

Appendix C

Phantom Description

Schmid & Panner Engine	eering AG	s	p	e	a	g
Zeughausstrater 43, 80 Prone +41 1 245 9700, nfo©igeag com, HitpUA	Fax +41 1 245 9779					
Certificate of Co	onformity / First Article Inspect	ion				
item	SAM Twin Phantom V4.0		_			_
Type No	QD 000 P40 C				_	
Series No	TP-1150 and higher	_			_	
Manufacturer	SPEAG Zeughausstrasse 43 CH-8004 Zürich Switzerland					
Complete tests were wries first article Typ using further series t	n process used allows the limitation to t made on the pre-series Type No. OD 0 pe No. QD 000 P40 BA, Serial No. TP-1 terns (called samples) or are tested at e	000 P 1008. nach 1	40 AA, 5 Certain tem	Serial No. TI	have	been retest
Test	Requirement		talis			Units tested
Dimensions	Compliant with the geametry according to the CAD model.	1	SCAD		1	First article, Samples
Material thickness of shell	Compliant with the requirements according to the standards	an		2mm in flat c areas of m	1	first article, Samples, TP-1314 ff,
Material thickness at ERP	Compliant with the requirements according to the standards	Bm	m +/- 0.:	Zrom at ER		irst article, All items
Material parameters	Dielectric parameters for required frequencies	Re		0 GHz: mittivity <: nt < 0.05		Material uamples
Material resistivity	The material has been tested to be	DE	GMBE L	been	1	Pre-series,

1051) ikada wawanz	Lietais	DUIGS DESTED
Dimensions	Compliant with the geometry according to the CAD model.	(T'IS CAD File (*)	First article, Samples
Material thickness of shell	Compliant with the requirements according to the standards	2mm +/- 0.2mm in flat and specific areas of head section	First article, Samples, TP-1314 ff.
Material thickness at ERP	Compliant with the requirements according to the standards	6mm +/- 0.2mm at ERP	First article, All items
Material parameters	Dielectric parameters for required frequencies	300 MHz - 0 GHz: Relative permittivity < 5. Loss tangent < 0.05	Material samples
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions. Observe technical Note for material compatibility.	DEGMBE based simulating liquids	Pre-series, First article, Material samples
Segging	Compliant with the requirements according to the standards. Sagging of the flat section when filled with tissue simulating figuid	< 1% typical < 0.8% if blied with 155mm of HSL900 and without DUT below	Prototypes, Sample testing

Standards

- CENELEC EN 50361
- IEEE Sid 1528-2003 IEC 62209 Part 1
- (1)(3)(4)()
- FCC OET Buildin 65, Supplement C, Edition 01-01 The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of the other documents.

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standards [1] to [4]

07.07.2005

Date	

Signature / Stamp

*	-			
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	arrau to	1.04	Wron/	Fau-341-1 245 9778

Doc He MIL- QO 000 PAR C - #

1113 Page

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Member of SGS Group



System Validation from Original Equipment Supplier

ccredited by the Swiss Accreditation he Swiss Accreditation Service fulfilateral Agreement for the rec	is one of the signatorie	es to the EA	Accreditation No.: SCS 0108
Allent SGS-TW (Auder	2		to: D750V3-1015_Aug19
CALIBRATION C	ERTIFICATE		
Object	D750V3 - SN:10	15	
Calibration procedure(s)	QA CAL 05.v11		and a state of the
	Calibration Proce	edure for SAR Validation Source	s between 0.7-3 GHz
Calibration date:	August 23, 2019	0	
All calibrations have been conducts	ed in the closed laborato	robability are given on the following pages a ry facility: environment temperature (22 + 3)	
All calibrations have been conducts Calibration Equipment used (M&TE Primary Standards Power meter NRP	ad in the closed laborato E critical (or calibration) ID # SN: 104778	ny facility: environment temperature (22 + 3) Gal Date (Certificate No.) 03-Apr-10 (No. 217-03892/02893)	°C and humidity = 70% Beheduled Calibration Apr-20
All calibrations have been conclucts Calibration Equipment used (M&TE Primary Standards Power meter NRIP Power search RIP/291	ed in the closed laborato E critical for calibration)	ry facility: environment temperature (22 + 3) Cal Date (Certificate No.)	C and humidity = 70% Scheduled Calibration
All calibrations have been conclude Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sonsor NRP-291 Power sonsor NRP-291 Power sonsor NRP-291	ed in the closed laborato E critical (or calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 203245 SN: 2050 (20k)	ry facility: environment temperature (22 + 3) Gel Date (Certificate No.) 03-Apr-16 (No. 217-02802)02892) 03-Apr-19 (No. 217-02803) 03-Apr-19 (No. 217-02803) 04-Apr-19 (No. 217-02804)	°C and humidity = 70% Scheduled Calibration Apr-20 Apr-20
All calibrations have been conduct Calibration Equipment used (MATE Primary Standards Dower meter MRP Power sansor NRP-291 Power sansor NRP-291 Reference 20 dD Attenuator Type-Ar miamatic combination	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103244 SN: 103244 SN: 5032 (20k) SN: 5047.2/08327	Cal Date (Certificate No.) 03-Apr-10 (No. 217-03892/02892) 03-Apr-10 (No. 217-03892) 03-Apr-10 (No. 217-02893) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02894)	*C and humidity < 70% Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20
All calibrations have been conduct Calibration Equipment used (MATE Primary Standards Power meter NBP Power sansor NRP-291 Power sansor NRP-291 Reference 82 of Attenuator Type-N mismalch contisinalian Reference 87 of Calibration	ed in the closed laborato E critical (or calibration) 5N: 103244 5N: 103245 5N: 103245 5N: 2026 (204) 5N: 5060 (204) 5N: 5060 (204) 5N: 5061 (206)	ry facility: environment temperature (22 + 3) Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892)02993) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02894) 29-May-19 (No. 217-02896) 29-May-19 (No. 217-02896)	C and humidity < 70% Scheduled Calibration Apr-30 Apr-20 Apr-20 Apr-20 Apr-20 May-20
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All calibrations have been conduct Calibration Equipment used (MAT8 Primary Standards Dower meter MRP Power sansor NRP-251 Power meter F4419B	ed in the closed laborato E critical (or calibration) ID # SN: 104778 SN: 104778 SN: 103244 SN: 103244 SN: 103244 SN: 103244 SN: 0026(20k) SN: 5047 2/ 06327 SN: 7349 SN: 5047 ID # ID #	Cal Data (Certificate No.) 03-Apr-19 (No. 217-02892/02892) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02894) 29-May-19 (No. 217-02894) 29-May-19 (No. 217-02894) 20-Apr-19 (No. 124-03495) 20-Apr-19 (No. 124-03495) 20-Apr-19 (No. 1464-031-Apr14) Check Date (in house)	*C and humidity < 70% Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house Check: Cct-20
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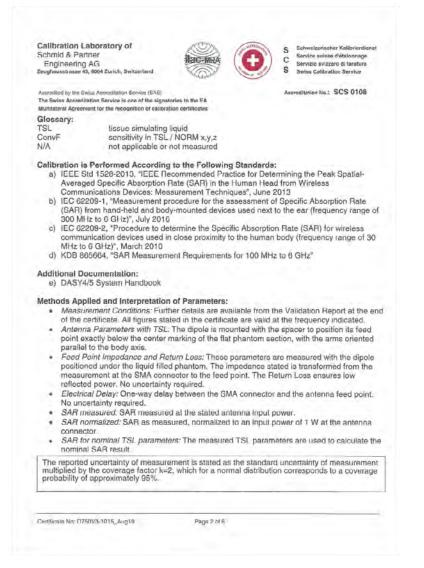
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Measurement Conditions

DASY Version	DASY5	V52 10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.7 + 6 %	0.90 mhn/m ± 6 %
Head TSL temperature change during test	< 0,5 °C	فيت	-

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Nead TSL	Condition	
SAR measured	250 mW input power	2.16 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.60 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm ² (10 g) of Head TSL	condition	
SAR averaged over 10 cm ² (10 g) of Head TSL SAR measured	condition 250 mW input power	1.42 W/kg

