



#### Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerin C Service sui Servizio sv S Swiss Calif

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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Certificate No: D835V2-4d069\_Jul21

Page 2 of 6

of





#### **Measurement Conditions**

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

#### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.2 ± 6 %	0.94 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.48 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.63 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL SAR measured	condition 250 mW input power	1.60 W/kg

Certificate No: D835V2-4d069\_Jul21

Page 3 of 6





# Appendix (Additional assessments outside the scope of SCS 0108)

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.7 Ω - 2.3 jΩ
Return Loss	- 31.0 dB

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.393 ns

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

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

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

#### **Additional EUT Data**

SPEAG

Certificate No: D835V2-4d069\_Jul21

Page 4 of 6



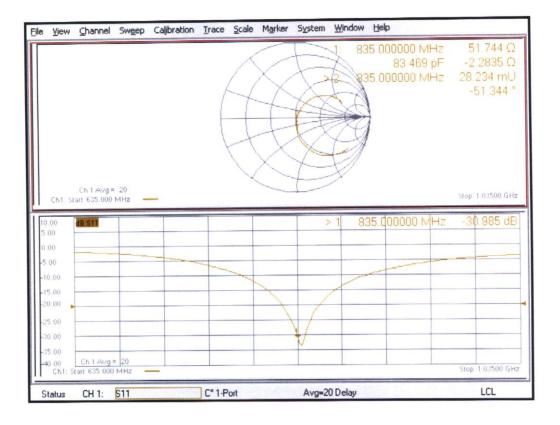


# **DASY5 Validation Report for Head TSL** Date: 12.07.2021 Test Laboratory: SPEAG, Zurich, Switzerland DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d069 Communication System: UID 0 - CW; Frequency: 835 MHz Medium parameters used: f = 835 MHz; $\sigma = 0.94$ S/m; $\varepsilon_r = 42.2$ ; $\rho = 1000$ kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011) DASY52 Configuration: Probe: EX3DV4 - SN7349; ConvF(9.69, 9.69, 9.69) @ 835 MHz; Calibrated: 28.12.2020 Sensor-Surface: 1.4mm (Mechanical Surface Detection) Electronics: DAE4 Sn601; Calibrated: 02.11.2020 Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001 . DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501) . 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 = 63.94 V/m; Power Drift = -0.06 dB Peak SAR (extrapolated) = 3.76 W/kg SAR(1 g) = 2.48 W/kg; SAR(10 g) = 1.60 W/kg Smallest distance from peaks to all points 3 dB below = 16.3 mm Ratio of SAR at M2 to SAR at M1 = 66.1% Maximum value of SAR (measured) = 3.29 W/kg dB n -2.00 -4.00 -6.00 -8.00 -10.00 0 dB = 3.29 W/kg = 5.18 dBW/kgPage 5 of 6 Certificate No: D835V2-4d069 Jul21





# Impedance Measurement Plot for Head TSL



Certificate No: D835V2-4d069\_Jul21

Page 6 of 6

10





8

### 1750 MHz Dipole Calibration Certificate

credited by the Swiss Accreditati	, Switzerland	S A	Servizio svizzero di taratura Swiss Calibration Service ccreditation No.: SCS 0108
he Swiss Accreditation Service ultilateral Agreement for the rec	the state of the s		
lient CTTL (Auden)			o: D1750V2-1003_Jul21
CALIBRATION C	ERTIFICATE		
Object	D1750V2 - SN:1	003	
Calibration procedure(s)	QA CAL-05.v11		
	Calibration Proce	edure for SAR Validation Sources	s between 0.7-3 GHz
Calibration date:	July 12, 2021		
All calibrations have been conduct	ed in the closed laborato	robability are given on the following pages as ry facility: environment temperature (22 ± 3)°	
All calibrations have been conduct Calibration Equipment used (M&Tf	ed in the closed laborato E critical for calibration)	ry facility: environment temperature $(22 \pm 3)^{\circ}$	C and humidity < 70%.
All calibrations have been conduct Calibration Equipment used (M&TF Primary Standards	ed in the closed laborato	ry facility: environment temperature (22 ± 3)° Cal Date (Certificate No.)	C and humidity < 70%. Scheduled Calibration
All calibrations have been conduct Calibration Equipment used (M&Tf Primary Standards Power meter NRP	ed in the closed laborato E critical for calibration)	ry facility: environment temperature $(22 \pm 3)^{\circ}$	C and humidity < 70%.
All calibrations have been conduct Calibration Equipment used (M&TF Primary Standards Power meter NRP Power sensor NRP-Z91	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245	ry facility: environment temperature (22 ± 3)° Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292)	C and humidity < 70%. Scheduled Calibration Apr-22
All calibrations have been conduct Calibration Equipment used (M&Tf Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k)	ry facility: environment temperature (22 ± 3)° <u>Cal Date (Certificate No.)</u> 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03291)	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22
All calibrations have been conduct Calibration Equipment used (M&Tf Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327	Cal Date (Certificate No.)         09-Apr-21 (No. 217-03291/03292)         09-Apr-21 (No. 217-03291)         09-Apr-21 (No. 217-03292)         09-Apr-21 (No. 217-03343)         09-Apr-21 (No. 217-03344)	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Apr-22
All calibrations have been conduct Calibration Equipment used (M&Tf Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH3394 (20k) SN: 310982 / 06327 SN: 7349	Cal Date (Certificate No.)         09-Apr-21 (No. 217-03291/03292)         09-Apr-21 (No. 217-03291)         09-Apr-21 (No. 217-03291)         09-Apr-21 (No. 217-03343)         09-Apr-21 (No. 217-03344)         28-Dec-20 (No. EX3-7349_Dec20)	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21
All calibrations have been conduct Calibration Equipment used (M&Tf Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327	Cal Date (Certificate No.)         09-Apr-21 (No. 217-03291/03292)         09-Apr-21 (No. 217-03291)         09-Apr-21 (No. 217-03292)         09-Apr-21 (No. 217-03343)         09-Apr-21 (No. 217-03344)	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Apr-22
All calibrations have been conduct Calibration Equipment used (M&TF 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	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH3394 (20k) SN: 310982 / 06327 SN: 7349	Cal Date (Certificate No.)         09-Apr-21 (No. 217-03291/03292)         09-Apr-21 (No. 217-03291)         09-Apr-21 (No. 217-03291)         09-Apr-21 (No. 217-03343)         09-Apr-21 (No. 217-03344)         28-Dec-20 (No. EX3-7349_Dec20)	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21
	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21
All calibrations have been conduct Calibration Equipment used (M&Tf 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	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID #	Cal Date (Certificate No.)         09-Apr-21 (No. 217-03291/03292)         09-Apr-21 (No. 217-03291)         09-Apr-21 (No. 217-03292)         09-Apr-21 (No. 217-03343)         09-Apr-21 (No. 217-03344)         28-Dec-20 (No. EX3-7349_Dec20)         02-Nov-20 (No. DAE4-601_Nov20)         Check Date (in house)	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check
All calibrations have been conduct Calibration Equipment used (M&TF 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	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317	Cal Date (Certificate No.)         09-Apr-21 (No. 217-03291/03292)         09-Apr-21 (No. 217-03291)         09-Apr-21 (No. 217-03292)         09-Apr-21 (No. 217-03343)         09-Apr-21 (No. 217-03344)         28-Dec-20 (No. EX3-7349_Dec20)         02-Nov-20 (No. DAE4-601_Nov20)         Check Date (in house)         30-Oct-14 (in house check Oct-20)	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22
All calibrations have been conduct Calibration Equipment used (M&TF 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	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103244 SN: 103245 SN: 103245 SN: 310982 / 06327 SN: 310982 / 06327 SN: 601 ID # SN: GB39512475 SN: GB39512475 SN: US37292763 SN: MY41092317 SN: 100972	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22
All calibrations have been conduct Calibration Equipment used (M&TF 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 RF generator R&S SMT-06	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22 In house check: Oct-22
All calibrations have been conduct Calibration Equipment used (M&Tf 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	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103244 SN: 103245 SN: 103245 SN: 310982 / 06327 SN: 310982 / 06327 SN: 601 ID # SN: GB39512475 SN: GB39512475 SN: US37292763 SN: MY41092317 SN: 100972	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22
All calibrations have been conduct Calibration Equipment used (M&TF 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	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41092317 SN: 10972 SN: US41080477	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           31-Mar-14 (in house check Oct-20)	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-21 Signature
All calibrations have been conduct Calibration Equipment used (M&Tf 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 Network Analyzer Agilent E8358A	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 013245 SN: 014 ID # SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41092317 SN: US3120677 N: US41080477 Name	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           31-Mar-14 (in house check Oct-20)           Function	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-21 Signature
All calibrations have been conduct Calibration Equipment used (M&TF 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 Network Analyzer Agilent E8358A Calibrated by:	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 013245 SN: 014 ID # SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41092317 SN: US3120677 N: US41080477 Name	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           31-Mar-14 (in house check Oct-20)           Function	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-21
All calibrations have been conduct Calibration Equipment used (M&Tf 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 Network Analyzer Agilent E8358A	ed in the closed laborato E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103244 SN: 103245 SN: 103245 SN: 103245 SN: 310982 / 06327 SN: 310982 / 06327 SN: 601 ID # SN: GB39512475 SN: GB39512475 SN: GB39512475 SN: US37292783 SN: MY41092317 SN: 1037292783 SN: MY41092317 SN: 1037292783 SN: MY41092317 SN: 1037292783 SN: US41080477 Name Jeffrey Katzman	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           S1-Mar-14 (in house check Oct-20)           Function           Laboratory Technician	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-21 Signature





