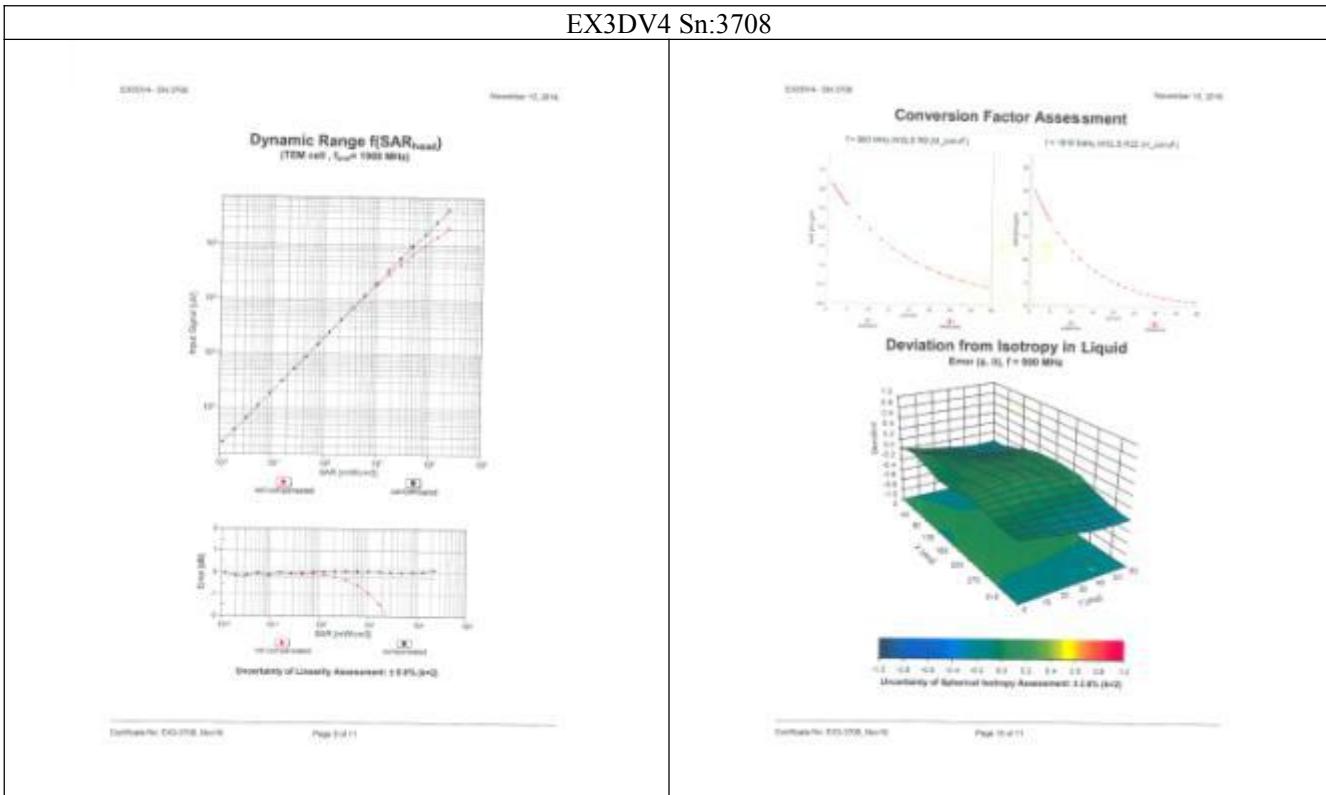


EX3DV4 Sn:3708



EX3DV4-SN:3708

November 10, 2016

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3708

Other Probe Parameters

| | |
|---|------------|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | -1.9 |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disabled |
| Probe Overall Length | 337 mm |
| Probe Body Diameter | 10 mm |
| Tip Length | 9 mm |
| Tip Diameter | 2.5 mm |
| Probe Tip to Sensor X Calibration Point | 1 mm |
| Probe Tip to Sensor Y Calibration Point | 1 mm |
| Probe Tip to Sensor Z Calibration Point | 1 mm |
| Recommended Measurement Distance from Surface | 1.4 mm |

Certificate No: EX3-3708_Nov16

Page 11 of 11



D835V2 Sn:4d023

D835V2 Sn:4d023

Calibration Laboratory of
Schmid & Partner
Engineering AG
Baugassestrasse 15, 8004 Zurich, Switzerland

S: Referenzinstitut Eidgenössische
Technische Hochschule Zürich
C: Bezeichnung des Dienstes
SAR: Calibration Services

Accredited by Swiss Accreditation Service (SCS)
The Swiss Accreditation Service is one of the signatories to the Ra-
Muhwerk Agreement for the recognition of calibration certificates.

Accreditation No.: SCS 9198

SRTE: (Wire)

Certificate No.: D835V2-4d023_Oct16

CALIBRATION CERTIFICATE

Date: D835V2 - 4d023

Calibration procedure: QM-CAL-BSI.vB
Calibration procedure for dipole validation data above 700 MHz

Calibration date: October 24, 2016

This calibration certificate describes the uncertainty of relevant test data, which relates to the physical units of measurement (SI). The measurement uncertainty and its confidence interval are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility, environment temperature 20 ± 0.5 (test humidity < 50%).

Calibration Equipment used: MDT (noted for reference)

| Primary Standards | (SI) A | (SI) B (Dipole for SAR) | Reference Standard |
|-------------------------------|-------------------|-------------------------|--------------------|
| Power meter 4000 | SIK 1001/PW | SIK 1001/PW | SIK 1001/PW |
| Power source 4000 | SIK 1001/PS | SIK 1001/PS | SIK 1001/PS |
| Power source 5000 | SIK 12045 | SIK 12045 | SIK 12045 |
| Reference 10 dB Attenuator | SIK 5000/2A | SIK 5000/2A | SIK 5000/2A |
| Type II Interlock combination | SIK 3001/2 (3002) | SIK 3001/2 (3002) | SIK 3001/2 (3002) |
| Antenna Probe ESD379 | SIK 1398 | SIK 1398 | SIK 1398 |
| Antenna Probe ESD379 | SIK 1398 | SIK 1398 | SIK 1398 |
| SIK 1398 | SIK 1398 | SIK 1398 | SIK 1398 |