Certificate No: D750V3-1015_Aug19

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Impedance, transformed to feed point		.53.1 Ω - 0.6 μΩ
Return Loss		- 30.4 dB
Electrical Delay (one direction) After long term use with 100W radiated power, only The tilpole is made of standard semifigid coaxial ca second arm of the dipole. The antenna is therefore are added to the dipole arms in order to improve me Measurement Conditions' prangraph The SAR dal according to the Standard. No excessive force must be applied to the dipole ar	ble. The center conduct short-circuited for DC- stching when loaded at ta are not affected by t	ctor of the feeding line is directly connected to th signals. On some of the dipoles, small end caps soording to the position as explained in the his change. The overall dipole length is still
Isedpoint may be damaged.	na, ocasise ney nigi	
Manufactured by		SPEAG

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Date: 23.08.2019

DASY5 Validation Report for Head TSL

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MIIz; Type: D750V3; Serial: D750V3 - SN:1015

Communication System: UID 0 - CW; Frequency: 750 MHz Medium parameters used: f = 750 MHz; σ = 0.9 S/m; ϵ_r = 42,7; ρ = 1000 kg/m³ Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

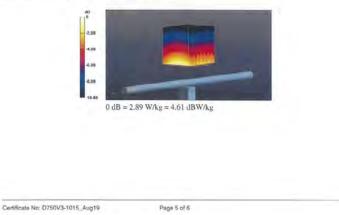
DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(10.07, 10.07, 10.07) @ 750 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- · Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 4.9 (tront); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

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 = 59.91 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.25 W/kg SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.42 W/kg

Maximum value of SAR (measured) = 2.89 W/kg



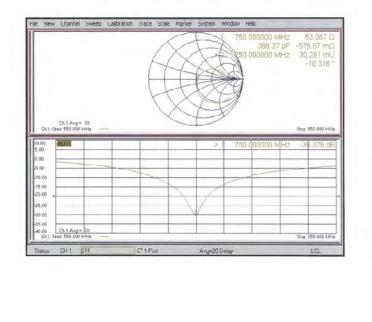
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Impedance Measurement Plot for Head TSL



Certificate No: D750V3-1015_Aug19	Page 6 of 6	
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Accredited by the Swiss Accreditation The Swiss Accreditation Service i Aultilateral Agreement for the rec	is one of the signatorie	s to the EA	creditation No.: SCS 0108
lient Auden		Certificate No	: D750V3-1078_Jun19
CALIBRATION CI	ERTIFICATE		
Dbject	D750V3 - SN:107	78	
Calibration procedure(s)	QA CAL-05.v11 Calibration Proce	edure for SAR Validation Sources	between 0.7-3 GHz
Calibration date:	June 27, 2019		
All calibrations have been conducte	ad in the closed laborato	ny facility: environment temperature (22 \pm 3)"	C and humidity < 70%.
Calibration Equipment used (M&TE	E critical for calibration)		
Calibration Equipment used (M&TE Primary Standards	E critical for calibration)	Cal Date (Certificate No.)	Scheduled Calibration
Calibration Equipment used (M&TE Primary Standards Power meter NRP	E critical for calibration)	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893)	Scheduled Calibration Apr-20
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91	E critical for calibration)	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892)	Scheduled Calibration Apr-20 Apr-20
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91	E critical for calibration)	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893)	Scheduled Calibration Apr-20
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893)	Scheduled Calibration Apr-20 Apr-20 Apr-20
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Type-N mismatch combination	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k)	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID #	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (in house)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Apr-20 Scheduled Check
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: 6B39512475	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (in house) 30-Oct-14 (in house check Feb-19)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (in house) 30-Oct-14 (in house check Feb-19) 07-Oct-15 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20 In house check: Oct-20
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A	E critical for calibration) ID # SN: 104778 SN: 103245 SN: 50472 / 06327 SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (in house) 30-Oct-14 (in house check: Feb-19) 07-Oct-15 (in house check Oct-18) 07-Oct-15 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20 In house check: Oct-20 In house check: Oct-20 In house check: Oct-20
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB. Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5047.2 / 06327 SN: 5047.2 / 06327 SN: 601 ID # SN: 603 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41092317 SN: 100972	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. 217-02895) 29-May-19 (No. EX3-7349 May19) 30-Apr-19 (No. DAE4-601 Apr19) Check Date (in house) 30-Oct1-14 (in house check Reb-19) 07-Oct-15 (in house check Oct-18) 15-Jun-15 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20 In house check: Oct-20 In house check: Oct-20 In house check: Oct-20 In house check: Oct-20
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06	E critical for calibration) ID # SN: 104778 SN: 103245 SN: 50472 / 06327 SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (in house) 30-Oct-14 (in house check: Feb-19) 07-Oct-15 (in house check Oct-18) 07-Oct-15 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20 In house check: Oct-20 In house check: Oct-20 In house check: Oct-20
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Aglient E8358A	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41092317 SN: US37292783 SN: MY41092317 SN: US41080477 Name	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (in house) 30-Oct-14 (in house check Fab-19) 07-Oct-15 (in house check Oct-18) 15-Jun-15 (in house check Oct-18) 15-Jun-15 (in house check Oct-18) 15-Mar-14 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20 In house check: Oct-20 In house check: Oct-20 In house check: Oct-20
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A Power sensor HP 8481A Power sensor HP 8481A Power sensor HP 8481A	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047 2 / 06327 SN: 7349 SN: 601 ID # SN: 6B39512475 SN: US37292783 SN: MY41092317 SN: US310972 SN: US41080477	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (in house) 30-Oct-14 (in house check Fab-19) 07-Oct-15 (in house check Oct-18) 07-Oct-15 (in house check Oct-18) 15-Jun-15 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Scheduled Check In house check: Oct-20 In house check: Oct-20
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Certificate No: D750V3-1078_Jun19

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Accreditation No.: SCS 0108

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Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) 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: D750V3-1078 Jun19

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Measurement Conditions

ASY system configuration, as far as not	given on page 1.	
DASY Version	DASY5	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.0 ± 6 %	0.88 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	2.13 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.60 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	1.39 W/kg

Body TSL parameters

The following parameters and calculations were applied.

<u> </u>	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.5 ± 6 %	0.96 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	2.16 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	8.64 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	1.42 W/kg

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.4 Ω + 1.4 jΩ
Return Loss	- 25.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.3 Ω - 2.4 jΩ
Return Loss	- 32.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.037 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

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Report No. :E5/2019/A0006 Rev: 01 Page: 12 of 57

DASY5 Validation Report for Head TSL

Date: 20.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1078

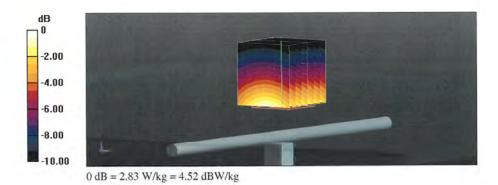
Communication System: UID 0 - CW; Frequency: 750 MHz Medium parameters used: f = 750 MHz; $\sigma = 0.88 \text{ S/m}$; $\varepsilon_r = 42$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(10.07, 10.07, 10.07) @ 750 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001 .
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470) .

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 = 60.18 V/m; Power Drift = 0.01 dB Peak SAR (extrapolated) = 3.21 W/kg SAR(1 g) = 2.13 W/kg; SAR(10 g) = 1.39 W/kg Maximum value of SAR (measured) = 2.83 W/kg



Certificate No: D750V3-1078 Jun19

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Report No. :E5/2019/A0006 Rev: 01 Page: 13 of 57

481 dP

Stop 950.000 MHz

LCL

File View Channel Sweep Calibration Trace Scale Marker System Window Help 750.000000 MHz 55.441 Q 290.06 pH 1.3669 Q 50 000000 MHz 53.203 mU 13.359 * Ch 1 Avg = 20 Ch1: Start 550,000 MHz Stop 950,000 MHz 10.00 dB 511 000000 MHz ъ 00 0.00 5.00

C* 1-Port

Impedance Measurement Plot for Head TSL

Certificate No: D750V3-1078_Jun19

10.00 15.00 20.00 25.00 30.00 35.00

Status

40.00 Ch 1 Avg = 20 Ch 1: Start 550.000 MH

CH 1: 511

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Avg=20 Delay

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DASY5 Validation Report for Body TSL

Date: 27.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1078

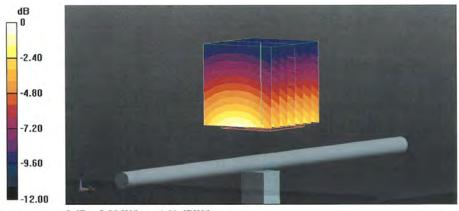
Communication System: UID 0 - CW: Frequency: 750 MHz Medium parameters used: f = 750 MHz; $\sigma = 0.96 \text{ S/m}$; $\varepsilon_r = 55.5$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(10.4, 10.4, 10.4) @ 750 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection) .
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019 .
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005 .
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