#### 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

S

С

S

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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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: D1750V2-1003 Jul21

Page 2 of 6





### **Measurement Conditions**

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

#### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.4 ± 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 <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.9 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL SAR measured	condition 250 mW input power	4.82 W/kg

Certificate No: D1750V2-1003\_Jul21

Page 3 of 6

©Copyright. All rights reserved by CTTL.





#### Appendix (Additional assessments outside the scope of SCS 0108)

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.7 Ω + 0.3 jΩ
Return Loss	- 47.0 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.215 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
-----------------	-------

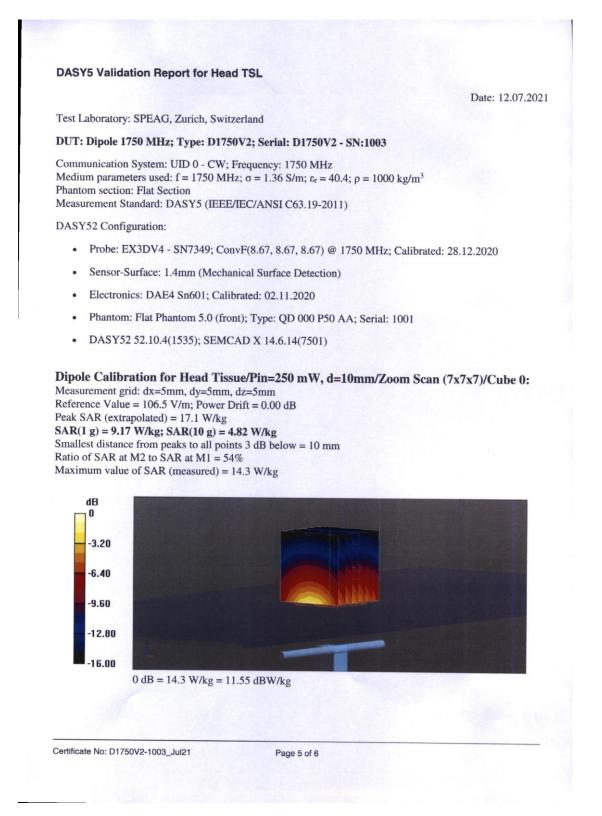
Certificate No: D1750V2-1003\_Jul21

Page 4 of 6

©Copyright. All rights reserved by CTTL.











Eile View Channel Sweep Calibration Irace Scale Marker System Window Help 1.750000 GHz 49.667 Ω 26.647 pH 1.750000 GHz 293.00 mΩ 4.4473 mU 138.45 ° Ch 1 Avg = 20 Ch1: Start 1.55000 GHz Stop 1.95000 GHz 10.00 5.00 10 011 50000 GHz -47 0.00 5.00 10.00 15.00 20.00 25.00 30.00 35.00 40.00 Ch 1 Avg = 20 Ch 1: Start 1.55000 GHz Stop 1.95000 GH Status CH 1: 511 C\* 1-Port Avg=20 Delay LCL

