mm)	UMTS FDD 2	0.82	0.70
	LTE Band 7	0.57	0.55
	GSM 850	1.09	1.07
Body-worn	PCS 1900	0.72	0.69
(Separation Distance	UMTS FDD 5	0.65	0.38
10mm)	UMTS FDD 2	1.23	0.96
	LTE Band 7	0.57	0.53



850 Left Cheek Low

Date: 2015-05-8 Electronics: DAE4 Sn777 Medium: Head 850 MHz Medium parameters used: f = 825 MHz; $\sigma = 0.918$ mho/m; $\epsilon r = 42.94$; $\rho = 1000$ kg/m³ Ambient Temperature: 22.3°C Liquid Temperature: 21.8°C Communication System: GSM 850 Frequency: 824.2 MHz Duty Cycle: 1:8.3 Probe: EX3DV4 - SN3846 ConvF(9.18, 9.18, 9.18)

Cheek Low/Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm Maximum value of SAR (interpolated) = 0.454 W/kg

Cheek Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 7.787 V/m; Power Drift = -0.09 dB Peak SAR (extrapolated) = 0.531 W/kg SAR(1 g) = 0.414 W/kg; SAR(10 g) = 0.313 W/kg Maximum value of SAR (measured) = 0.452 W/kg



Fig.I.1 850MHz



850 Body Rear Middle

Date: 2015-05-8 Electronics: DAE4 Sn777 Medium: Body 850 MHz Medium parameters used (interpolated): f = 836.6 MHz; $\sigma = 0.93$ S/m; $\epsilon_r = 53.86$; $\rho = 1000$ kg/m³ Ambient Temperature: 22.4°C Liquid Temperature: 22.0°C Communication System: GSM 850 GPRS Frequency: 836.6 MHz Duty Cycle: 1:2 Probe: EX3DV4 - SN3846 ConvF(9.09, 9.09, 9.09)

Rear Middle/Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm Maximum value of SAR (interpolated) = 1.10 W/kg

Rear Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mmReference Value = 33.44 V/m; Power Drift = -0.09 dB Peak SAR (extrapolated) = 1.26 W/kg **SAR(1 g) = 1.01 W/kg; SAR(10 g) = 0.768 W/kg**

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



Fig.I.2 850 MHz



GSM1900 Left Cheek High

Date: 2015-05-09 Electronics: DAE4 Sn777 Medium: Head 1900 MHz Medium parameters used (interpolated): f = 1910 MHz; $\sigma = 1.447$ S/m; $\epsilon_r = 38.45$; $\rho = 1000$ kg/m³ Ambient Temperature: 22.4°C Liquid Temperature: 22.0°C Communication System: GSM 1900MHz Frequency: 1909.8 MHz Duty Cycle: 1:8.3 Probe: EX3DV4 - SN3846 ConvF(7.26, 7.26, 7.26)

Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm Maximum value of SAR (interpolated) = 0.454 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 5.464 V/m; Power Drift = 0.17 dB Peak SAR (extrapolated) = 0.653 W/kg SAR(1 g) = 0.393 W/kg; SAR(10 g) = 0.226 W/kg

Maximum value of SAR (measured) = 0.433 W/kg



Fig.I.3 1900 MHz



GSM1900 Body Bottom Middle

Date: 2015-05-09 Electronics: DAE4 Sn777 Medium: Body 1900 MHz Medium parameters used: f = 1880 MHz; $\sigma = 1.504$ S/m; $\epsilon_r = 53.966$; $\rho = 1000$ kg/m³ Ambient Temperature: 22.4°C Liquid Temperature: 22.0°C Communication System: GSM 1900MHz GPRS Frequency: 1880 MHz Duty Cycle: 1:2 Probe: EX3DV4 - SN3846 ConvF(7.15, 7.15, 7.15)

Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm Maximum value of SAR (interpolated) = 0.662 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 9.683 V/m; Power Drift = -0.15 dB Peak SAR (extrapolated) = 0.899 W/kg SAR(1 g) = 0.555 W/kg; SAR(10 g) = 0.341 W/kg Maximum value of SAR (measured) = 0.667 W/kg



Fig.I.4 1900 MHz



WCDMA 850 Left Cheek Middle

Date: 2015-05-08 Electronics: DAE4 Sn777 Medium: Head 850 MHz Medium parameters used (interpolated): f = 846.6 MHz; $\sigma = 0.94$ S/m; $\epsilon_r = 42.8$; $\rho = 1000$ kg/m³ Ambient Temperature: 22.4°C Liquid Temperature: 22.0°C Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1 Probe: EX3DV4 - SN3846 ConvF(9.18, 9.18, 9.18)

Cheek High/Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm Maximum value of SAR (interpolated) = 0.284 W/kg