| Secondary Standards | (SI) A | (SI) B (Dipole for SAR) | Reference Standard |
|---------------------------|----------------|-------------------------|--------------------|
| Power Meter SIKA 4000 | SIK 0201/H400V | SIK 0201/H400V | SIK 0201/H400V |
| Power source SIKA 5000 | SIK 12045 | SIK 12045 | SIK 12045 |
| Power source SIKA 4000 | SIK 1001/PS | SIK 1001/PS | SIK 1001/PS |
| Power source SIKA 4000 | SIK 1001/PS | SIK 1001/PS | SIK 1001/PS |
| RF-probe SIKA 1001/PS | SIK 1001/PS | SIK 1001/PS | SIK 1001/PS |
| Vehicle Antenna SIKA 1000 | SIK 1001/PS | SIK 1001/PS | SIK 1001/PS |

| Uncertainty | Name | Function | Signature |
|--------------|------------|----------------|-----------|
| Uncertainty: | Ulf Körber | Labcoordinator | |

| Responsible | Name | Function | Signature |
|--------------|----------------|------------------|-----------|
| Responsible: | Klaus Pfeiffer | Testroom Manager | |

This calibration certificate shall not be reproduced except in its original version approved at the moment.

Certificate No.: D835V2-4d023_0016 Page 1 of 6

Measurement Conditions:

MDT antenna configuration, as far as not given in chapter 1.

| DART Version | SIKEV9 | TSI 3.0 |
|------------------------------|------------------------|-------------|
| Extrapolation | Advanced Extrapolation | |
| Phantom | Humanoid Flat Phantom | |
| Distance Dipole-Center - TSL | 15 mm | with dipole |
| Zoom Scan Resolution | 0.5, 0.6, 0.8 > 2 mm | |
| Frequency | 200 MHz ± 10 kHz | |

Head TSL parameters

The following parameters and calculations were used:

| Temperature | Permeability | Conductivity |
|---|-----------------|--------------------------|
| Non-linear Head TSL parameters | 20.0 ± 1.0 | 41.0 ± 1.00 mho/m |
| Measured Head TSL parameters | (20.0 ± 0.5 °C) | 40.0 ± 0.70 ± 0.00 mho/m |
| Head TSL temperature change during test | + 0.2 °C | — |

SAR result with Head TSL

| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition |
|---|--------------------|
| SAR measured | 200 mW input power |
| SAR measured | 1.00 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W |

| SAR averaged over 10 cm ³ (10 g) of Head TSL | Condition |
|---|--------------------|
| SAR measured | 200 mW input power |
| SAR measured | 1.00 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W |

Body TSL parameters

The following parameters and calculations were used:

| Temperature | Permeability | Conductivity |
|---|-----------------|--------------------------|
| Measured Body TSL parameters | 20.0 ± 1.0 | 41.0 ± 1.00 mho/m |
| Measured Body TSL parameters | (20.0 ± 0.5 °C) | 40.0 ± 0.70 ± 0.00 mho/m |
| Body TSL temperature change during test | + 0.2 °C | — |

SAR result with Body TSL

| SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition |
|---|--------------------|
| SAR measured | 200 mW input power |
| SAR measured | 1.00 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W |
| SAR for nominal Body TSL parameters | normalized to 1W |

Calibration Laboratory of
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S: Referenzinstitut Eidgenössische
Technische Hochschule Zürich
C: Bezeichnung des Dienstes
SAR: Calibration Services

Accreditation No.: SCS 9198

Accredited by the Swiss Accreditation Service (SCS)
The Swiss Accreditation Service is one of the signatories to the Ra-
Muhwerk Agreement for the recognition of calibration certificates.

Class:

TSL
CMI/F

Issue simulating liquid
servicing/repair
N/A

Glossary:
Calibration is Performed According to the Following Standards:

- a) IEEE Std 1625-2012, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2012
- b) IEC 62209-1, "Procedure to Measure the Specific Absorption Rate (SAR) for Hand-held devices used in close proximity to the head (frequency range of 30 MHz to 3 GHz)", February 2005
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDS 65664, "SAR Measurement Requirements for 100 MHz to 6 GHz".

Additional Documentation:

- e) DASY4/S System Handbook

Methodology 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.

- a) Antennas are tested with TSL. The dipole is mounted with the center in position to feed centrally to the dummy head. The dipole is oriented parallel to the TSL plane.
- b) **Field Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- c) **Electrical Delay:** One way delay between the SMA connector and the antenna feed point. No uncertainty required.
- d) **SAR measured:** SAR measured at the stated antenna input power.
- e) **SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- f) **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.: D835V2-4d023_0016 Page 2 of 6

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

| Impedance, transformed to feed point | 53.4 Ω - 5.1 jΩ |
|--------------------------------------|-----------------|
| Return Loss | -28.4 dB |

Antenna Parameters with Body TSL

| Impedance, transformed to feed point | 49.3 Ω - 5.1 jΩ |
|--------------------------------------|-----------------|
| Return Loss | -25.6 dB |

General Antenna Parameters and Design

| Electrical Delay (one direction) | 1.389 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 "Antenna Parameters" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

Additional EUT Data

| Manufactured by | SPEAG |
|-----------------|-------------------|
| Manufactured on | December 17, 2004 |

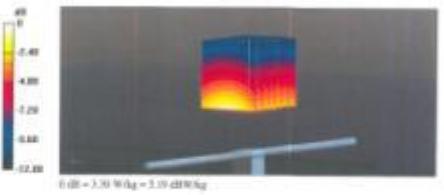
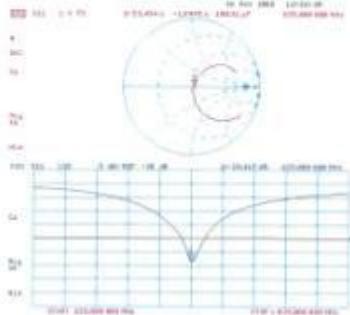
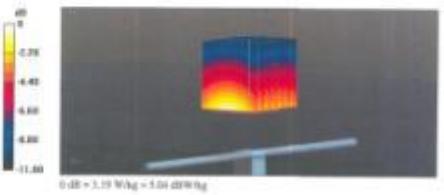
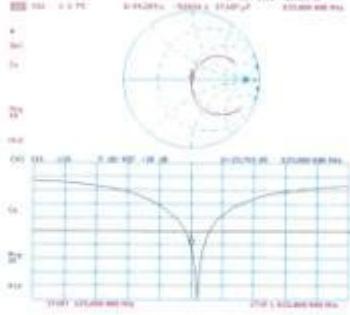
Certificate No.: D835V2-4d023_0016