### Impedance Measurement Plot for Head TSL

Certificate No: D1750V2-1003\_Jul21

Page 6 of 6





### 1900 MHz Dipole Calibration Certificate

Schmid & Partner Engineering AG eughausstrasse 43, 8004 Zurich,	Of Switzerland	S C S	Schweizerischer Kalibrierdien Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service
Accredited by the Swiss Accreditation	s one of the signatories	s to the EA	ccreditation No.: SCS 0108
Induitilateral Agreement for the rec	ognition of calibration		: D1900V2-5d101_Jul2
CALIBRATION CI	ERTIFICATE		
Object	D1900V2 - SN:50	1101	
Calibration procedure(s)	QA CAL-05.v11 Calibration Proce	dure for SAR Validation Sources	s between 0.7-3 GHz
Calibration date:	July 15, 2021		
The measurements and the uncerta	ainties with confidence p	onal standards, which realize the physical ur robability are given on the following pages ar y facility: environment temperature (22 ± 3)°	nd are part of the certificate.
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE	ainties with confidence p ed in the closed laborator E critical for calibration)	robability are given on the following pages ar y facility: environment temperature (22 $\pm$ 3)°	nd are part of the certificate. C and humidity < 70%.
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards	ainties with confidence p ed in the closed laborator E critical for calibration)	robability are given on the following pages ar y facility: environment temperature (22 ± 3)° Cal Date (Certificate No.)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Power meter NRP	ainties with confidence p ad in the closed laborator E critical for calibration) ID # SN: 104778	robability are given on the following pages ar ry facility: environment temperature (22 ± 3)° Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91	ainties with confidence p ad in the closed laborator E critical for calibration) ID # SN: 104778 SN: 103244	Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291) 09-Apr-21 (No. 217-03291)	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91	ainties with confidence p ad in the closed laborator E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91	ainties with confidence p ad in the closed laborator E critical for calibration) ID # SN: 104778 SN: 103244	Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291) 09-Apr-21 (No. 217-03291)	C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator	ainties with confidence p ed in the closed laborator E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k)	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03293)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination	ainties with confidence p ad in the closed laborator E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327	robability are given on the following pages ar ry facility: environment temperature (22 ± 3)° Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03292) 09-Apr-21 (No. 217-03343) 09-Apr-21 (No. 217-03344)	Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Apr-22
The measurements and the uncert All calibrations have been conducte 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	ainties with confidence p ad in the closed laborator E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 10325 SN: 10325 S	robability are given on the following pages ar y facility: environment temperature (22 ± 3)° Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03291) 09-Apr-21 (No. 217-03292) 09-Apr-21 (No. 217-03343) 09-Apr-21 (No. 217-03344) 28-Dec-20 (No. EX3-7349_Dec20) 02-Nov-20 (No. DAE4-601_Nov20) Check Date (in house)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards 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	ainties with confidence p and in the closed laborator critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 103245 SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22
The measurements and the uncert All calibrations have been conducte 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 E44198 Power sensor HP 8481A	ainties with confidence p ed in the closed laborator E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 103245 SN: 8H9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards 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	ainties with confidence p and in the closed laborator critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 103245 SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22
The measurements and the uncert All calibrations have been conducte 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	ainties with confidence p ad in the closed laborator E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103244 SN: 103245 SN: 8H9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)	A are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22 In house check: Oct-22 In house check: Oct-22
The measurements and the uncert All calibrations have been conducte 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	ainties with confidence p ad in the closed laborator E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317 SN: US37292783 SN: MY41092317 SN: 100972 SN: US41080477 Name	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)	A are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22
The measurements and the uncert All calibrations have been conducte 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	ainties with confidence p and in the closed laborator critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41092317 SN: US41080477	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           31-Mar-14 (in house check Oct-20)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22 In house check: Oct-22 In house check: Oct-22 In house check: Oct-21 Signature
The measurements and the uncert All calibrations have been conducte 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 E44198 Power sensor HP 8481A Power sensor HP 8481A RF generator R&S SMT-06 Network Analyzer Agilent E8358A	ainties with confidence p ad in the closed laborator E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317 SN: US37292783 SN: MY41092317 SN: 100972 SN: US41080477 Name	cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           31-Mar-14 (in house check Oct-20)           Function	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22 In house check: Oct-22 In house check: Oct-22 In house check: Oct-21





#### 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

S

C

S

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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Certificate No: D1900V2-5d101\_Jul21

Page 2 of 6





#### **Measurement Conditions**

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	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	40.4 ± 6 %	1.40 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

#### SAR result with Head TSL

SAR for nominal Head TSL parameters

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.0 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.1 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR averaged over to citr (to g) of head 13L	condition	
SAR measured	250 mW input power	5.22 W/kg

normalized to 1W

20.9 W/kg ± 16.5 % (k=2)

Certificate No: D1900V2-5d101\_Jul21

Page 3 of 6





#### Appendix (Additional assessments outside the scope of SCS 0108)

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.9 Ω + 4.8 jΩ	
Return Loss	- 26.2 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
-----------------	-------

Certificate No: D1900V2-5d101\_Jul21

Page 4 of 6





#### DASY5 Validation Report for Head TSL

Date: 15.07.2021

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 1900 MHz Medium parameters used: f = 1900 MHz;  $\sigma$  = 1.4 S/m;  $\epsilon_r$  = 40.4;  $\rho$  = 1000 kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(8.43, 8.43, 8.43) @ 1900 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

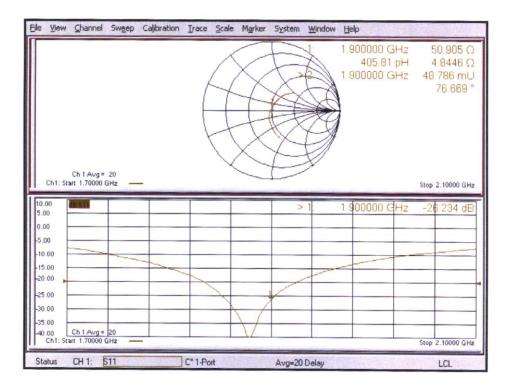
Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 110.1 V/m; Power Drift = 0.05 dB Peak SAR (extrapolated) = 18.4 W/kg SAR(1 g) = 10 W/kg; SAR(10 g) = 5.22 W/kg Smallest distance from peaks to all points 3 dB below = 9.8 mm Ratio of SAR at M2 to SAR at M1 = 54.9% Maximum value of SAR (measured) = 15.5 W/kg







#### Impedance Measurement Plot for Head TSL



Certificate No: D1900V2-5d101\_Jul21

Page 6 of 6

©Copyright. All rights reserved by CTTL.