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 = 55.85 V/m; Power Drift = -0.00 dB Peak SAR (extrapolated) = 3.24 W/kg SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.42 W/kg Maximum value of SAR (measured) = 2.89 W/kg



0 dB = 2.89 W/kg = 4.61 dBW/kg

Certificate No: D750V3-1078 Jun19

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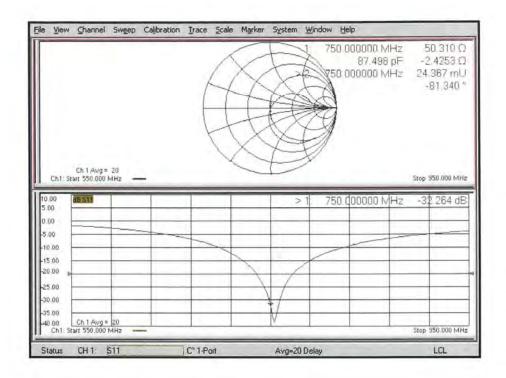
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Report No. :E5/2019/A0006 Rev: 01 Page: 15 of 57

Impedance Measurement Plot for Body TSL



Certificate No: D750V3-1078_Jun19

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Accredited by the Swiss Accreditation Service	is one of the signatoria	as to the EA	coreditation No.: SCS 0108
Iultilateral Agreement for the reconstruction SGS-TW (Auder			o: D835V2-4d063_Aug19
CALIBRATION C	ERTIFICATE	E	
Object	D835V2 - SN:4d	063	
Calibration procedure(s)	QA CAL-05.V11 Calibration Proce	edure for SAR Validation Source	s between 0.7-3 GHz
Calibration date:	August 23, 2019		
All calibrations have been conduct		ry facility: environment temperature (22 ± 3)*	C and humidRy < 70%.
M pailbrations have been conduct Calibration Equipment used (M&TF Primary Standards	E critical for calibration)	ry facility: environment temperature (22 ± 3)* Gal Date (Certificate No.)	C and humidity < 70%. Scheduled Calibration
All calibrations have been conduct Calibration Equipment used (MATE Primary Standards Power meter NBP	E critical for calibration)	ry Isoliky: environment temperature (22 = 3)* Gal Date (Centricate No.) 03-Apr-19 (No. 217-02892/02893)	Scheduled Calibration
All outlibrations have been conduct Calibration Equipment used (M&TE Primary Standards Power meter NRP Power ensor NRP-201	E critical for calibration)	ry facility: environment temperature (22 ± 5) ⁴ <u>Cal Date (Centricate No.)</u> OS-Agr-19 (No. 217-02692(02893) OS Agr-19 (No. 217-02692)	Scheduled Calibration Apr-20 Apr-20
All outlibrations have been conduct Calibration Equipment used (M&TE Primary Standards Power meter: NRP-291 Power sensor NRP-291 Power sensor NRP-291	E critical for calibration) ID N SN: 104778 SN: 103244	ry Isoliky: environment temperature (22 = 3)* Gal Date (Centricate No.) 03-Apr-19 (No. 217-02892/02893)	Scheduled Calibration Apr-20 Apr-20 Apr-20
M cultrations have been conduct Calibration Equipment used (MATI Primary Standards "Dower mellsr NRP Dower sensor NRP-201 Power sensor NRP-201 Power sensor NRP-201 Heterance 20 dB Attenuator Typeet N winshalt combination	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5058 (20k) SN: 5047.2 / 06327	ry facility: environment temperature (22 = 3)* <u>Cal Date (Certificate No.)</u> 00-Apr-19 (No. 217-02802) 00 Apr-19 (No. 217-02802) 03-Apr-19 (No. 217-02803)	Scheduled Calibration Apr-20 Apr-20
All pullimations have been conduct Calibration Equipment used (MATE Primary Standards Power meller NPIP Power anneor NRP-201 Power anneor NRP-201 Power anneor NRP-201 Heterence 2X 08 Afternuator Type-N mismatch combination Reference Prote XXIDV4	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (201k) SN: 5058 (201k) SN: 5047 2 / 06327 SN: 7340	ry facility: environment temperature (22 = 3)* Cat Uate (Certificate No.) 03-Apr-19 (No. 217-02802/02893) 03 Apr-19 (No. 217-02802) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29 Amy-16 (No. 217-02895) 29 Amy-16 (No. 217-02895)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20
All pullimations have been conduct Calibration Equipment used (MATE Primary Standards Power meller NPIP Power anneor NRP-201 Power anneor NRP-201 Power anneor NRP-201 Heterence 2X 08 Afternuator Type-N mismatch combination Reference Prote XXIDV4	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5058 (20k) SN: 5047.2 / 06327	ry facility: environment temperature (22 ∈ 3) ⁴ Cal Date (Certiticate No.) Co-Apr-19 (No. 217-02682/02893) Co-Apr-19 (No. 217-02893) D4-Apr-19 (No. 217-02893) D4-Apr-19 (No. 217-02894) O4-Apr-19 (No. 217-02895)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20
All pullimations have been conduct Calibration Equipment used (MATI Primary Standards Power energy NRP-201 Power sensor NRP-201 Power sonsor NRP-201 Power s	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (201k) SN: 5058 (201k) SN: 5047 2 / 06327 SN: 7340	ry facility: environment temperature (22 = 3)* Cat Uate (Certificate No.) 03-Apr-19 (No. 217-02802/02893) 03 Apr-19 (No. 217-02802) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29 Amy-16 (No. 217-02895) 29 Amy-16 (No. 217-02895)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20
All pullibrations have been conduct Calibration Equipment used (MATI Primary Standards Power meets NRP Power encor NRP-201 Heferance zo ds Attenuator Power and combination Reference Probe EX3DV4 DAF4 Secondary Standards Power meter E4410B	E critical for calibration) ID # SN: 100244 SN: 100244 SN: 100244 SN: 50047 270 SN: 5047 2705 SN: 5047 2705 SN: 5047 2705 SN: 5041 ID # EN: C0309512475	ry facility: environment temperature (22 ∈ 3) ⁴ Cal Date (Certificate No.) 00 Apr 19 (No. 217-02692)(2283) 00 Apr 19 (No. 217-02693) 04 Apr 19 (No. 217-02693) 04 Apr 19 (No. 217-02693) 20 Apr 19 (No. 21	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20
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All pulliprolions have been conduct Calibration Equipment used (MATI Primary Standards Prover enter NRP-201 Power enter NRP-201 Power sensor NRP-201 Herternero 2008 Anemution Type-N mismatch combination Reference Probe EX4DV4 DAF4 Secondary Standards Power metter E44108 Power sensor HP 6481A Power sensor HP 6481A	E critical for calibration) ID # SN: 103245 SN: 103244 SN: 00345 SN: 0038 (200) SN: 5047 2 / 05327 SN: 7340 SN: 5047 2 / 05327 SN: 7340 SN: 0039512475 SN: 0337292783 SN: W141082317	ry facility: environment temperature (22 ± 5) ⁴ Cal Uate (Centricate No.) 03 Apr 19 (No. 217 -02892(02893) 03 Apr 19 (No. 217 -02893) 04 Apr 19 (No. 217 -02893) 04 Apr 19 (No. 217 -02893) 04 Apr 19 (No. 217 -02893) 05	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In Incuse check, Oct-20 In Incuse check: Oct-20 In Incuse check: Oct-20
All oxilianalions have been conduct Calibration Equipment used (MATT Primary Standards Dower realers NFP Power realers NFP Power eensor NFP-201 Heterance 24 06 Attenuator Typer N mismatch combination Reletance Probe EX3DV4 DAE4 Secondary Standards Power motor E4108 Power sensor NFP 6481A Power Sensor NFP 6481A Power Sensor NFP 6481A	E critical for calibration) ID # SN: 104778 SN: 103245 SN: 5058 (20k) SN: 5058 (20k) SN: 5058 (20k) SN: 536 (20k) SN: 7340 SN: 7340 SN: 5059 (20k) SN: 5059 (20k)	ry facility: environment temperature (22 ± 5) ⁴ <u>Cal Jate (Certificate No.)</u> 03-Apr-19 (No. 217-02890202893) 03 Apr-19 (No. 217-028902) 04-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02893) 20-Apr-19 (No. 217-02893) 30-Apr-19 (No. 217-02893) 30-Apr-19 (No. 217-02893) 30-Apr-19 (No. 217-02893) 30-Apr-19 (No. 217-02893) 30-Apr-19 (No. 217-02893) 30-Oct-14 (in house check Feb-19) 30-Oct-14 (in house check Feb-19)	Scheduled Calibration Apr-20 Apr-20 Apr-25 Apr-25 Apr-26 Apr-20 May-20 Apr-20 Scheduled Check In Incuse check: Oct-20 In Incuse check: Oct-20
All pailbrailions have been conduct Calibration Equipment used (MATE Primary Standards Power relens NFP Power eensor NFP-201 Power ananco NFP-201 Fereina 20 do Attenuator Type: N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power metor E410B Power sensor HP 6481A Power sensor HP 6481A Power Sensor HP 6481A	E-critical for calibration) ID # SN: 104778 SN: 103244 SN: 103345 SN: 5058 (20%) SN: 5058 (20%) SN: 5058 (20%) SN: 5058 (20%) SN: 5058 (20%) SN: 5058 (20%) SN: 10537292783 SN: IU537292783 SN: IU537292783 SN: MY41082317 SN: I0772	ry facility: environment temperature (22 ± 3)* Cal Date (Certificate No.) 03-Apr-19 (No. 217-02802/02893) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02894) 05-Apr-19 (No. 217-	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Scheduled Check In Incus direck, Oct-20 In house check: Oct-20
All oxilianations have been conduct Calibration Equipment used (MATE Primary Standards Power meter NRP 201 Power sensor NRP-201 Power sensor NRP-201 Power sensor NRP-201 Type-Yn rissmatch combination Reference 20 vol Anemator Proter Et4108 Power sensor HP 881A Power sensor HP 881A Power sensor HP 881A Power sensor HP 881A Network Analyzer Agilant E8358A	E-critical for calibration) ID # SN: 104778 SN: 103244 SN: 5058 (20%) SN: 1037992783 SN: MY41082317 SN: 00541000477	ry facility: environment temperature (22 ∈ 3) ⁴ Cal Date (Certificate No.) 00 Apr 19 (No. 217-02692)(2293) 00 Apr 19 (No. 217-02693) 04 Apr 19 (No. 217-02693) 04 Apr 19 (No. 217-02693) 29 May 10 (No. 217-02693) 20 Apr 19 (No. 21	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In Insue check, Oct-20 In Insue check: Oct-20 In Insue check: Oct-20 In Insue check: Oct-20
All oxilianations have been conduct Calibration Equipment used (MATE Primary Standards Power meter NRP 201 Power sensor NRP-201 Power sensor NRP-201 Power sensor NRP-201 Type-Yn rissmatch combination Reference 20 vol Anemator Proter Et4108 Power sensor HP 881A Power sensor HP 881A Power sensor HP 881A Power sensor HP 881A Network Analyzer Agilant E8358A	E critical for calibration) ID # SN: 104778 SN: 103245 SN: 5036 (20k) SN: 5036 (20k) SN: 5047 27 (0327 SN: 5047 27 (0327) SN: 5047 27 SN: 5047 27 S	ry facility: environment temperature (22 ± 5)* Cal Jate (Centhcate No.) 03-Apr-19 (No. 217-02802/02893) 03 Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02893) 20-Apr-19 (No. 217-02893) 20-Apr-19 (No. 217-02893) 20-Apr-19 (No. 217-02893) 20-Apr-19 (No. 217-02893) 30-Apr-19 (No. 217-028	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Scheduled Check In Issue deteck, Oct-20 In house check: Oct-20
The measurements and the uncert All calibrations have been conduct Calibration Equipment used (MATT Primary Standards Down melex NRP Power energy NRP-201 Power sensor NRP-201 Networks 20 dt Attenuation Reference Prote Ex4109 Power meter E44109 Power sensor NP 6481A Power sensor NP 6481A Power sensor NP 6481A Power sensor NP 6481A Network Analyzer Agilient E835BA Laborated by:	E critical for calibration) ID # SN: 104778 SN: 103245 SN: 5036 (20k) SN: 5036 (20k) SN: 5036 (20k) SN: 5047 27 (0327 SN: 5047 27 (0327 S	ry facility: environment temperature (22 ± 5)* Cal Jate (Centhcate No.) 03-Apr-19 (No. 217-02802/02893) 03 Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02893) 20-Apr-19 (No. 217-02893) 20-Apr-19 (No. 217-02893) 20-Apr-19 (No. 217-02893) 20-Apr-19 (No. 217-02893) 30-Apr-19 (No. 217-028	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Scheduled Check In Issue deteck, Oct-20 In house check: Oct-20
Al ostilarations have been conduct Calibration Equipment used (MATE Primary Standards Power render NRP-201 Power render NRP-201 Power render NRP-201 Power render DARP-201 Hieference 20 ob Antenuator Type-In Instanton Combination Releisence Probe EX3DV4 DAF4 Secondary Standards Power sensor PR 8481A Power sensor PR 8481A Power sensor PR 8481A Power sensor PR 8481A Network Analyzer Agiliant E83SBA Labdrated by:	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103345 SN: 5058 (20%) SN: 5058 (20%) SN: 5058 (20%) SN: 5058 (20%) SN: 5057 2 / 05327 SN: 5057 2 / 05327 SN: 10537292783 SN: 105572 SN: 105572	ry facility: environment temperature (22 ± 5) ⁴ Cal Late (Centricate No.) 00 Apr 10 (No. 217 02082/0283) 00 Apr 10 (No. 217 02082) 03 Apr 10 (No. 217 02083) 04 Apr 10 (No. 217 02893) 04 Apr 10 (No. 217 02894) 04 Apr 10 (No. 217 02894) 04 Apr 10 (No. 217 02894) 05 Apr 10 (No. 217 0	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Scheduled Check In Incuse check: Oci-20 In house c