Page 3 of 6

Certificate No.: D835V2-4d023_0016

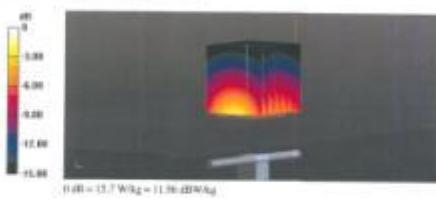
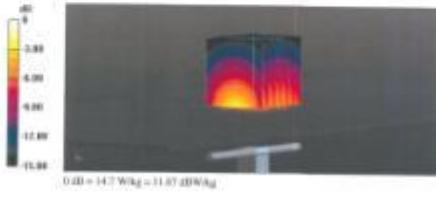
Page 4 of 8

D835V2 Sn:4d023

| | |
|--|---|
| <p>DASYS Validation Report for Head TSL</p> <p>Date: 24.10.2016</p> <p>Test Laboratory: SPEAG, Zurich, Switzerland</p> <p>BUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d023</p> <p>Communication System: ULD 0 - CW; Frequency: 835 MHz</p> <p>Medium parameter const: $\epsilon = 835 \text{ Mif}, \eta = 0.95 \text{ S/m}, \alpha = 40 \text{ }, \rho = 1000 \text{ kg/m}^3$</p> <p>Phantom sector: Phant Sector</p> <p>Measurement Standard: DASYS (IEEE/IEC/ANSI CISPR-19-2011)</p> <p>DASYS2 Configuration:</p> <ul style="list-style-type: none"> • Probe: EX309A - INT348; Const(9.32, 0.72); Calibrated: 11.06.2016 • Sensor-Surface: 1-Area (Mechanical Surface Detection) • Electronic: DAE4 SWR; Calibrated: 01.12.2015 • Phantom: Phant Phant-4.0L; Type: QD000P99A; Serial: 1001 • DASYS2 52.3.8(129); SEMCAD X (4.6.10/372) <p>Dipole Calibration for Head Tissue: $\text{Power}=250 \text{ mW}, d=15\text{mm}/\text{Zoom Scan} (7x7)/\text{Cube} 8$</p> <p>Measurement grid: d=15mm, d=Zoom, d=Zoom</p> <p>Reference Value = 41.71 V/m, Power Dose = 0.03 dB</p> <p>Peak SAR (extrapolated) = 3.77 W/kg</p> <p>SAR10 g = 2.47 W/kg, SAR30 g = 1.09 W/kg</p> <p>Maximum value of SAR (measured) = 3.30 W/kg</p>  <p>0 dB = 3.30 W/kg = 3.04 dBW/kg</p> <p>Certificate No: 080010-4d023_0010; Page 3 of 6</p> | <p>Impedance Measurement Plot for Head TSL</p>  <p>0 dB = 0.71 V/m = 0.71 dBW/kg</p> <p>Certificate No: 080010-4d023_0010; Page 4 of 6</p> |
| <p>DASYS Validation Report for Body TSL</p> <p>Date: 24.10.2016</p> <p>Test Laboratory: SPEAG, Zurich, Switzerland</p> <p>BUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d023</p> <p>Communication System: ULD 0 - CW; Frequency: 835 MHz</p> <p>Medium parameter const: $\epsilon = 835 \text{ Mif}, \eta = 0.95 \text{ S/m}, \alpha = 55 \text{ }, \rho = 1000 \text{ kg/m}^3$</p> <p>Phantom sector: Phant Sector</p> <p>Measurement Standard: DASYS (IEEE/IEC/ANSI CISPR-19-2011)</p> <p>DASYS2 Configuration:</p> <ul style="list-style-type: none"> • Probe: EX309A - INT348; Const(9.35, 0.73); Calibrated: 11.06.2016 • Sensor-Surface: 1-Area (Mechanical Surface Detection) • Electronic: DAE4 SWR; Calibrated: 01.12.2015 • Phantom: Phant Phant-4.0L; Type: QD000P99A; Serial: 1001 • DASYS2 52.3.8(129); SEMCAD X (4.6.10/372) <p>Dipole Calibration for Body Tissue: $\text{Power}=250 \text{ mW}, d=15\text{mm}/\text{Zoom Scan} (7x7)/\text{Cube} 8$</p> <p>Measurement grid: d=15mm, d=Zoom, d=Zoom</p> <p>Reference Value = 79.01 V/m, Power Dose = 0.03 dB</p> <p>Peak SAR (extrapolated) = 3.19 W/kg</p> <p>SAR10 g = 2.44 W/kg, SAR30 g = 1.08 W/kg</p> <p>Maximum value of SAR (measured) = 3.19 W/kg</p>  <p>0 dB = 3.19 W/kg = 3.04 dBW/kg</p> <p>Certificate No: 080010-4d023_0010; Page 5 of 6</p> | <p>Impedance Measurement Plot for Body TSL</p>  <p>0 dB = 0.71 V/m = 0.71 dBW/kg</p> <p>Certificate No: 080010-4d023_0010; Page 6 of 6</p> |

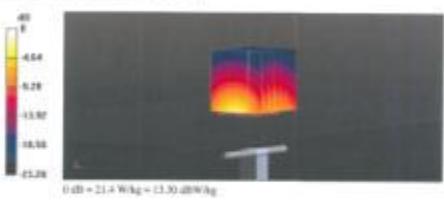
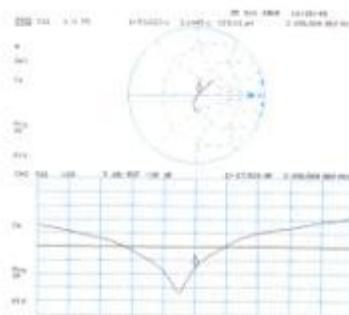
D1900V2 Sn:5d113