Page 178 of 207





### 2450 MHz Dipole Calibration Certificate

Engineering AG eughausstrasse 43, 8004 Zurich,	<b>of</b> Switzerland	S S S S S S S S S S S S S S S S S S S	Schweizerischer Kalibrierdienst Service suisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service
ccredited by the Swiss Accreditation he Swiss Accreditation Service i			ccreditation No.: SCS 0108
Iultilateral Agreement for the rec	ognition of calibration		D2450V2-853_Jul21
	ERTIFICATE		
Object	D2450V2 - SN:8		
Calibration procedure(s)	QA CAL-05.v11 Calibration Proce	edure for SAR Validation Sources	s between 0.7-3 GHz
Calibration date:	July 26, 2021		
The measurements and the uncerta	ainties with confidence p ad in the closed laborato	ional standards, which realize the physical un robability are given on the following pages at ry facility: environment temperature $(22 \pm 3)^{\circ}$	nd are part of the certificate.
The measurements and the uncerta	ainties with confidence p ad in the closed laborato	orobability are given on the following pages a	nd are part of the certificate.
The measurements and the uncerta All calibrations have been conducte Calibration Equipment used (M&TE	ainties with confidence p ed in the closed laborato critical for calibration)	robability are given on the following pages any facility: environment temperature $(22 \pm 3)^{\circ}$	nd are part of the certificate. C and humidity < 70%.
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards	ainties with confidence p ad in the closed laborato critical for calibration)	robability are given on the following pages an ry facility: environment temperature (22 ± 3)° Cal Date (Certificate No.)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Power meter NRP	ainties with confidence p ad in the closed laborato critical for calibration) ID # SN: 104778	robability are given on the following pages as ry facility: environment temperature (22 ± 3)° Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22
The measurements and the uncerta All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Power meter NRP Power sensor NRP-Z91	ainties with confidence p and in the closed laborato critical for calibration) ID # SN: 104778 SN: 103244	robability are given on the following pages as ry facility: environment temperature (22 ± 3)° Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03291)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Power sensor NRP-291 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination	ainties with confidence p and in the closed laborato critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245	robability are given on the following pages ar ry facility: environment temperature (22 ± 3)° Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03291) 09-Apr-21 (No. 217-03292)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Power sensor NRP- Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4	ainties with confidence p ad in the closed laborato critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 103245 SN: 103245 SN: 310982 / 06327 SN: 7349	robability are given on the following pages as ry facility: environment temperature (22 ± 3)* Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03291) 09-Apr-21 (No. 217-03243) 09-Apr-21 (No. 217-03343) 09-Apr-21 (No. 217-03344) 28-Dec-20 (No. EX3-7349_Dec20)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21
The measurements and the uncert All calibrations have been conducte 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	ainties with confidence p and in the closed laborato critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327	robability are given on the following pages as ry facility: environment temperature (22 ± 3)* Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03292) 09-Apr-21 (No. 217-03343) 09-Apr-21 (No. 217-03344)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Apr-22
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards	ainties with confidence p and in the closed laborato critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID #	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check
The measurements and the uncerta All calibrations have been conducte 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	ainties with confidence p and in the closed laborato critical for calibration) ID # SN: 104778 SN: 103244 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22
The measurements and the uncerta All calibrations have been conducte 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	ainties with confidence p and in the closed laborato critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 103245 SN: 8H9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22
The measurements and the uncerta All calibrations have been conducte 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	ainties with confidence p and in the closed laborato critical for calibration) ID # SN: 104778 SN: 103244 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41092317	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)	nd are part of the certificate. C and humidity < 70%. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22 In house check: Oct-22
The measurements and the uncerta All calibrations have been conducte 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	ainties with confidence p and in the closed laborato critical for calibration) ID # SN: 104778 SN: 103244 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 310982 / 06327 SN: 5349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41092317 SN: 100972	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7344_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22
The measurements and the uncerta All calibrations have been conducte 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	ainties with confidence p and in the closed laborato critical for calibration) ID # SN: 104778 SN: 103244 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: MY41092317	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)	nd are part of the certificate. C and humidity < 70%. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22 In house check: Oct-22
The measurements and the uncerta All calibrations have been conducte 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 Network Analyzer Agilent E8358A	ainties with confidence p ad in the closed laborato critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317 SN: US37292783 SN: MY41092317 SN: US31080477 Name	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           31-Mar-14 (in house check Oct-20)	nd are part of the certificate. C and humidity < 70%. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-21 Signature
The measurements and the uncert All calibrations have been conducte Calibration Equipment used (M&TE Primary Standards Power meter NRP 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	ainties with confidence p and in the closed laborato critical for calibration) ID # SN: 104778 SN: 103245 SN: 10325 SN: 10325 SN: 10325 SN: 10325 SN: 1032	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           31-Mar-14 (in house check Oct-20)	nd are part of the certificate. C and humidity < 70%. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-21 Signature
The measurements and the uncerta All calibrations have been conducte 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 Network Analyzer Agilent E8358A	ainties with confidence p ad in the closed laborato critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317 SN: US37292783 SN: MY41092317 SN: US31080477 Name	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           31-Mar-14 (in house check Oct-20)	nd are part of the certificate. C and humidity < 70%. Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-21





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



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

Accreditation No.: SCS 0108

S

S

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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the . center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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: D2450V2-853\_Jul21

Page 2 of 6





#### **Measurement Conditions**

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

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

#### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.9 ± 6 %	1.88 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	53.3 W/kg ± 17.0 % (k=2)
SAB averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL SAR measured	condition 250 mW input power	6.33 W/kg

Certificate No: D2450V2-853\_Jul21

Page 3 of 6





### Appendix (Additional assessments outside the scope of SCS 0108)

#### Antenna Parameters with Head TSL

	50.0.0.0.0.00
Impedance, transformed to feed point	53.6 Ω + 3.8 jΩ
Return Loss	- 25.9 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction)	1.164 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	
inditation of by	

SPEAG

Certificate No: D2450V2-853\_Jul21

Page 4 of 6





#### DASY5 Validation Report for Head TSL

Date: 26.07.2021

Test Laboratory: SPEAG, Zurich, Switzerland

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

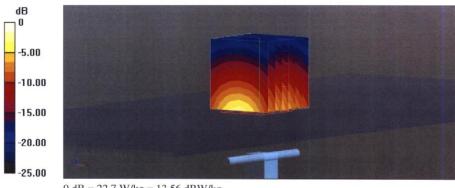
Communication System: UID 0 - CW; Frequency: 2450 MHz Medium parameters used: f = 2450 MHz;  $\sigma = 1.88$  S/m;  $\varepsilon_r = 37.9$ ;  $\rho = 1000$  kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(7.96, 7.96, 7.96) @ 2450 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

#### 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 = 116.2 V/m; Power Drift = 0.09 dB Peak SAR (extrapolated) = 27.4 W/kg SAR(1 g) = 13.7 W/kg; SAR(10 g) = 6.33 W/kg Smallest distance from peaks to all points 3 dB below = 9 mm Ratio of SAR at M2 to SAR at M1 = 50% Maximum value of SAR (measured) = 22.7 W/kg



0 dB = 22.7 W/kg = 13.56 dBW/kg

Certificate No: D2450V2-853\_Jul21

Page 5 of 6





Elle View Channel Sweep Calibration Irace Scale Marker System Window Help 2.450000 GHz 53.578 Q 3.8150 Ω 247.83 pH 2.450000 GHz 50.464 mU 44.725 ° Ch 1 Avg = 20 Ch1: Start 2.25000 GHz Stop 2.65000 GHz dB S11 5.940 dB 450000 GHz 00 00 00 5.00 10.00 15.00 20.00 25.00 30.00 35.00 Ch 1 Avg = 20 Start 2.25000 GHz 40.00 Ch1 Stop 2.65000 GHz Status CH 1: 511 C\* 1-Port Avg=20 Delay LCL

Impedance Measurement Plot for Head TSL

Certificate No: D2450V2-853\_Jul21

Page 6 of 6

©Copyright. All rights reserved by CTTL.