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Calibration Lab Chmid & Partne Engineering AC aughausstrasse 43, 80	er -		S Schweizerlacher Kallbrierdienar C Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service
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lossary:			
SL	tissue simulating		
onvF //A	sensitivity in TSL not applicable or		
 a) IEEE Std Averaged Communit b) IEC 62205 	1528-2013, "IEEE R Specific Absorption cations Devices: Me 9-1, "Measurement p	Rate (SAR) in the Hun asurement Techniques procedure for the asses	for Determining the Peak Spatial- nan Head from Wireless
300 MHz I c) IEC 62209	to 6 GHz)", July 2010 9-2, "Procedure to de	6 elermine the Specific A	Absorption Rate (SAR) for wireless a human body (frequency range of 30
MHz to 61	GHz)*. March 2010	nent Requirements for	
dditional Docu	mentation		
	System Handbook		
lethods Applie	d and Interpretation	n of Parameters:	
 of the cert Antenna F point exact 	nlicate. All ligures sta Parameters with TSL	ated in the certificate a .: The dipole is mounte	le from the Validation Report at the end re valid at the frequency indicated, d with the spacer to position its feed intom section, with the arms oriented
 Feed Poir positioned measurem reflected p 	nt Impedance and Re I under the liquid fille nent at the SMA con power. No uncertaint	ed phantom. The imper nector to the feed poin ly required.	uneters are measured with the dipole dance stated is transformed from the t. The Return Loss ensures low
	Delay: One-way dela ainty required.	ay between the SMA o	onnector and the antenna feed point.
 SAR measurements 	sured: SAR measure	ed at the stated antenn	
 SAR norm connector 		sured, normalized to a	n input power of 1 W at the antenna
 SAR for n nominal S 		ters: The measured TS	L parameters are used to calculate the
multiplied by the	ncertainty of measur e coverage factor k= oproximatoly 95%.	ement is stated as the 2, which for a normal t	standard uncertainty of measurement distribution corresponds to a coverage

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Measurement Conditions

DASY Version	DASY5	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spaner
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

	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	42.5±8%	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	2.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.57 W/kg ± 17.0 % (k=2)
	The Control of Control	
SAR averaged over 10 cm ² (10 g) of Head TSL	condition	
SAR averaged over 10 cm ² (10 g) of Head TSL SAR measured	condition 250 mW input power	1.57 W/kg

Certilicate No: D835V2-4d063_Aug19

Page 3 of 6

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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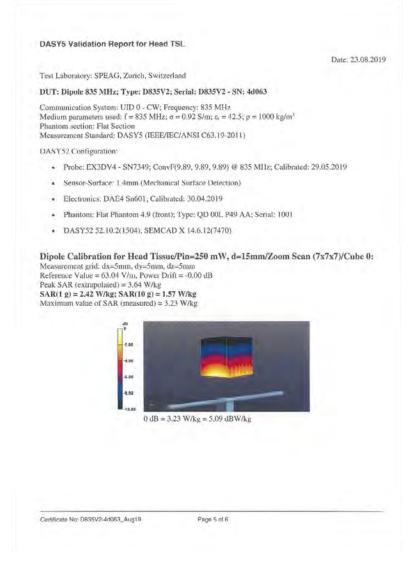