| <div style="border: 1px solid black; padding: 10px;"> <p>Calibration Laboratory of Schmid & Partner Engineering AG, Hönggstrasse 14, 8001 Zürich, Switzerland</p> <p> </p> <p>B Referenzlaboratorium C Service-Sicher & Dokumentation D Service-beratung & Beratung E Service-Consulting Services</p> <p>Accredited by the Swiss Accreditation (Swiss-akz): The Swiss Accreditation Service is one of the signatories to the IAC Multilateral Agreement for the recognition of calibration certificates.</p> <p>Issue: SRTC (WME) Certificate No.: D1900V2-Sn:5d113_Oct18</p> <p>CALIBRATION CERTIFICATE</p> <p>Item: D1900V2 - SN:5d113</p> <p>Calibration procedure: Q8-CAL-05-v3 Calibration procedure for dipole antenna test above 700-MHz</p> <p>Calibration date: October 26, 2018</p> <p>This calibration certificate documents the traceability to national standards, which makes the physical units of measurement. The measurements and the uncertainties are summarized on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the stated laboratory under environment temperature (20 ± 0.5°C) and humidity < 40%.</p> <p>Calibration Requirements used (MIL-STD-188-177C) for calibration:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Process Parameter</th> <th>Value</th> <th>Test Data Conditions No. 1</th> <th>Activation Condition</th> </tr> <tr> <td>Power meter HP1</td> <td>HP 100179</td> <td>HP 100179 (No. 217-020000000)</td> <td>Appl. 11</td> </tr> <tr> <td>Power source HP1-201</td> <td>HP 100204</td> <td>HP 100204 (No. 217-020000000)</td> <td>Appl. 11</td> </tr> <tr> <td>Power source HP1-001</td> <td>HP 100204</td> <td>HP 100204 (No. 217-020000000)</td> <td>Appl. 11</td> </tr> <tr> <td>Phantom</td> <td>Modular Flat Phantom</td> <td></td> <td></td> </tr> <tr> <td>Type 9 Impedance Calibrator</td> <td>HP 100001-01-P0007</td> <td>HP 100001-01-P0007 (No. 217-020000000)</td> <td>Appl. 11</td> </tr> <tr> <td>Reference Probe L00024</td> <td>HP 100001</td> <td>HP 100001 (No. 217-020000000)</td> <td>Appl. 11</td> </tr> <tr> <td>LNA</td> <td>HP 100001</td> <td>HP 100001 (No. 217-020000000)</td> <td>Appl. 11</td> </tr> </table> <p>Secondary Standard:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Value</th> <th>Test Data No. 2 (approx.)</th> <th>Activation Condition</th> </tr> <tr> <td>Power meter HP1-4442</td> <td>HP 100179-000000000</td> <td>HP 100179 (No. 217-020000000)</td> </tr> <tr> <td>Power source HP1-001</td> <td>HP 100204-000000000</td> <td>HP 100204 (No. 217-020000000)</td> </tr> <tr> <td>Power source HP1-201</td> <td>HP 100204-000000000</td> <td>HP 100204 (No. 217-020000000)</td> </tr> <tr> <td>Antenna connector RP1-547-00</td> <td>HP 100001-01-P0007</td> <td>HP 100001-01-P0007 (No. 217-020000000)</td> </tr> <tr> <td>Reference Probe L00024</td> <td>HP 100001</td> <td>HP 100001 (No. 217-020000000)</td> </tr> </table> <p>Calibrated by: [Signature]</p> <p>Approved by: [Signature]</p> <p>Issue: October 26, 2018</p> <p>Certificate No.: D1900V2-Sn:5d113_Oct18 Page 1 of 8</p> </div> | Process Parameter | Value | Test Data Conditions No. 1 | Activation Condition | Power meter HP1 | HP 100179 | HP 100179 (No. 217-020000000) | Appl. 11 | Power source HP1-201 | HP 100204 | HP 100204 (No. 217-020000000) | Appl. 11 | Power source HP1-001 | HP 100204 | HP 100204 (No. 217-020000000) | Appl. 11 | Phantom | Modular Flat Phantom | | | Type 9 Impedance Calibrator | HP 100001-01-P0007 | HP 100001-01-P0007 (No. 217-020000000) | Appl. 11 | Reference Probe L00024 | HP 100001 | HP 100001 (No. 217-020000000) | Appl. 11 | LNA | HP 100001 | HP 100001 (No. 217-020000000) | Appl. 11 | Value | Test Data No. 2 (approx.) | Activation Condition | Power meter HP1-4442 | HP 100179-000000000 | HP 100179 (No. 217-020000000) | Power source HP1-001 | HP 100204-000000000 | HP 100204 (No. 217-020000000) | Power source HP1-201 | HP 100204-000000000 | HP 100204 (No. 217-020000000) | Antenna connector RP1-547-00 | HP 100001-01-P0007 | HP 100001-01-P0007 (No. 217-020000000) | Reference Probe L00024 | HP 100001 | HP 100001 (No. 217-020000000) | <div style="border: 1px solid black; padding: 10px;"> <p>Calibration Laboratory of Schmid & Partner Engineering AG, Hönggstrasse 14, 8001 Zürich, Switzerland</p> <p> </p> <p>B Referenzlaboratorium C Service-Sicher & Dokumentation D Service-beratung & Beratung E Service-Consulting Services</p> <p>Accredited by the Swiss Accreditation (Swiss-akz): The Swiss Accreditation Service is one of the signatories to the IAC Multilateral Agreement for the recognition of calibration certificates.</p> <p>Glossary: TSL: Human simulating liquid ComF: sensitivity in TSL / NORML X,y,z N/A: not applicable or not measured</p> <p>Calibration is Performed According to the Following Standards:</p> <ul style="list-style-type: none"> (a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013 (b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005 (c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010 (d) ICNIRP 68694, "SAR Measurement Requirements for 100 MHz to 5 GHz" <p>Additional Documentation:</p> <ul style="list-style-type: none"> (e) DASY45 System Handbook <p>Methods Applied and Interpretation of Parameters:</p> <ul style="list-style-type: none"> • Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures listed in the certificate are valid at the frequency indicated. • Antenna Parameters with TSL: The dipole is measured with the upper tip position in its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis. • Peak Power Impedance and Return Loss: These parameters are measured with the dipole positioned under the head of the flat phantom. The impedance stand is transformed from the measurement at the SMA connector to the feed point. The Return Loss measures low reflected power. No uncertainty required. • Electrical Delay: One-way delay between the SMA connector and the antenna feed point. No uncertainty required. • SAR measured: SAR measured at the stated antenna input power. • SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector. • SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result. <p>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%.