Page 184 of 207





### 2600 MHz Dipole Calibration Certificate

ne Swiss Accreditation Service	is one of the signatorie	s to the EA	
ultilateral Agreement for the rec	-	certificates	: D2600V2-1012_Jul21
CTTL (Auden)	ERTIFICATE		. D2000V2-1012_00121
Dbject	D2600V2 - SN:10	012	
Calibration procedure(s)	QA CAL-05.v11		
	Calibration Proce	dure for SAR Validation Sources	between 0.7-3 GHz
Calibration date:	July 26, 2021		
valibration date.	July 20, 2021		
his calibration certificate docume	nts the traceability to nati	onal standards, which realize the physical un	nits of measurements (SI).
The measurements and the uncert	ainties with confidence p	robability are given on the following pages ar	nd are part of the certificate.
All calibrations have been conduct	ed in the closed laborato	ry facility: environment temperature (22 ± 3)°	C and humidity < 70%.
All calibrations have been conduct	ed in the closed laborato	ry facility: environment temperature (22 $\pm$ 3)°	C and humidity < 70%.
		ry facility: environment temperature (22 $\pm$ 3)°	C and humidity < 70%.
		ry facility: environment temperature $(22 \pm 3)^{\circ}$	C and humidity < 70%.
All calibrations have been conduct Calibration Equipment used (M&Tf Primary Standards		ry facility: environment temperature (22 ± 3)°r Cal Date (Certificate No.)	C and humidity < 70%. Scheduled Calibration
Calibration Equipment used (M&T	E critical for calibration)		
Calibration Equipment used (M&Tf Primary Standards Power meter NRP Power sensor NRP-Z91	E critical for calibration) ID # SN: 104778 SN: 103244	Cal Date (Certificate No.)	Scheduled Calibration
Calibration Equipment used (M&Tf Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245	Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03291) 09-Apr-21 (No. 217-03292)	Scheduled Calibration Apr-22
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 SN: BH9394 (20k)	Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03291) 09-Apr-21 (No. 217-03292) 09-Apr-21 (No. 217-03343)	Scheduled Calibration Apr-22 Apr-22
Calibration Equipment used (M&TF Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327	Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03291) 09-Apr-21 (No. 217-03292)	Scheduled Calibration Apr-22 Apr-22 Apr-22
Calibration Equipment used (M&Tf 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: BH3394 (20k) SN: 310982 / 06327 SN: 7349	Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03291) 09-Apr-21 (No. 217-03292) 09-Apr-21 (No. 217-03343) 09-Apr-21 (No. 217-03344) 28-Dec-20 (No. EX3-7349_Dec20)	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21
Calibration Equipment used (M&Tf 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: BH9394 (20k) SN: 310982 / 06327	Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03291) 09-Apr-21 (No. 217-03292) 09-Apr-21 (No. 217-03343) 09-Apr-21 (No. 217-03344)	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22
Calibration Equipment used (M&Tf 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	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310924 (66327 SN: 7349 SN: 601	Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03291) 09-Apr-21 (No. 217-03292) 09-Apr-21 (No. 217-03343) 09-Apr-21 (No. 217-03344) 28-Dec-20 (No. EX3-7349_Dec20) 02-Nov-20 (No. DAE4-601_Nov20)	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21
Calibration Equipment used (M&TE 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	E oritical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID #	Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03291) 09-Apr-21 (No. 217-03292) 09-Apr-21 (No. 217-03343) 09-Apr-21 (No. 217-03344) 28-Dec-20 (No. EX3-7349_Dec20) 02-Nov-20 (No. DAE4-601_Nov20) Check Date (in house)	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 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: 8H9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475	Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03291) 09-Apr-21 (No. 217-03292) 09-Apr-21 (No. 217-03343) 09-Apr-21 (No. 217-03344) 28-Dec-20 (No. EX3-7349_Dec20) 02-Nov-20 (No. DAE4-601_Nov20) Check Date (in house) 30-Oct-14 (in house check Oct-20)	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22
Calibration Equipment used (M&TF 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	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 8H9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22
Calibration Equipment used (M&TF 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: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22 In house check: Oct-22
Calibration Equipment used (M&TF 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 RF generator R&S SMT-06	E critical for calibration) ID # SN: 104778 SN: 103245 SN: B19394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317 SN: 100972	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22 In house check: Oct-22 In house check: Oct-22 In house check: Oct-22
Calibration Equipment used (M&TF 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 RF generator R&S SMT-06	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22 In house check: Oct-22
Calibration Equipment used (M&TF 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: B19394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317 SN: 100972	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22
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 Network Analyzer Agilent E8358A	E ortitical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37282783 SN: MY41092317 SN: US31080477	Cal Date (Certificate No.) 09-Apr-21 (No. 217-03291/03292) 09-Apr-21 (No. 217-03291) 09-Apr-21 (No. 217-03292) 09-Apr-21 (No. 217-03343) 09-Apr-21 (No. 217-03344) 28-Dec-20 (No. EX3-7349_Dec20) 02-Nov-20 (No. DAE4-601_Nov20) Check Date (in house) 30-Oct-14 (in house check Oct-20) 07-Oct-15 (in house check Oct-20) 07-Oct-15 (in house check Oct-20) 15-Jun-15 (in house check Oct-20) 31-Mar-14 (in house check Oct-20)	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22 In house check: Oct-22 In house check: Oct-22 In house check: Oct-22
Calibration Equipment used (M&TT 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 Network Analyzer Agilent E8358A	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317 SN: US37292783 SN: WY41092317 SN: US41080477 Name	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           31-Mar-14 (in house check Oct-20)           Function	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22
Calibration Equipment used (M&TF 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 sensor HP 8481A Power s	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317 SN: US37292783 SN: WY41092317 SN: US41080477 Name Michael Weber	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           31-Mar-14 (in house check Oct-20)           Function           Laboratory Technician	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22
Calibration Equipment used (M&TF 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 sensor HP 8481A Power s	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317 SN: US37292783 SN: WY41092317 SN: US41080477 Name	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           31-Mar-14 (in house check Oct-20)           Function	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22
Calibration Equipment used (M&TF 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 sensor HP 8481A Power s	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317 SN: US37292783 SN: WY41092317 SN: US41080477 Name Michael Weber	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           31-Mar-14 (in house check Oct-20)           Function           Laboratory Technician	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22
Calibration Equipment used (M&TF Power meter NRP Power sensor NRP-Z91 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	E critical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: BH9394 (20k) SN: 310982 / 06327 SN: 7349 SN: 601 ID # SN: GB39512475 SN: US37292783 SN: WY41092317 SN: US37292783 SN: WY41092317 SN: US41080477 Name Michael Weber	Cal Date (Certificate No.)           09-Apr-21 (No. 217-03291/03292)           09-Apr-21 (No. 217-03291)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03292)           09-Apr-21 (No. 217-03343)           09-Apr-21 (No. 217-03344)           28-Dec-20 (No. EX3-7349_Dec20)           02-Nov-20 (No. DAE4-601_Nov20)           Check Date (in house)           30-Oct-14 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           07-Oct-15 (in house check Oct-20)           15-Jun-15 (in house check Oct-20)           31-Mar-14 (in house check Oct-20)           Function           Laboratory Technician	Scheduled Calibration Apr-22 Apr-22 Apr-22 Apr-22 Dec-21 Nov-21 Scheduled Check In house check: Oct-22 In house check: Oct-22





### Calibration Laboratory of Schmid & Partner

**Engineering AG** Zeughausstrasse 43, 8004 Zurich, Switzerland



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

S

S

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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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: D2600V2-1012\_Jul21

Page 2 of 6

4





#### **Measurement Conditions**

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

#### **Head TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.3 ± 6 %	2.05 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	57.1 W/kg ± 17.0 % (k=2)
CAD overseed over 10 cm <sup>3</sup> (10 c) of Head TCI	condition	
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL SAR measured	condition 250 mW input power	6.48 W/kg

Certificate No: D2600V2-1012\_Jul21

Page 3 of 6

©Copyright. All rights reserved by CTTL.