Antenna Parameters with Head TSL		
Impedance, transformed to feed point	50.6 Q - 2.2 Q	
Return Loss	- 32.8 d8	
General Antenna Parameters and Desi Electrical Delay (one direction) After long term use with 100W radiated power, only	a slight warming of the dipole near the feedpoint can b	e measured.
second arm of the dipole. The antenna is therefore are added to the dipole arms in order to improve mo "Measurement Conditions" paragraph. The SAR dat according to the Standard.	bile. The center conductor of the feeding line is directly short-sinculed for DC-signals. On some of the dipoles, tching when loaded according to the position as explain a are not affected by this change. The overall dipole lar ms, because they might bend of the soldered connection	small end cap ned in the ngth is still
Additional EUT Data		
Manwactured by	SPEAG	
Mariul actured by	SPEAG	

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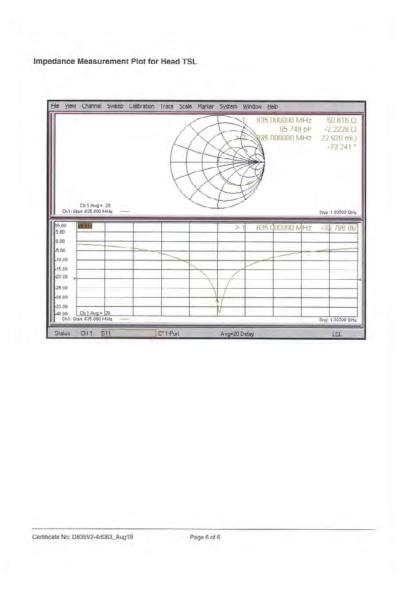


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Accredited by the Swiss Accredite The Swiss Accreditation Servic Multilateral Agreement for the r	e is one of the signator	ries to the EA on certificates	Accreditation No.: SCS 0108
Client Auden		Certificat	e No: D835V2-4d092_Jun19
CALIBRATION C	CERTIFICAT	E	
Object	D835V2 - SN:40	d092	
Calibration procedure(s)	QA CAL-05.v11 Calibration Proc	edure for SAR Validation Source	ces between 0.7-3 GHz
Calibration date:	June 20, 2019		
All calibrations have been conduct	ted in the closed laborate	probability are given on the following pages ony facility: environment temperature (22 \pm)	s and are part of the certificate.
VI calibrations have been conduct	ted in the closed laborate	probability are given on the following pages ory facility: environment temperature (22 \pm :	s and are part of the certificate. 3)°C and humidity < 70%.
VI calibrations have been conduct Calibration Equipment used (M&T Primary Standards	ted in the closed laborate E critical for calibration)	probability are given on the following pages ory facility: environment temperature (22 ±) Cal Date (Certificate No.)	s and are part of the certificate. 3)°C and humidity < 70%. Scheduled Calibration
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Certificate No: D835V2-4d092_Jun19

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



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Servizio svizzero di taratura Swiss Calibration Service

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Accreditation No.: SCS 0108

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, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) 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	V52.10.2
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	41.8 ± 6 %	0.91 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	9.50 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	1.54 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	55.4 ± 6 %	0.98 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	2.41 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.57 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	1.57 W/kg

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.2 Ω - 1.0 jΩ
Return Loss	- 32.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3 Ω - 7.3 jΩ
Return Loss	- 21.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.397 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
	SFEAG

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Report No. :E5/2019/A0006 Rev: 01 Page: 26 of 57

DASY5 Validation Report for Head TSL

Date: 20.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d092

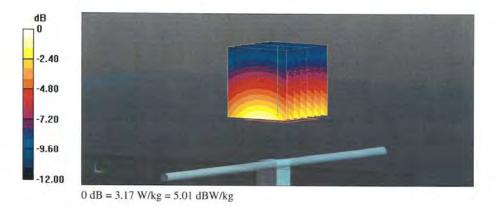
Communication System: UID 0 - CW; Frequency: 835 MHz Medium parameters used: f = 835 MHz; σ = 0.91 S/m; ϵ_r = 41.8; ρ = 1000 kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(9.89, 9.89, 9.89) @ 835 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection) .
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019 .
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

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 = 63.07 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 3.60 W/kg SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.54 W/kg Maximum value of SAR (measured) = 3.17 W/kg



Certificate No: D835V2-4d092 Jun19

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Report No. :E5/2019/A0006 Rev: 01 Page: 27 of 57

Impedance Measurement Plot for Head TSL

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Certificate No: D835V2-4d092_Jun19

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DASY5 Validation Report for Body TSL

Date: 19.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d092

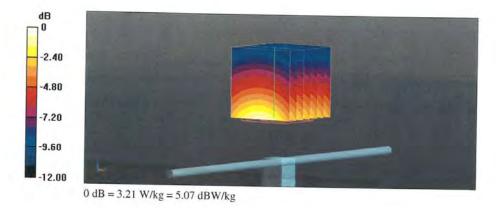
Communication System: UID 0 - CW; Frequency: 835 MHz Medium parameters used: f = 835 MHz; σ = 0.98 S/m; ϵ_r = 55.4; ρ = 1000 kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(10.16, 10.16, 10.16) @ 835 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019 •
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

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 = 58.23 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 3.61 W/kg SAR(1 g) = 2.41 W/kg; SAR(10 g) = 1.57 W/kg Maximum value of SAR (measured) = 3.21 W/kg



Certificate No: D835V2-4d092_Jun19

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Report No. :E5/2019/A0006 Rev: 01 Page: 29 of 57

Impedance Measurement Plot for Body TSL

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Certificate No: D835V2-4d092_Jun19

Page 8 of 8

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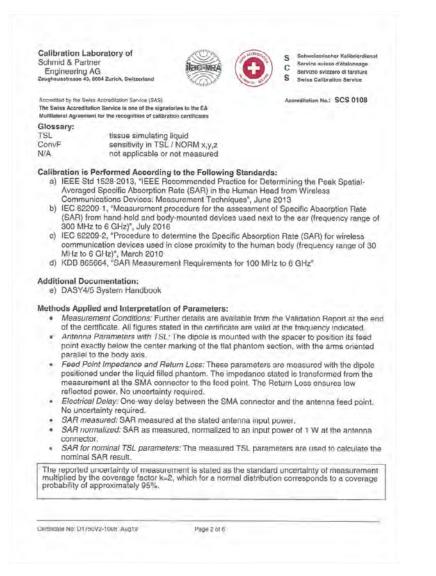


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ecredited by the Swiss Accreditation he Swiss Accreditation Service in fulfilateral Agreement for the rec	is one of the signatoria	es to the EA	Accreditation No.: SCS 0108
CALIBRATION C			No: D1750V2-1008_Aug19
Object	D1750V2 - SN:1		
oojaci	01/00/2-014.1	000	
Calibration procedure(s)	QA CAL-05.v11 Galibration Proce	edure for SAR Validation Source	es between 0,7-3 GHz
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Measurement Conditions

DASY Version	DASY5	V52 10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Recolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The folk wing parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.8 ± 6 %	1.36 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	
SAH measured	250 mW input power	9 13 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.8 W/kg ± 17.0 % (k=2)
CAD summed sum 10 sm ² (10 s) of Head TCI	aandiiaa	
SAR averaged over 10 cm ² (10 g) of Head TSL	condition	A DO WAR
SAR averaged over 10 cm ² (10 g) of Head TSL SAR measured SAR for nominal Head TSL parameters	condition 250 mW input power normalized to 1W	4.83 W/kg 19.4 W/kg ± 16.5 % (k=2)

Certificate No: D1750V2-1008_Aug19

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Antenna Parameters with Head TSL			
Impedance, transformed to feed point		40.0 Ω + 0.6 Ω	
Return Loss		- 38.5 dB	
General Antenna Parameters and Design Electrical Delay (one direction) After long term use with 100W radiated power, only u The dipole is made of standard semiripid coaxial cat	a elight warming of the		
second arm of the dipole. The antenna is therefore s are added to the dipole arms in order to improve mail Measurament Conditions' partagraph This SAR data according to the Standard. No excessive force must be applied to the dipole arm feedpoint may be damaged. Additional EUT Data	hort-circuited for DC-si tching when loaded act a are not affected by th	gnals. On some of the dipoles, small o ording to the position as explained in is change. The overall dipole length is	end caps the still
Manufactured by		SPEAG	_