</p> <p>Certificate No.: D1900V2-Sn:5d113_Oct18 Page 2 of 8</p> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---------------------------|--|----------------------------|----------------------|-----------------|------------------------|-------------------------------|----------|----------------------|-----------|-------------------------------|----------|----------------------|-----------------------|-------------------------------|----------|-----------|----------------------|--|--|-----------------------------|--------------------|--|-----------------------------|------------------------|-----------|-------------------------------|------------------------------|-----------------|------------|-------------------------------|---|----------|---------------------------|----------------------|---|---------------------|-------------------------------|----------------------|---------------------|-------------------------------|-------------------------------------|---------------------|-------------------------------|---|--------------------|--|------------------------|--------------------|-------------------------------|---|------------------|--------------------------|--|-------------|--------------|--------------|-----------------------------|---------|------|------------|------------------------------|-----------------|------------|------------------|---|----------|------|------|---|-----------|--|--------------|--------------------|-----------|-------------------------------------|------------------|--------------------------|---|-----------|--|--------------|--------------------|-----------|-------------------------------------|------------------|--------------------------|
| Process Parameter | Value | Test Data Conditions No. 1 | Activation Condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power meter HP1 | HP 100179 | HP 100179 (No. 217-020000000) | Appl. 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power source HP1-201 | HP 100204 | HP 100204 (No. 217-020000000) | Appl. 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power source HP1-001 | HP 100204 | HP 100204 (No. 217-020000000) | Appl. 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phantom | Modular Flat Phantom | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Type 9 Impedance Calibrator | HP 100001-01-P0007 | HP 100001-01-P0007 (No. 217-020000000) | Appl. 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reference Probe L00024 | HP 100001 | HP 100001 (No. 217-020000000) | Appl. 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| LNA | HP 100001 | HP 100001 (No. 217-020000000) | Appl. 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Value | Test Data No. 2 (approx.) | Activation Condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power meter HP1-4442 | HP 100179-000000000 | HP 100179 (No. 217-020000000) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power source HP1-001 | HP 100204-000000000 | HP 100204 (No. 217-020000000) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power source HP1-201 | HP 100204-000000000 | HP 100204 (No. 217-020000000) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Antenna connector RP1-547-00 | HP 100001-01-P0007 | HP 100001-01-P0007 (No. 217-020000000) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reference Probe L00024 | HP 100001 | HP 100001 (No. 217-020000000) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Measurement Conditions DASY system configuration, as far as not given on page 1.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>DASY Version</th> <th>DASY</th> <th>V52.8</th> </tr> <tr> <td>Extrapolation</td> <td>Advanced Extrapolation</td> <td></td> </tr> <tr> <td>Phantom</td> <td>Modular Flat Phantom</td> <td></td> </tr> <tr> <td>Distance Dipole Center - TSL</td> <td>10 mm</td> <td>with Spacer</td> </tr> <tr> <td>Zoom Scale Resolution</td> <td>dx, dy, dz = 5 mm</td> <td></td> </tr> <tr> <td>Frequency</td> <td>1900 MHz ± 1 MHz</td> <td></td> </tr> </table> <p>Head TSL parameters The following parameters and calculations were applied.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th></th> <th>Temperature</th> <th>Permittivity</th> <th>Conductivity</th> </tr> <tr> <td>Nominal Head TSL parameters</td> <td>22.0 °C</td> <td>40.0</td> <td>1.40 mho/m</td> </tr> <tr> <td>Measured Head TSL parameters</td> <td>(22.0 ± 0.2) °C</td> <td>40.6 ± 6 %</td> <td>1.39 mho/m ± 6 %</td> </tr> <tr> <td>Head TSL temperature change during test</td> <td>< 0.5 °C</td> <td>----</td> <td>----</td> </tr> </table> <p>SAR result with Head TSL The following parameters and calculations were applied.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>SAR averaged over 1 cm³ (1 g) of Head TSL</td> <td>Condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>10.1 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>40.7 W/kg ± 17.0 % (k=2)</td> </tr> <tr> <td>SAR averaged over 10 cm³ (10 g) of Head TSL</td> <td>condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>5.30 W/kg</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>21.3 W/kg ± 16.5 % (k=2)</td> </tr> </table> <p>Body TSL parameters The following parameters and calculations were applied.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th></th> <th>Temperature</th> <th>Permittivity</th> <th>Conductivity</th> </tr> <tr> <td>Nominal Body TSL parameters</td> <td>22.0 °C</td> <td>53.3</td> <td>1.52 mho/m</td> </tr> <tr> <td>Measured Body TSL parameters</td> <td>(22.0 ± 0.2) °C</td> <td>53.2 ± 6 %</td> <td>1.46 mho/m ± 6 %</td> </tr> <tr> <td>Body TSL temperature change during test</td> <td>< 0.5 °C</td> <td>----</td> <td>----</td> </tr> </table> <p>SAR result with Body TSL The following parameters and calculations were applied.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>SAR averaged over 1 cm³ (1 g) of Body TSL</td> <td>Condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>9.80 W/kg</td> </tr> <tr> <td>SAR for nominal Body TSL parameters</td> <td>normalized to 1W</td> <td>39.8 W/kg ± 17.0 % (k=2)</td> </tr> <tr> <td>SAR averaged over 10 cm³ (10 g) of Body TSL</td> <td>condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>5.23 W/kg</td> </tr> <tr> <td>SAR for nominal Body TSL parameters</td> <td>normalized to 1W</td> <td>21.1 W/kg ± 16.5 % (k=2)</td> </tr> </table> <p>Certificate No.: D1900V2-Sn:5d113_Oct18 Page 3 of 8</p> | | DASY Version | DASY | V52.8 | Extrapolation | Advanced Extrapolation | | Phantom | Modular Flat Phantom | | Distance Dipole Center - TSL | 10 mm | with Spacer | Zoom Scale Resolution | dx, dy, dz = 5 mm | | Frequency | 1900 MHz ± 1 MHz | | | Temperature | Permittivity | Conductivity | Nominal Head TSL parameters | 22.0 °C | 40.0 | 1.40 mho/m | Measured Head TSL parameters | (22.0 ± 0.2) °C | 40.6 ± 6 % | 1.39 mho/m ± 6 % | Head TSL temperature change during test | < 0.5 °C | ---- | ---- | SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | | SAR measured | 250 mW input power | 10.1 W/kg | SAR for nominal Head TSL parameters | normalized to 1W | 40.7 W/kg ± 17.0 % (k=2) | SAR averaged over 10 cm ³ (10 g) of Head TSL | condition | | SAR measured | 250 mW input power | 5.30 W/kg | SAR for nominal Head TSL parameters | normalized to 1W | 21.3 W/kg ± 16.5 % (k=2) | | Temperature | Permittivity | Conductivity | Nominal Body TSL parameters | 22.0 °C | 53.3 | 1.52 mho/m | Measured Body TSL parameters | (22.0 ± 0.2) °C | 53.2 ± 6 % | 1.46 mho/m ± 6 % | Body TSL temperature change during test | < 0.5 °C | ---- | ---- | SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | | SAR measured | 250 mW input power | 9.80 W/kg | SAR for nominal Body TSL parameters | normalized to 1W | 39.8 W/kg ± 17.0 % (k=2) | SAR averaged over 10 cm ³ (10 g) of Body TSL | condition | | SAR measured | 250 mW input power | 5.23 W/kg | SAR for nominal Body TSL parameters | normalized to 1W | 21.1 W/kg ± 16.5 % (k=2) |
| DASY Version | DASY | V52.8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Extrapolation | Advanced Extrapolation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phantom | Modular Flat Phantom | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Distance Dipole Center - TSL | 10 mm | with Spacer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Zoom Scale Resolution | dx, dy, dz = 5 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Frequency | 1900 MHz ± 1 MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Temperature | Permittivity | Conductivity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nominal Head TSL parameters | 22.0 °C | 40.0 | 1.40 mho/m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 40.6 ± 6 % | 1.39 mho/m ± 6 % | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Head TSL temperature change during test | < 0.5 °C | ---- | ---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR measured | 250 mW input power | 10.1 W/kg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR for nominal Head TSL parameters | normalized to 1W | 40.7 W/kg ± 17.0 % (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR averaged over 10 cm ³ (10 g) of Head TSL | condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR measured | 250 mW input power | 5.30 W/kg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR for nominal Head TSL parameters | normalized to 1W | 21.3 W/kg ± 16.5 % (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Temperature | Permittivity | Conductivity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nominal Body TSL parameters | 22.0 °C | 53.3 | 1.52 mho/m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 53.2 ± 6 % | 1.46 mho/m ± 6 % | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Body TSL temperature change during test | < 0.5 °C | ---- | ---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR measured | 250 mW input power | 9.80 W/kg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR for nominal Body TSL parameters | normalized to 1W | 39.8 W/kg ± 17.0 % (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR averaged over 10 cm ³ (10 g) of Body TSL | condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR measured | 250 mW input power | 5.23 W/kg | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR for nominal Body TSL parameters | normalized to 1W | 21.1 W/kg ± 16.5 % (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| D1900V2 Sn:5d113 | |
|---|--|
| <p>DASYS Validation Report for Head TSL</p> <p>Date: 31.10.2016</p> <p>Test Laboratory: GPSAG, Zurich, Switzerland</p> <p>DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2-SN:d113</p> <p>Communication System: USD 0 - CW; Frequency: 1900 MHz</p> <p>Antenna parameter used: $\Gamma = 1900 \text{ MHz}$, $\alpha = 1.25^\circ \text{ Sinc}$, $\kappa = 40.0$, $\beta = 1000 \text{ kpm}^2$</p> <p>Phantom source: Flat Phantom</p> <p>Measurement Standard: DASY3 (IEEE/IEC/ANSI C13.19-2011)</p> <p>DASYS2 Configuration:</p> <ul style="list-style-type: none"> • Probe: EXODIVA - 5977349; Calibrated: 15.06.2016; • Sensor Surface: 1.4mm (Mechanical Surface Density) • Electronics: DAED Sat01; Calibrated: 30.12.2013 • Phantom: Flat Phantom 5.0 (front); Type: QX000PSSAA; Serial: 1181 • DASY32 32.8.8 (228); SEMCAD X 14.6.007372 <p>Dipole Calibration for Head ThomasPlan=250 mW, d=10mm/Zoom Scale (7x7x7)Cube R: Measurement grid: d=1mm, d=1mm, d=1mm Reference Value = 104.4 V/m; Power Drill = 4.03 dB Peak SAR (extrapolated) = 7.0 W/kg SAR(1 g) = 10.1 W/kg; SAR(10 g) = 8.3 W/kg Maximum value of SAR (measured) = 13.7 W/kg</p> <p></p> <p>0 dB = 13.7 W/kg = 1.19 dBW/dg</p> <p>Certificate No: 01900V2-SN:5d113_00100</p> <p>Page 5 of 8</p> | <p>Impedance Measurement Plot for Head TSL.</p> <p>Date: 31.10.2016</p> <p>Plot showing Impedance (Z) vs Frequency (f). The plot shows a minimum impedance point around 1900 MHz.</p> <p>Certificate No: 01900V2-SN:5d113_00101</p> <p>Page 6 of 8</p> |
| <p>DASYS Validation Report for Body TSL</p> <p>Date: 31.10.2016</p> <p>Test Laboratory: GPSAG, Zurich, Switzerland</p> <p>DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2-SN:d113</p> <p>Communication System: USD 0 - CW; Frequency: 1900 MHz</p> <p>Antenna parameter used: $\Gamma = 1900 \text{ MHz}$, $\alpha = 1.25^\circ \text{ Sinc}$, $\kappa = 55.2$, $\beta = 1000 \text{ kpm}^2$</p> <p>Phantom source: Flat Phantom</p> <p>Measurement Standard: DASY3 (IEEE/IEC/ANSI C13.19-2011)</p> <p>DASYS2 Configuration:</p> <ul style="list-style-type: none"> • Probe: EXODIVA - 5977349; Calibrated: 15.06.2016; • Sensor Surface: 1.4mm (Mechanical Surface Density) • Electronics: DAED Sat01; Calibrated: 30.12.2013 • Phantom: Flat Phantom 5.0 (back); Type: QX000PSSAA; Serial: 1182 • DASY32 32.8.8 (228); SEMCAD X 14.6.007372 <p>Dipole Calibration for Body ThomasPlan=250 mW, d=10mm/Zoom Scale (7x7x7)Cube R: Measurement grid: d=1mm, d=1mm, d=1mm Reference Value = 104.5 V/m; Power Drill = 4.09 dB Peak SAR (extrapolated) = 17.2 W/kg SAR(1 g) = 9.8 W/kg; SAR(10 g) = 5.23 W/kg Maximum value of SAR (measured) = 14.7 W/kg</p> <p></p> <p>0 dB = 14.7 W/kg = 11.07 dBW/dg</p> <p>Certificate No: 01900V2-SN:5d113_00100</p> <p>Page 7 of 8</p> | <p>Impedance Measurement Plot for Body TSL.</p> <p>Date: 31.10.2016</p> <p>Plot showing Impedance (Z) vs Frequency (f). The plot shows a minimum impedance point around 1900 MHz.</p> <p>Certificate No: 01900V2-SN:5d113_00101</p> <p>Page 8 of 8</p> |