1





#### Appendix (Additional assessments outside the scope of SCS 0108)

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.8 Ω - 5.7 jΩ	
Return Loss	- 24.1 dB	

### General Antenna Parameters and Design

Electrical Delay (one direction)	1.153 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
-----------------	-------

Certificate No: D2600V2-1012\_Jul21

Page 4 of 6





#### **DASY5 Validation Report for Head TSL**

Date: 26.07.2021

Test Laboratory: SPEAG, Zurich, Switzerland

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

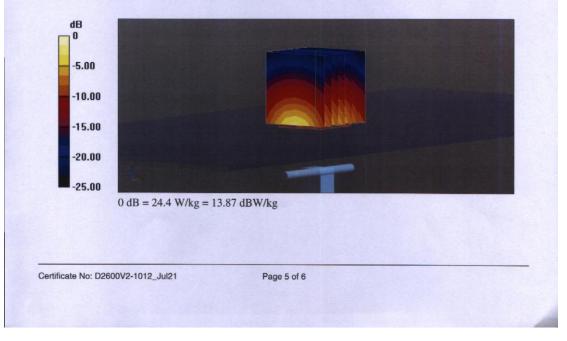
Communication System: UID 0 - CW; Frequency: 2600 MHz Medium parameters used: f = 2600 MHz;  $\sigma = 2.05$  S/m;  $\varepsilon_r = 37.3$ ;  $\rho = 1000$  kg/m<sup>3</sup> Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(7.84, 7.84, 7.84) @ 2600 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

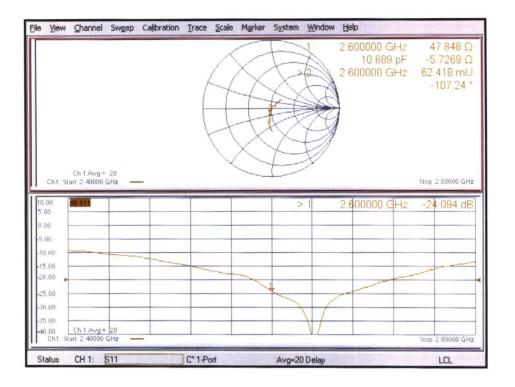
Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 118.6 V/m; Power Drift = 0.09 dB Peak SAR (extrapolated) = 29.5 W/kg SAR(1 g) = 14.7 W/kg; SAR(10 g) = 6.48 W/kg Smallest distance from peaks to all points 3 dB below = 8.9 mm Ratio of SAR at M2 to SAR at M1 = 49.6% Maximum value of SAR (measured) = 24.4 W/kg







#### Impedance Measurement Plot for Head TSL



Certificate No: D2600V2-1012\_Jul21

Page 6 of 6

©Copyright. All rights reserved by CTTL.





# **ANNEX I SPOCT CHECK**

### I.1 Tissue and Verification

### Table I.1-1: Dielectric Performance of Head Tissue Simulating Liquid

Measurement Date (yyyy-mm-dd)	Туре	Frequency	Permittivity ε	Drift (%)	Conductivity σ (S/m)	Drift (%)
2022-5-17	Head	835MHz	43.08	3.81%	0.9165	1.83%
2022-5-17	Head	1750MHz	40.99	2.27%	1.389	1.39%

Table I.1-2: System Validation of Head

Measurement		Target val	ue (W/kg)	Measured	value(W/kg)	Devi	ation
Date	Frequency	10 g	1 g	10 g	1 g	10 g	1 g
(yyyy-mm-dd)		Average	Average	Average	Average	Average	Average
2022-5-17	835MHz	6.24	9.63	5.92	9.52	-5.13%	-1.14%
2022-5-17	1750MHz	19.4	36.9	19.2	34.8	-1.03%	-5.69%

### I.2 Measurement results

Frequency Band	Channel Number	Frequency (MHz)	Test setup	EUT Measured Power (dBm)	Tune up (dBm)	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
LTE Band26	26775	822.5	1RB-Middle	23.44	24.00	0.513	0.58	0.379	0.43	-0.06
WCDMA1700	1412	1732.5	Bottom Edge 10mm	22.49	22.70	1.00	1.05	0.545	0.57	-0.04

### I.3 Reported SAR Comparison

### Table : Highest Reported SAR (1g)

### Note: The spot check results marked blue are larger than the original result.

			Highest Rep	orted SAR (1g	a)
				Reported	Reported
	Mode	1g SAR	1g SAR	SAR	SAR
		Head	10mm	Spot check	spot check
				Head	Body
GSM	GSM 850	0.24	0.26	١	\
0.5101	PCS 1900	0.05	0.76	١	\
	UMTS FDD 2	0.12	0.84	١	λ
WCDMA	UMTS FDD 4	0.14	1.36	١	1.06
	UMTS FDD 5	0.71	0.34	١	λ
	LTE Band 2	0.13	0.77	١	λ
	LTE Band 7	0.18	1.19	١	λ
LTE	LTE Band 12	0.32	0.24	١	λ
	LTE Band 13	0.54	0.28	١	λ
	LTE Band 26	0.74	0.22	0.68	λ
	LTE Band 66	0.13	١		λ
WI	AN 2.4 GHz	0.34	0.24	١	
	ВТ	0.03	0.02	١	





## I.4 List of Main Instruments

### Table I.4-1: List of Main Instruments

No.	Name	Туре	Serial Number	Calibration Date	Valid Period
01	Network analyzer	N5239A	MY55491241	May 31, 2021	One year
02	Power meter	NRP2	106277	Sontombor 22 2021	
03	Power sensor	NRP8S	104291	September 23,2021	One year
04	Signal Generator	E4483C	MY49071430	January 13, 2022	One Year
05	Amplifier	60S1G4	0331848	No Calibration	Requested
06	BTS	CMW500	166370	June 25, 2021	One year
07	E-field Probe	SPEAG EX3DV4	7517	January 19,2022	One year
08	DAE	SPEAG DAE4	1525	September 1, 2021	One year
09	Dipole Validation Kit	SPEAG D835V2	4d069	July 12,2021	One year
10	Dipole Validation Kit	SPEAG D1750V2	1003	July 12,2021	One year





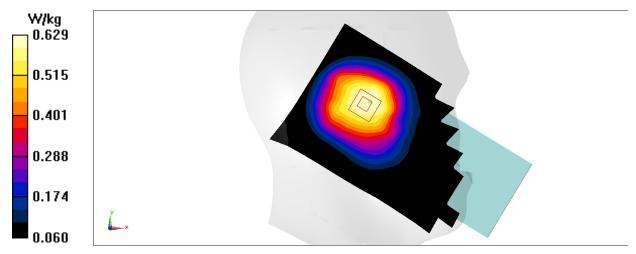
### I.5 Graph Results

### LTE Band26 Head

Date/Time: 5/17/2022 Electronics: DAE4 Sn1525 Medium: H700-6000M Medium parameters used (interpolated): f = 822.5 MHz;  $\sigma$  = 0.911 S/m;  $\epsilon_r$  = 43.112;  $\rho$  = 1000 kg/m<sup>3</sup> Ambient Temperature:23.3°C Liquid Temperature: 22.5°C Communication System: UID 0, LTE Band26 (0) Frequency: 822.5 MHz Duty Cycle: 1:1 Probe: EX3DV4 - SN7517 ConvF(9.7, 9.7, 9.7); Calibrated: 1/19/2022

Area Scan (81x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm Maximum value of SAR (interpolated) = 0.659 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 22.31 V/m; Power Drift = -0.07 dB Peak SAR (extrapolated) = 0.697 W/kg SAR(1 g) = 0.513 W/kg; SAR(10 g) = 0.379 W/kg Maximum value of SAR (measured) = 0.629 W/kg