Cheek High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 5.546 V/m; Power Drift = 0.09 dB Peak SAR (extrapolated) = 0.333 W/kg

SAR(1 g) = 0.261 W/kg; SAR(10 g) = 0.197 W/kg

Maximum value of SAR (measured) = 0.283 W/kg



Fig.I.5 WCDMA 850



WCDMA 850 Body Rear Middle

Date: 2015-05-08 Electronics: DAE4 Sn777 Medium: Body 850 MHz Medium parameters used (interpolated): f = 846.6 MHz; $\sigma = 0.94$ S/m; $\epsilon_r = 53.7$; $\rho = 1000$ kg/m³ Ambient Temperature: 22.4°C Liquid Temperature: 22.0°C Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1 Probe: EX3DV4 - SN3846 ConvF(9.09, 9.09, 9.09)

Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm Maximum value of SAR (interpolated) = 0.332 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mmReference Value = 18.16 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 0.368 W/kg SAR(1 g) = 0.301 W/kg; SAR(10 g) = 0.230 W/kg

Maximum value of SAR (measured) = 0.329 W/kg



Fig.I.6 WCDMA 850



WCDMA 1900 Right Cheek Low

Date: 2015-05-09 Electronics: DAE4 Sn777 Medium: Head 1900 MHz Medium parameters used (interpolated): f = 1852.4 MHz; $\sigma = 1.42$ S/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³ Ambient Temperature: 22.4°C Liquid Temperature: 22.0°C Communication System: WCDMA 1900 Frequency: 1852.4 MHz Duty Cycle: 1:1 Probe: EX3DV4 - SN3846 ConvF(7.26, 7.26, 7.26)

Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm Maximum value of SAR (interpolated) = 0.586 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mmReference Value = 8.170 V/m; Power Drift = 0.16 dB Peak SAR (extrapolated) = 0.887 W/kg SAR(1 g) = 0.553 W/kg; SAR(10 g) = 0.339 W/kg

Maximum value of SAR (measured) = 0.595 W/kg



Fig.I.7 WCDMA1900



WCDMA 1900 Body Rear Low

Date: 2015-03-16 Electronics: DAE4 Sn777 Medium: Body 1900 MHz Medium parameters used: f = 1852.4 MHz; $\sigma = 1.53$ S/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³ Ambient Temperature: 22.4°C Liquid Temperature: 22.0°C Communication System: WCDMA 1900 Frequency: 1880 MHz Duty Cycle: 1:1 Probe: EX3DV4 - SN3846 ConvF(7.15, 7.15, 7.15)

Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm Maximum value of SAR (interpolated) = 0.881 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 11.07 V/m; Power Drift = 0.06 dB Peak SAR (extrapolated) = 1.23 W/kg SAR(1 g) = 0.756 W/kg; SAR(10 g) = 0.461 W/kg Maximum value of SAR (measured) = 0.908 W/kg



Fig.I.8 WCDMA1900



LTE Band7 Right Cheek Middle with QPSK_20M_1RB_Middle

Date: 2015-05-17 Electronics: DAE4 Sn777 Medium: Head2600 MHz Medium parameters used: f = 2535 MHz; $\sigma = 1.95$ mho/m; $\epsilon r = 38.015$; $\rho = 1000$ kg/m³ Ambient Temperature: 22.2°C Liquid Temperature: 21.7°C Communication System: LTE Band7Frequency: 2535 MHz Duty Cycle: 1:1 Probe: EX3DV4 - SN3846 ConvF(6.50, 6.50, 6.50)

Area Scan (81x141x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm Maximum value of SAR (interpolated) = 0.635 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 5.110 V/m; Power Drift = 0.55 dB Peak SAR (extrapolated) = 1.05 W/kg SAR(1 g) = 0.546 W/kg; SAR(10 g) = 0.293 W/kg Maximum value of SAR (measured) = 0.617 W/kg



Fig.I.9 LTE Band 7



LTE Band7 Body Rear Middle with QPSK_20M_1RB_Middle

Date: 2015-05-17 Electronics: DAE4 Sn777 Medium: Body2600 MHz Medium parameters used: f = 2535 MHz; $\sigma = 2.1$ mho/m; $\epsilon r = 51.5$; $\rho = 1000$ kg/m³ Ambient Temperature: 22.2°C Liquid Temperature: 21.7°C Communication System: LTE Band7 Frequency: 2535 MHz Duty Cycle: 1:1 Probe: EX3DV4 - SN3846 ConvF(6.68, 6.68, 6.68)

Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm Maximum value of SAR (interpolated) = 0.567 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 8.678 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 1.01 W/kg SAR(1 g) = 0.518 W/kg; SAR(10 g) = 0.268 W/kg Maximum value of SAR (measured) = 0.643 W/kg



Fig.I.10 LTE Band 7



ANNEX J Accreditation Certificate