| <p>D2450V2 Sn:738</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="width: 45%;"> <p>Calibration Laboratory of: Schmid & Partner Engineering AG Engenierstrasse 18, 8804 Schaffhausen, Switzerland</p> <p>Accredited by Swiss Accreditation Services (SCS)</p>   <p>SCS 8198</p> </div> <div style="width: 45%;"> <p>Calibration Laboratory of: Schmid & Partner Engineering AG Engenierstrasse 18, 8804 Schaffhausen, Switzerland</p> <p>Accredited by Swiss Accreditation Services (SCS)</p>   <p>SCS 8198</p> </div> </div> <div style="font-size: small; margin-top: 10px;"> <p>The Swiss Accreditation Services is one of the signatories to the EU互认协议 for the recognition of calibration certificates.</p> <p>Label: SRTC (H) Certificate No.: D2450V2-738_0018</p> <p>CALIBRATION CERTIFICATE</p> <p>Date: 2018-10-25</p> <p>Customer identification: SIA CAL-05-V0 Calibration procedure for dipole antenna loss above 700 MHz</p> <p>Calibration date: October 25, 2018</p> <p>This calibration certificate documents the traceability to national standards which makes the physical units of measurement (SI). The measurement units and their conversion factors, whenever applicable, are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the relevant frequency testing environment (temperature 23°C ± 0.5°C and humidity < 40%).</p> <p>Calibration equipment used: DASY4.00 version 00-00000000000000000000000000000000</p> <p>Chassis Grounds:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Part Number</th> <th>Part Name</th> <th>Calibration Date</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>181 100110</td> <td>181 100110 (Certificate No.)</td> <td>Apr-17</td> <td>Scheduled Calibration</td> </tr> <tr> <td>181 102394</td> <td>181 102394 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 100121</td> <td>181 100121 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300001</td> <td>181 300001 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300002</td> <td>181 300002 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300003</td> <td>181 300003 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300004</td> <td>181 300004 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300005</td> <td>181 300005 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300006</td> <td>181 300006 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300007</td> <td>181 300007 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300008</td> <td>181 300008 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300009</td> <td>181 300009 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300010</td> <td>181 300010 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300011</td> <td>181 300011 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300012</td> <td>181 300012 (Certificate No.)</td> 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<td>Apr-17</td> <td></td> </tr> <tr> <td>181 300181</td> <td>181 300181 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300182</td> <td>181 300182 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300183</td> <td>181 300183 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300184</td> <td>181 300184 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300185</td> <td>181 300185 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300186</td> <td>181 300186 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300187</td> <td>181 300187 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300188</td> <td>181 300188 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300189</td> <td>181 300189 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300190</td> <td>181 300190 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300191</td> <td>181 300191 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300192</td> <td>181 300192 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300193</td> <td>181 300193 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300194</td> <td>181 300194 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>181 300195</td> <td>181 300195 (Certificate No.)</td> <td>Apr-17</td> <td></td> </tr> <tr> <td>18</td></tr></tbody></table></div> | | Part Number | Part Name | Calibration Date | Remarks | 181 100110 | 181 100110 (Certificate No.) | Apr-17 | Scheduled Calibration | 181 102394 | 181 102394 (Certificate No.) | Apr-17 | | 181 100121 | 181 100121 (Certificate No.) | Apr-17 | | 181 300001 | 181 300001 (Certificate No.) | Apr-17 | | 181 300002 | 181 300002 (Certificate No.) | Apr-17 | | 181 300003 | 181 300003 (Certificate No.) | Apr-17 | | 181 300004 | 181 300004 (Certificate No.) | Apr-17 | | 181 300005 | 181 300005 (Certificate No.) | Apr-17 | | 181 300006 | 181 300006 (Certificate No.) | Apr-17 | | 181 300007 | 181 300007 (Certificate No.) | Apr-17 | | 181 300008 | 181 300008 (Certificate No.) | Apr-17 | | 181 300009 | 181 300009 (Certificate No.) | Apr-17 | | 181 300010 | 181 300010 (Certificate No.) | Apr-17 | | 181 300011 | 181 300011 (Certificate No.) | Apr-17 | | 181 300012 | 181 300012 (Certificate No.) | Apr-17 | | 181 300013 | 181 300013 (Certificate No.) | Apr-17 | | 181 300014 | 181 300014 (Certificate No.) | Apr-17 | | 181 300015 | 181 300015 (Certificate No.) | Apr-17 | | 181 300016 | 181 300016 (Certificate No.) | Apr-17 | | 181 300017 | 181 300017 (Certificate No.) | Apr-17 | | 181 300018 | 181 300018 (Certificate No.) | Apr-17 | | 181 