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Date: 23.08.2019

DASY5 Validation Report for Head TSL

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MIIz; Type: D1750V2; Serial: D1750V2 - SN:1008

Communication System: UID 0 - CW; Frequency: 1750 MHz Medium parameters used: f = 1750 MHz; α = 1.36 S/m; ϵ_r = 40.8; p = 1000 kg/m³ Phantom section: Flat Section

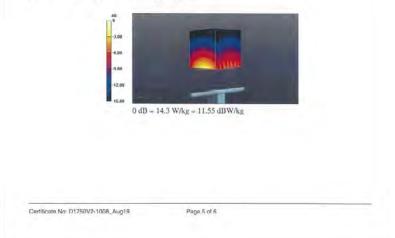
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(8.67, 8.67, 8.67) @ 1750 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- · Electronics: DAE4 Sn601: Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

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 = 106.5 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 17.0 W/kgSAR(1 g) = 9.13 W/kg; SAR(10 g) = 4.83 W/kgMaximum value of SAR (measured) = 14.3 W/kg



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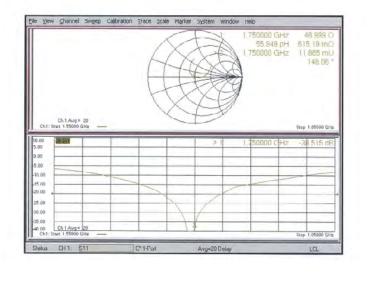
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Impedance Measurement Plot for Head TSL



Certificate No: D1750V2-1008_Aug19	Page 6 of 6	

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ccredited by the Swiss Accreditation he Swiss Accreditation Service is fultilateral Agreement for the rec	s one of the signatorie	s to the EA	creditation No.: SCS 0108
CALIBRATION CI	FRTIFICATE		: D1750V2-1023_Jun19
Dbject	D1750V2 - SN:10		
Calibration procedure(s)	QA CAL-05.v11 Calibration Proce	edure for SAR Validation Sources	between 0.7-3 GHz
Calibration date:	June 20, 2019		
		probability are given on the following pages an ny facility: environment temperature $(22 \pm 3)^{\circ}$	d are part of the certificate.
The measurements and the uncerte All calibrations have been conducte Calibration Equipment used (M&TE	ed in the closed laborato		d are part of the certificate.
The measurements and the uncerte All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards	ed in the closed laborato E critical for calibration)	ry facility: environment temperature (22 \pm 3)*(d 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





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

Accreditation No.: SCS 0108

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, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) 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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Conductivity 1.37 mho/m

1.34 mho/m ± 6 %

Measurement Conditions

as far as not given on page 1 DASV system ofiguratio

DASY Version	DASY5	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied Temperature Permittivity 22.0 °C Nominal Head TSL parameters 40.1

SAR result with Head TSL

Measured Head TSL parameters

Head TSL temperature change during test

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	8.90 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.1 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	4.69 W/kg

(22.0 ± 0.2) °C

< 0.5 °C

40.0 ± 6 %

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	$53.9 \pm 6 \%$	1.46 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	9.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	37.5 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	4.91 W/kg

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.3 Ω - 0.1 jΩ
Return Loss	- 50.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.4 Ω - 1.0 jΩ
Return Loss	- 28.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.218 ns	
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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

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

Additional EUT Data

Manufactured by

SPEAG

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DASY5 Validation Report for Head TSL

Date: 19.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1023

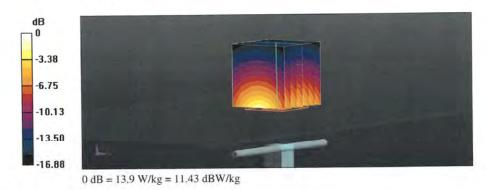
Communication System: UID 0 - CW; Frequency: 1750 MHz Medium parameters used: f = 1750 MHz; $\sigma = 1.34 \text{ S/m}$; $\epsilon_r = 40$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(8.67, 8.67, 8.67) @ 1750 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001 .
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

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 = 106.5 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 16.6 W/kg SAR(1 g) = 8.9 W/kg; SAR(10 g) = 4.69 W/kg Maximum value of SAR (measured) = 13.9 W/kg



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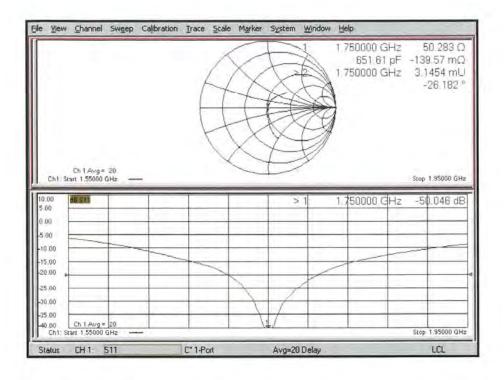
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Report No. :E5/2019/A0006 Rev: 01 Page: 41 of 57

Impedance Measurement Plot for Head TSL



Certificate No: D1750V2-1023 Jun19

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DASY5 Validation Report for Body TSL

Date: 20.06.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1023

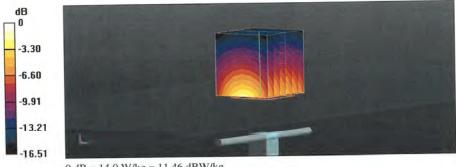
Communication System: UID 0 - CW; Frequency: 1750 MHz Medium parameters used: f = 1750 MHz; $\sigma = 1.46 \text{ S/m}$; $\varepsilon_r = 53.9$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(8.45, 8.45, 8.45) @ 1750 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

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 = 102.7 V/m; Power Drift = -0.00 dB Peak SAR (extrapolated) = 16.5 W/kg SAR(1 g) = 9.23 W/kg; SAR(10 g) = 4.91 W/kg Maximum value of SAR (measured) = 14.0 W/kg



0 dB = 14.0 W/kg = 11.46 dBW/kg

Certificate No: D1750V2-1023_Jun19

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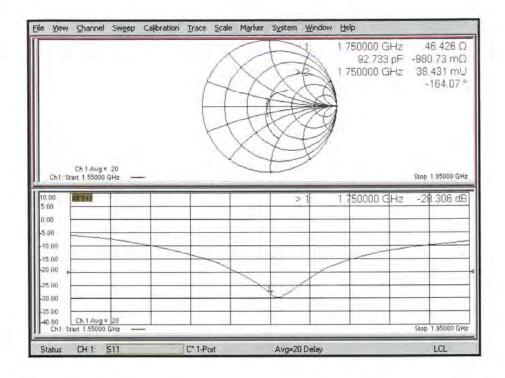
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Report No. :E5/2019/A0006 Rev: 01 Page: 43 of 57