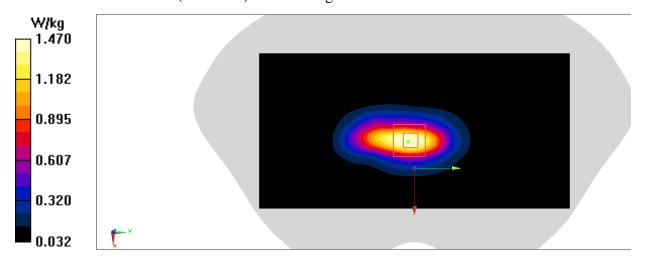


### WCDMA1700 Body

Date/Time: 5/17/2022 Electronics: DAE4 Sn1525 Medium: H700-6000M Medium parameters used (interpolated): f = 1732.4 MHz;  $\sigma = 1.378$  S/m;  $\epsilon_r = 41.034$ ;  $\rho = 1000$  kg/m<sup>3</sup> Ambient Temperature: 23.3°C Liquid Temperature: 22.5°C Communication System: UID 0, WCDMA 1700 Band4 (0) Frequency: 1732.4 MHz Duty Cycle: 1:1 Probe: EX3DV4 - SN7517 ConvF(8.1, 8.1, 8.1); Calibrated: 1/19/2022

**Area Scan (71x141x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm Maximum value of SAR (interpolated) = 1.58 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 25.99 V/m; Power Drift = -0.04 dB Peak SAR (extrapolated) = 1.71 W/kg SAR(1 g) = 1.000 W/kg; SAR(10 g) = 0.545 W/kg Maximum value of SAR (measured) = 1.47 W/kg







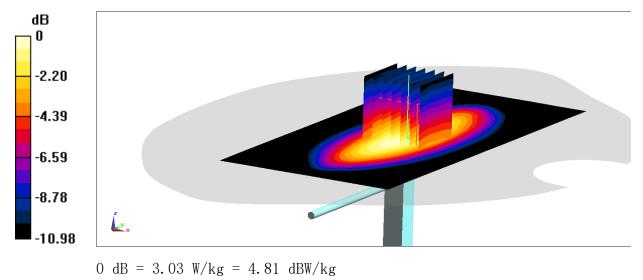
### **I.6 System Verification Results**

### SystemPerformanceCheck-D835\_4d069

Date/Time: 5/17/2022 Electronics: DAE4 Sn1525 Medium: H700-6000M Medium parameters used: f = 835 MHz;  $\sigma$  = 0.917 S/m;  $\epsilon_r$  = 43.075;  $\rho$  = 1000 kg/m<sup>3</sup> Ambient Temperature:23.3°C Liquid Temperature: 22.5°C Communication System: UID 0, CW (0) Frequency: 835 MHz Duty Cycle: 1:1 Probe: EX3DV4 - SN7517 ConvF(9.7, 9.7, 9.7); Calibrated: 1/19/2022

System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=250 mW, dist=2.0mm (EX-Probe)/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm Maximum value of SAR (interpolated) = 3.03 W/kg

System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=250 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 57.78 V/m; Power Drift = 0.10 dB Peak SAR (extrapolated) = 3.93 W/kg SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.48 W/kg Maximum value of SAR (measured) = 3.18 W/kg





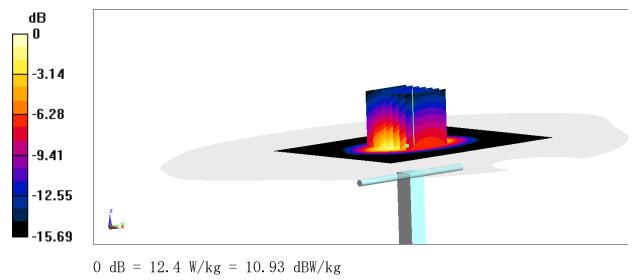


### SystemPerformanceCheck-D1750\_1003

Date/Time: 5/17/2022 Electronics: DAE4 Sn1525 Medium: H700-6000M Medium parameters used: f = 1750 MHz;  $\sigma$  = 1.389 S/m;  $\epsilon_r$  = 40.991;  $\rho$  = 1000 kg/m<sup>3</sup> Ambient Temperature:23.3°C Liquid Temperature: 22.5°C Communication System: UID 0, CW Frequency: 1750 MHz Duty Cycle: 1:1 Probe: EX3DV4 - SN7517 ConvF(8.1, 8.1, 8.1); Calibrated: 1/19/2022

System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=2.0mm (EX-Probe)/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm Maximum value of SAR (interpolated) = 12.4 W/kg

System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 92.79 V/m; Power Drift = -0.19 dB Peak SAR (extrapolated) = 15.0 W/kg SAR(1 g) = 8.72 W/kg; SAR(10 g) = 4.78 W/kg Maximum value of SAR (measured) = 12.0 W/kg