Impedance Measurement Plot for Body TSL



Certificate No: D1750V2-1023 Jun19

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	Switzerland	Stand Stan	Servizio svizzero di taratura Swiss Calibration Service
credited by the Swiss Accreditatio e Swiss Accreditation Service is Itilateral Agreement for the reco	s one of the signatories	s to the EA	creditation No.: SCS 0108
ent SGS-TW (Auden)	Certificate No	: D1900V2-5d173_Apr19
ALIBRATION C	ERTIFICATE		
bject	D1900V2 - SN:50	1173	
alibration procedure(s)	QA CAL-05.v11 Calibration Proce	dure for SAR Validation Sources	between 0.7-3 GHz
Calibration date:	April 23, 2019		
All calibrations have been conducte		ry facility: environment temperature (22 \pm 3)°	C and humidity < 70%.
Calibration Equipment used (M&TE	E critical for calibration)	Cal Date (Certificate No.)	Scheduled Calibration
alibration Equipment used (M&TE rimary Standards ower meter NRP	E critical for calibration)	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893)	Scheduled Calibration Apr-20
alibration Equipment used (M&TE rimary Standards ower meter NRP ower sensor NRP-Z91	E critical for calibration) ID # SN: 104778 SN: 103244	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892)	Scheduled Calibration Apr-20 Apr-20
alibration Equipment used (M&TE rimary Standards ower meter NRP ower sensor NRP-Z91 ower sensor NRP-Z91	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893)	Scheduled Calibration Apr-20 Apr-20 Apr-20
alibration Equipment used (M&TE rimary Standards ower meter NRP ower sensor NRP-291 ower sensor NRP-291 leference 20 dB Attenuator	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k)	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20
alibration Equipment used (M&TE trimary Standards lower meter NRP lower sensor NRP-Z91 lower sensor NRP-Z91 teference 20 dB Attenuator ype-N mismatch combination	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893)	Scheduled Calibration Apr-20 Apr-20 Apr-20
alibration Equipment used (M&TE rimary Standards ower meter NRP ower sensor NRP-Z91 ower sensor NRP-Z91 leference 20 dB Attenuator ype-N mismatch combination leference Probe EX3DV4	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20
talibration Equipment used (M&TE trimary Standards tower meter NRP tower sensor NRP-Z91 tower sensor NRP-Z91 teference 20 dB Attenuator type-N mismatch combination teference Probe EX3DV4 tyAE4 secondary Standards	Critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 5047.2 / 06327 SN: 7349 SN: 601 ID #	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 31-Dec-18 (No. EX3-7349_Dec18) 04-Oct-18 (No. DAE4-601_Oct18) Check Date (in house)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Dec-19 Oct-19 Scheduled Check
Calibration Equipment used (M&TE trimary Standards lower meter NRP lower sensor NRP-291 lower sensor NRP-291 Reference 20 dB Attenuator ype-N mismatch combination leference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B	Critical for calibration)	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 31-Dec-18 (No. EX3-7349_Dec18) 04-Oct-18 (No. DAE4-601_Oct18) Check Date (in house) 07-Oct-15 (in house check Feb-19)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 Dec-19 Oct-19 Oct-19 Scheduled Check In house check: Oct-20
Calibration Equipment used (M&TE trimary Standards lower meter NRP lower sensor NRP-291 leference 20 dB Attenuator ype-N mismatch combination leference Probe EX3DV4 OAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 31-Dec-18 (No. EX3-7349_Dec18) 04-Oct-18 (No. DAE4-601_Oct18) Check Date (in house) 07-Oct-15 (in house check Feb-19) 07-Oct-15 (in house check Cot-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Dec-19 Oct-19 Scheduled Check In house check: Oct-20 In house check: Oct-20
alibration Equipment used (M&TE trimary Standards lower meter NRP lower sensor NRP-Z91 teference 20 dB Attenuator ype-N mismatch combination leference Probe EX3DV4 JAE4 secondary Standards lower meter E4419B Power sensor HP 8481A Power sensor HP 8481A	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02893) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 31-Dec-18 (No. EX3-7349_Dec18) 04-Oct-18 (No. DAE4-601_Oct18) Check Date (in house) 07-Oct-15 (in house check Feb-19) 07-Oct-15 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Dec-19 Oct-19 Scheduled Check In house check: Oct-20 In house check: Oct-20 In house check: Oct-20
alibration Equipment used (M&TE rimary Standards ower meter NRP ower sensor NRP-Z91 ower sensor NRP-Z91 leference 20 dB Attenuator ype-N mismatch combination leference Probe EX3DV4 iAE4 econdary Standards rower sensor HP 8481A lower sensor HP 8481A lower sensor HP 8481A legenerator R&S SMT-06	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41092317 SN: 100972	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 31-Dec-18 (No. EX3-7349_Dec18) 04-Oct-18 (No. DAE4-601_Oct18) Check Date (in house) 07-Oct-15 (in house check Feb-19) 07-Oct-15 (in house check Oct-18) 15-Jun-15 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Dec-19 Oct-19 Oct-19 Scheduled Check In house check: Oct-20 In house check: Oct-20 In house check: Oct-20 In house check: Oct-20 In house check: Oct-20
Calibration Equipment used (M&TE trimary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Sype-N mismatch combination Reference Probe EX3DV4 AAE4 Secondary Standards Power sensor HP 8481A Power sensor HP 8481A Power sensor HP 8481A Ref generator R&S SMT-06	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 5047.2 / 06327 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: US37292783 SN: MY41092317 SN: US41080477	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 31-Dec-18 (No. EX3-7349_Dec18) 04-Oct-18 (No. DAE4-601_Oct18) Check Date (in house) 07-Oct-15 (in house check Feb-19) 07-Oct-15 (in house check Feb-19) 07-Oct-15 (in house check Cot-18) 15-Jun-15 (in house check Oct-18) 31-Mar-14 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Dec-19 Oct-19 Scheduled Check In house check: Oct-20 In house check: Oct-20
Calibration Equipment used (M&TE Primary Standards Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator ype-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A Power sensor HP 8481A RE generator R&S SMT-06 Network Analyzer Agilent E8358A	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41092317 SN: US41080477 Name	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 31-Dec-18 (No. EX3-7349_Dec18) 04-Oct-18 (No. DAE4-601_Oct18) O4-Oct-18 (No. DAE4-601_Oct18) O7-Oct-15 (in house check Cot-18) 07-Oct-15 (in house check Oct-18) 07-Oct-15 (in house check Oct-18) 15-Jun-15 (in house check Oct-18) 31-Mar-14 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Dec-19 Oct-19 Oct-19 Scheduled Check In house check: Oct-20 In house check: Oct-20 In house check: Oct-20 In house check: Oct-20 In house check: Oct-20
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A Reference R&S SMT-06 Network Analyzer Agilent E8358A	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 5047.2 / 06327 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: US37292783 SN: MY41092317 SN: US41080477	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 31-Dec-18 (No. EX3-7349_Dec18) 04-Oct-18 (No. DAE4-601_Oct18) Check Date (in house) 07-Oct-15 (in house check Feb-19) 07-Oct-15 (in house check Oct-18) 15-Jun-15 (in house check Oct-18) 31-Mar-14 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Dec-19 Oct-19 Scheduled Check In house check: Oct-20 In house check: Oct-20
	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41092317 SN: US41080477 Name	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 31-Dec-18 (No. EX3-7349_Dec18) 04-Oct-18 (No. DAE4-601_Oct18) O4-Oct-18 (No. DAE4-601_Oct18) O7-Oct-15 (in house check Cot-18) 07-Oct-15 (in house check Oct-18) 07-Oct-15 (in house check Oct-18) 15-Jun-15 (in house check Oct-18) 31-Mar-14 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Dec-19 Oct-19 Scheduled Check In house check: Oct-20 In house check: Oct-20

Certificate No: D1900V2-5d173_Apr19

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Swiss Calibration Service

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Accreditation No.: SCS 0108

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Glossary:

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

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

e) 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: D1900V2-5d173 Apr19

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Measurement Conditions

DASY Version	DASY5	V52.10.2
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.

Q.,	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	40.6 ± 6 %	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	9.92 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.2 W/kg ± 17.0 % (k=2)
SAB 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	5.22 W/kg

Certificate No: D1900V2-5d173_Apr19

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.3 Ω + 5.1 jΩ
Return Loss	- 25.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.201 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	
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DASY5 Validation Report for Head TSL

Date: 23.04.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d173

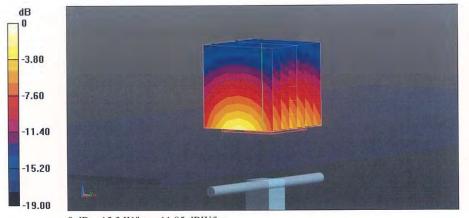
Communication System: UID 0 - CW; Frequency: 1900 MHz Medium parameters used: f = 1900 MHz; σ = 1.38 S/m; ϵ_r = 40.6; ρ = 1000 kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(8.26, 8.26, 8.26) @ 1900 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection) .
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

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 = 110.1 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 18.1 W/kg SAR(1 g) = 9.92 W/kg; SAR(10 g) = 5.22 W/kg Maximum value of SAR (measured) = 15.3 W/kg



0 dB = 15.3 W/kg = 11.85 dBW/kg

Certificate No: D1900V2-5d173_Apr19

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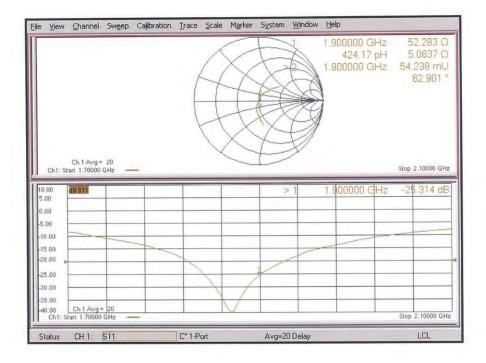
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Impedance Measurement Plot for Head TSL



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lient Auden			o: D1900V2-5d142_Jul19
CALIBRATION CI	ERTIFICATE		
Dbject	D1900V2 - SN:5	d142	
Calibration procedure(s)	QA CAL-05.v11 Calibration Proce	edure for SAR Validation Sources	s between 0.7-3 GHz
Calibration date:	July 26, 2019		
		ry facility: environment temperature (22 ± 3)°	C and humidity < 70%.
	critical for calibration)	Cal Date (Certificate No.)	C and humidity < 70%.
Primary Standards	1		
Primary Standards Power meter NRP	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Primary Standards Power meter NRP Power sensor NRP-291	ID # SN: 104778	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893)	Scheduled Calibration
Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-Z91	ID # SN: 104778 SN: 103244	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892)	Scheduled Calibration Apr-20 Apr-20
Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator	ID # SN: 104778 SN: 103244 SN: 103245	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893)	Scheduled Calibration Apr-20 Apr-20 Apr-20
Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Type-N mismatch combination	ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k)	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20
Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4	ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20
Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Fype-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards	ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 5047.2 / 06327 SN: 7349 SN: 601	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (in house)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check
Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Fype-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B	ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: 6B39512475	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (In house) 30-Oct-14 (In house check Feb-19)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20
Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A	ID # SN: 104778 SN: 103244 SN: 103245 SN: 5047.2 / 06327 SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: 6B39512475 SN: US37292783	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349 May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (in house) 30-Oct-14 (in house check Feb-19) 07-Oct-15 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20 Im house check: Oct-20
Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Fype-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A	ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: 6B39512475 SN: US37292783 SN: US37292783	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (in house) 30-Oct-14 (in house check Feb-19) 07-Oct-15 (in house check Oct-18) 07-Oct-15 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20 In house check: Oct-20 In house check: Oct-20
Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator (type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A Power sensor HP 8481A Power sensor HP 8481A Pagenerator R&S SMT-06	ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: US37292783 SN: 100972	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (in house) 30-Oct-14 (in house check Feb-19) 07-Oct-15 (in house check Cet-18) 15-Jun-15 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20 In house check: Oct-20 In house check: Oct-20 In house check: Oct-20 In house check: Oct-20
Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Rype-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06	ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: 6B39512475 SN: US37292783 SN: US37292783	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (in house) 30-Oct-14 (in house check Feb-19) 07-Oct-15 (in house check Oct-18) 07-Oct-15 (in house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20 In house check: Oct-20 In house check: Oct-20
Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agilent E8358A	ID # SN: 104778 SN: 103244 SN: 103245 SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: 6B39512475 SN: US37292783 SN: MY41092317 SN: 100972 SN: US41080477 Name	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (In house) 30-Oct-14 (In house check Feb-19) 07-Oct-15 (In house check Feb-19) 07-Oct-15 (In house check Oct-18) 15-Jun-15 (In house check Oct-18) 31-Mar-14 (In house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20 In house check: Oct-20 In house check: Oct-20 In house check: Oct-20 In house check: Oct-20
Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agilent E8358A	ID # SN: 104778 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: US37292783 SN: WY41092317 SN: 100972 SN: US41080477	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-501_Apr19) Check Date (In house) 30-Oct-14 (In house check Feb-19) 07-Oct-15 (In house check Cet-18) 15-Jun-15 (In house check Oct-18) 15-Jun-15 (In house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20 In house check: Oct-20
Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agilent E8358A Calibrated by:	ID # SN: 104778 SN: 103244 SN: 103245 SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: 6B39512475 SN: US37292783 SN: MY41092317 SN: 100972 SN: US41080477 Name	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. EX3-7349_May19) 30-Apr-19 (No. DAE4-601_Apr19) Check Date (In house) 30-Oct-14 (In house check Feb-19) 07-Oct-15 (In house check Feb-19) 07-Oct-15 (In house check Oct-18) 15-Jun-15 (In house check Oct-18) 31-Mar-14 (In house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20 In house check: Oct-20
Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter E4419B Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agilent E8358A Calibrated by: Approved by:	ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317 SN: US37292783 SN: WY41092317 SN: US41080477 Name Claudio Leubler	Cal Date (Certificate No.) 03-Apr-19 (No. 217-02892/02893) 03-Apr-19 (No. 217-02892) 03-Apr-19 (No. 217-02893) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02894) 04-Apr-19 (No. 217-02895) 29-May-19 (No. 217-02895) 29-May-19 (No. EX3-7349 May19) 30-Apr-19 (No. DAE4-601_Apr19) 07-Oct-10 (In house Check Pot-19) 07-Oct-15 (In house check Cot-18) 15-Jun-15 (In house check Oct-18) 15-Jun-15 (In house check Oct-18) 31-Mar-14 (In house check Oct-18) 31-Mar-14 (In house check Oct-18)	Scheduled Calibration Apr-20 Apr-20 Apr-20 Apr-20 Apr-20 May-20 Apr-20 Scheduled Check In house check: Oct-20 In house check: Oct-20

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



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Schweizerischer Kallbrierdienst Service suisse d'étalonnage Servizio svizzero di taratura

Swiss Calibration Service

Accreditation No.: SCS 0108

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

N/A

tissue simulating liquid ConvF sensitivity in TSL / NORM x,y,z 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, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) 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: D1900V2-5d142 Jul19

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Measurement Conditions

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

DASY Version	DASY5	V52.10.2
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	41.5 ± 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	9.94 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 measured	250 mW input power	5.22 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	54.1 ± 6 %	1.48 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	9.77 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.8 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	5.17 W/kg

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.7 Ω + 5.3 jΩ
Return Loss	- 25.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.7 Ω + 6.5 jΩ
Return Loss	- 23.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.198 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

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

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

Additional EUT Data

Manufactured by

SPEAG

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f (886-2) 2298-0488



DASY5 Validation Report for Head TSL

Date: 26.07.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d142

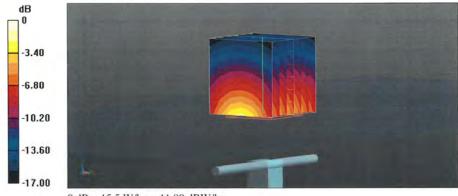
Communication System: UID 0 - CW; Frequency: 1900 MHz Medium parameters used: f = 1900 MHz; $\sigma = 1.37 \text{ S/m}$; $\epsilon_r = 41.5$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(8.44, 8.44, 8.44) @ 1900 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

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 = 110.3 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 18.4 W/kg SAR(1 g) = 9.94 W/kg; SAR(10 g) = 5.22 W/kg Maximum value of SAR (measured) = 15.5 W/kg



0 dB = 15.5 W/kg = 11.90 dBW/kg

Certificate No: D1900V2-5d142_Jul19

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Impedance Measurement Plot for Head TSL

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Certificate No: D1900V2-5d142_Jul19

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DASY5 Validation Report for Body TSL

Date: 26.07.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d142

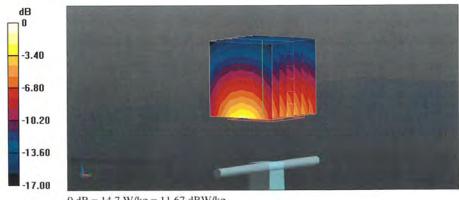
Communication System: UID 0 - CW; Frequency: 1900 MHz Medium parameters used: f = 1900 MHz; $\sigma = 1.48 \text{ S/m}$; $\varepsilon_r = 54.1$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63,19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(8.42, 8.42, 8.42) @ 1900 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470) ٠

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 = 104.1 V/m; Power Drift = -0.05 dB Peak SAR (extrapolated) = 17.5 W/kg SAR(1 g) = 9.77 W/kg; SAR(10 g) = 5.17 W/kgMaximum value of SAR (measured) = 14.7 W/kg



0 dB = 14.7 W/kg = 11.67 dBW/kg

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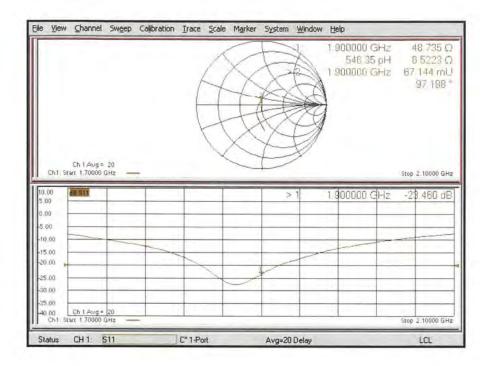
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Impedance Measurement Plot for Body TSL



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- End of report -

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