# **I.7 PROBE CALIBRATION CERTIFICATE**

E-mail: cttl@chinattl.com	Fax: +86-10-623046: Http://www.chinattl.or	cn	704 00550	
Client CTTL		Certificate No	: Z21-60558	
CALIBRATION CER	TIFICATE			
Object	EX3DV4 - S	NI · 7517		
	EX3DV4 - 3	SN . 7517		
Calibration Procedure(s)	FF-Z11-004	02		
		-02 Procedures for Dosimetric E-field Probe	26	
	Galibration		50	
Calibration date:	January 19,	2022		
pages and are part of the certifi	cate.	uncertainties with confidence probability		
Calibration Equipment used (M	&TE critical for ca	libration)		
Primary Standards	ID #	Cal Date(Calibrated by, Certificate No	.) Scheduled Calibration	
Power Meter NRP2 101919		15-Jun-21(CTTL, No.J21X04466) Jun-22		
		15-Jun-21(CTTL, No.J21X04466) Jun-22		
Power sensor NRP-Z91	101547	15-Jun-21(CTTL, No.J21X04466)		
NAME OF A DESCRIPTION OF A	101547 101548	15-Jun-21(CTTL, No.J21X04466) 15-Jun-21(CTTL, No.J21X04466)		
Power sensor NRP-Z91		15-Jun-21(CTTL, No.J21X04466)	Jun-22	
Power sensor NRP-Z91 Power sensor NRP-Z91	101548	15-Jun-21(CTTL, No.J21X04466) 10-Feb-20(CTTL, No.J20X00525)	Jun-22 Jun-22	
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 10dBAttenuator Reference 20dBAttenuator Reference Probe EX3DV4	101548 18N50W-10dB 18N50W-20dB SN 3617	15-Jun-21(CTTL, No.J21X04466) 10-Feb-20(CTTL, No.J20X00525)	Jun-22 Jun-22 Feb-22 Feb-22	
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 10dBAttenuator Reference 20dBAttenuator	101548 18N50W-10dB 18N50W-20dB	15-Jun-21(CTTL, No.J21X04466) 10-Feb-20(CTTL, No.J20X00525) 10-Feb-20(CTTL, No.J20X00526)	Jun-22 Jun-22 Feb-22 Feb-22 n21) Jan-22	
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 10dBAttenuator Reference 20dBAttenuator Reference Probe EX3DV4	101548 18N50W-10dB 18N50W-20dB SN 3617	15-Jun-21(CTTL, No.J21X04466) 10-Feb-20(CTTL, No.J20X00525) 10-Feb-20(CTTL, No.J20X00526) 27-Jan-21(SPEAG, No.EX3-3617_Ja	Jun-22 Jun-22 Feb-22 Feb-22 n21) Jan-22	
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 10dBAttenuator Reference 20dBAttenuator Reference Probe EX3DV4 DAE4	101548 18N50W-10dB 18N50W-20dB SN 3617 SN 1555	15-Jun-21(CTTL, No.J21X04466) 10-Feb-20(CTTL, No.J20X00525) 10-Feb-20(CTTL, No.J20X00526) 27-Jan-21(SPEAG, No.EX3-3617_Ja 20-Aug-21(SPEAG, No.DAE4-1555_/	Jun-22 Jun-22 Feb-22 Feb-22 n21) Jan-22 Aug21/2) Aug-22	
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 10dBAttenuator Reference 20dBAttenuator Reference Probe EX3DV4 DAE4 Secondary Standards	101548 18N50W-10dB 18N50W-20dB SN 3617 SN 1555 ID #	15-Jun-21(CTTL, No.J21X04466) 10-Feb-20(CTTL, No.J20X00525) 10-Feb-20(CTTL, No.J20X00526) 27-Jan-21(SPEAG, No.EX3-3617_Ja 20-Aug-21(SPEAG, No.DAE4-1555_/ Cal Date(Calibrated by, Certificate No.)	Jun-22 Jun-22 Feb-22 Feb-22 n21) Jan-22 Aug21/2) Aug-22 Scheduled Calibration	
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 10dBAttenuator Reference 20dBAttenuator Reference Probe EX3DV4 DAE4 Secondary Standards SignalGenerator MG3700A Network Analyzer E5071C	101548 18N50W-10dB 18N50W-20dB SN 3617 SN 1555 ID # 6201052605 MY46110673	15-Jun-21(CTTL, No.J21X04466) 10-Feb-20(CTTL, No.J20X00525) 10-Feb-20(CTTL, No.J20X00526) 27-Jan-21(SPEAG, No.EX3-3617_Ja 20-Aug-21(SPEAG, No.DAE4-1555_/ Cal Date(Calibrated by, Certificate No.) 16-Jun-21(CTTL, No.J21X04467)	Jun-22 Jun-22 Feb-22 n21) Jan-22 Aug21/2) Aug-22 Scheduled Calibration Jun-22	
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 10dBAttenuator Reference 20dBAttenuator Reference Probe EX3DV4 DAE4 Secondary Standards SignalGenerator MG3700A Network Analyzer E5071C	101548 18N50W-10dB 18N50W-20dB SN 3617 SN 1555 ID # 6201052605 MY46110673	15-Jun-21(CTTL, No.J21X04466) 10-Feb-20(CTTL, No.J20X00525) 10-Feb-20(CTTL, No.J20X00526) 27-Jan-21(SPEAG, No.EX3-3617_Ja 20-Aug-21(SPEAG, No.DAE4-1555_/ Cal Date(Calibrated by, Certificate No.) 16-Jun-21(CTTL, No.J21X04467) 14-Jan-22 (CTTL, No.J22X00406)	Jun-22 Jun-22 Feb-22 Feb-22 n21) Jan-22 Aug21/2) Aug-22 Scheduled Calibration Jun-22 Jan -23	
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 10dBAttenuator Reference 20dBAttenuator Reference Probe EX3DV4 DAE4 Secondary Standards SignalGenerator MG3700A Network Analyzer E5071C Nar Calibrated by: Yu	101548 18N50W-10dB 18N50W-20dB SN 3617 SN 1555 ID # 6201052605 MY46110673 me	15-Jun-21(CTTL, No.J21X04466) 10-Feb-20(CTTL, No.J20X00525) 10-Feb-20(CTTL, No.J20X00526) 27-Jan-21(SPEAG, No.EX3-3617_Ja 20-Aug-21(SPEAG, No.DAE4-1555_/ Cal Date(Calibrated by, Certificate No.) 16-Jun-21(CTTL, No.J21X04467) 14-Jan-22 (CTTL, No.J22X00406) Function	Jun-22 Jun-22 Feb-22 Feb-22 n21) Jan-22 Aug21/2) Aug-22 Scheduled Calibration Jun-22 Jan -23	
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 10dBAttenuator Reference 20dBAttenuator Reference Probe EX3DV4 DAE4 Secondary Standards SignalGenerator MG3700A Network Analyzer E5071C Nar Calibrated by: Yu Reviewed by: Lir	101548 18N50W-10dB 18N50W-20dB SN 3617 SN 1555 ID # 6201052605 MY46110673 me Zongying	15-Jun-21(CTTL, No.J21X04466) 10-Feb-20(CTTL, No.J20X00525) 10-Feb-20(CTTL, No.J20X00526) 27-Jan-21(SPEAG, No.EX3-3617_Ja 20-Aug-21(SPEAG, No.DAE4-1555_/ Cal Date(Calibrated by, Certificate No.) 16-Jun-21(CTTL, No.J21X04467) 14-Jan-22 (CTTL, No.J22X00406) Function SAR Test Engineer	Jun-22 Jun-22 Feb-22 Feb-22 n21) Jan-22 Aug21/2) Aug-22 Scheduled Calibration Jun-22 Jan -23	
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 10dBAttenuator Reference 20dBAttenuator Reference Probe EX3DV4 DAE4 Secondary Standards SignalGenerator MG3700A Network Analyzer E5071C Calibrated by: Yu Reviewed by: Lir	101548 18N50W-10dB 18N50W-20dB SN 3617 SN 1555 ID # 6201052605 MY46110673 me Zongying	15-Jun-21(CTTL, No.J21X04466) 10-Feb-20(CTTL, No.J20X00525) 10-Feb-20(CTTL, No.J20X00526) 27-Jan-21(SPEAG, No.EX3-3617_Ja 20-Aug-21(SPEAG, No.DAE4-1555_/ Cal Date(Calibrated by, Certificate No.) 16-Jun-21(CTTL, No.J21X04467) 14-Jan-22 (CTTL, No.J21X04467) 14-Jan-22 (CTTL, No.J22X00406) Function SAR Test Engineer SAR Test Engineer SAR Test Engineer	Jun-22 Jun-22 Feb-22 Feb-22 Aug21/2) Aug-22 Scheduled Calibration Jun-22 Jan -23 Signature	
Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 10dBAttenuator Reference 20dBAttenuator Reference Probe EX3DV4 DAE4 Secondary Standards SignalGenerator MG3700A Network Analyzer E5071C Nar Calibrated by: Yu Reviewed by: Lir Approved by: Qi	101548 18N50W-10dB 18N50W-20dB SN 3617 SN 1555 ID # 6201052605 MY46110673 me Zongying h Hao Dianyuan	15-Jun-21(CTTL, No.J21X04466) 10-Feb-20(CTTL, No.J20X00525) 10-Feb-20(CTTL, No.J20X00526) 27-Jan-21(SPEAG, No.EX3-3617_Ja 20-Aug-21(SPEAG, No.DAE4-1555_/ Cal Date(Calibrated by, Certificate No.) 16-Jun-21(CTTL, No.J21X04467) 14-Jan-22 (CTTL, No.J21X04467) 14-Jan-22 (CTTL, No.J22X00406) Function SAR Test Engineer SAR Test Engineer SAR Test Engineer	Jun-22 Jun-22 Feb-22 Feb-22 Aug21/2) Aug-22 Scheduled Calibration Jun-22 Jan -23 Signature	