300019 | 181 300019 (Certificate No.) | Apr-17 | | 181 300020 | 181 300020 (Certificate No.) | Apr-17 | | 181 300021 | 181 300021 (Certificate No.) | Apr-17 | | 181 300022 | 181 300022 (Certificate No.) | Apr-17 | | 181 300023 | 181 300023 (Certificate No.) | Apr-17 | | 181 300024 | 181 300024 (Certificate No.) | Apr-17 | | 181 300025 | 181 300025 (Certificate No.) | Apr-17 | | 181 300026 | 181 300026 (Certificate No.) | Apr-17 | | 181 300027 | 181 300027 (Certificate No.) | Apr-17 | | 181 300028 | 181 300028 (Certificate No.) | Apr-17 | | 181 300029 | 181 300029 (Certificate No.) | Apr-17 | | 181 300030 | 181 300030 (Certificate No.) | Apr-17 | | 181 300031 | 181 300031 (Certificate No.) | Apr-17 | | 181 300032 | 181 300032 (Certificate No.) | Apr-17 | | 181 300033 | 181 300033 (Certificate No.) | Apr-17 | | 181 300034 | 181 300034 (Certificate No.) | Apr-17 | | 181 300035 | 181 300035 (Certificate No.) | Apr-17 | | 181 300036 | 181 300036 (Certificate No.) | Apr-17 | | 181 300037 | 181 300037 (Certificate No.) | Apr-17 | | 181 300038 | 181 300038 (Certificate No.) | Apr-17 | | 181 300039 | 181 300039 (Certificate No.) | Apr-17 | | 181 300040 | 181 300040 (Certificate No.) | Apr-17 | | 181 300041 | 181 300041 (Certificate No.) | Apr-17 | | 181 300042 | 181 300042 (Certificate No.) | Apr-17 | | 181 300043 | 181 300043 (Certificate No.) | Apr-17 | | 181 300044 | 181 300044 (Certificate No.) | Apr-17 | | 181 300045 | 181 300045 (Certificate No.) | Apr-17 | | 181 300046 | 181 300046 (Certificate No.) | Apr-17 | | 181 300047 | 181 300047 (Certificate No.) | Apr-17 | | 181 300048 | 181 300048 (Certificate No.) | Apr-17 | | 181 300049 | 181 300049 (Certificate No.) | Apr-17 | | 181 300050 | 181 300050 (Certificate No.) | Apr-17 | | 181 300051 | 181 300051 (Certificate No.) | Apr-17 | | 181 300052 | 181 300052 (Certificate No.) | Apr-17 | | 181 300053 | 181 300053 (Certificate No.) | Apr-17 | | 181 300054 | 181 300054 (Certificate No.) | Apr-17 | | 181 300055 | 181 300055 (Certificate No.) | Apr-17 | | 181 300056 | 181 300056 (Certificate No.) | Apr-17 | | 181 300057 | 181 300057 (Certificate No.) | Apr-17 | | 181 300058 | 181 300058 (Certificate No.) | Apr-17 | | 181 300059 | 181 300059 (Certificate No.) | Apr-17 | | 181 300060 | 181 300060 (Certificate No.) | Apr-17 | | 181 300061 | 181 300061 (Certificate No.) | Apr-17 | | 181 300062 | 181 300062 (Certificate No.) | Apr-17 | | 181 300063 | 181 300063 (Certificate No.) | Apr-17 | | 181 300064 | 181 300064 (Certificate No.) | Apr-17 | | 181 300065 | 181 300065 (Certificate No.) | Apr-17 | | 181 300066 | 181 300066 (Certificate No.) | Apr-17 | | 181 300067 | 181 300067 (Certificate No.) | Apr-17 | | 181 300068 | 181 300068 (Certificate No.) | Apr-17 | | 181 300069 | 181 300069 (Certificate No.) | Apr-17 | | 181 300070 | 181 300070 (Certificate No.) | Apr-17 | | 181 300071 | 181 300071 (Certificate No.) | Apr-17 | | 181 300072 | 181 300072 (Certificate No.) | Apr-17 | | 181 300073 | 181 300073 (Certificate No.) | Apr-17 | | 181 300074 | 181 300074 (Certificate No.) | Apr-17 | | 181 300075 | 181 300075 (Certificate No.) | Apr-17 | | 181 300076 | 181 300076 (Certificate No.) | Apr-17 | | 181 300077 | 181 300077 (Certificate No.) | Apr-17 | | 181 300078 | 181 300078 (Certificate No.) | Apr-17 | | 181 300079 | 181 300079 (Certificate No.) | Apr-17 | | 181 300080 | 181 300080 (Certificate No.) | Apr-17 | | 181 300081 | 181 300081 (Certificate No.) | Apr-17 | | 181 300082 | 181 300082 (Certificate No.) | Apr-17 | | 181 300083 | 181 300083 (Certificate No.) | Apr-17 | | 181 300084 | 181 300084 (Certificate No.) | Apr-17 | | 181 300085 | 181 300085 (Certificate No.) | Apr-17 | | 181 300086 | 181 300086 (Certificate No.) | Apr-17 | | 181 300087 | 181 300087 (Certificate No.) | Apr-17 | | 181 300088 | 181 300088 (Certificate No.) | Apr-17 | | 181 300089 | 181 300089 (Certificate No.) | Apr-17 | | 181 300090 | 181 300090 (Certificate No.) | Apr-17 | | 181 300091 | 181 300091 (Certificate No.) | Apr-17 | | 181 300092 | 181 300092 (Certificate No.) | Apr-17 | | 181 300093 | 181 300093 (Certificate No.) | Apr-17 | | 181 300094 | 181 300094 (Certificate No.) | Apr-17 | | 181 300095 | 181 300095 (Certificate No.) | Apr-17 | | 181 300096 | 181 300096 (Certificate No.) | Apr-17 | | 181 300097 | 181 300097 (Certificate No.) | Apr-17 | | 181 300098 | 181 300098 (Certificate No.) | Apr-17 | | 181 300099 | 181 300099 (Certificate No.) | Apr-17 | | 181 300100 | 181 300100 (Certificate No.) | Apr-17 | | 181 300101 | 181 300101 (Certificate No.) | Apr-17 | | 181 300102 | 181 300102 (Certificate No.) | Apr-17 | | 181 300103 | 181 300103 (Certificate No.) | Apr-17 | | 181 300104 | 181 300104 (Certificate No.) | Apr-17 | | 181 300105 | 181 300105 (Certificate No.) | Apr-17 | | 181 300106 | 181 300106 (Certificate No.) | Apr-17 | | 181 300107 | 181 300107 (Certificate No.) | Apr-17 | | 181 300108 | 181 300108 (Certificate No.) | Apr-17 | | 181 300109 | 181 300109 (Certificate No.) | Apr-17 | | 181 300110 | 181 300110 (Certificate No.) | Apr-17 | | 181 300111 | 181 300111 (Certificate No.) | Apr-17 | | 181 300112 | 181 300112 (Certificate No.) | Apr-17 | | 181 300113 | 181 300113 (Certificate No.) | Apr-17 | | 181 300114 | 181 300114 (Certificate No.) | Apr-17 | | 181 300115 | 181 300115 (Certificate No.) | Apr-17 | | 181 300116 | 181 300116 (Certificate No.) | Apr-17 | | 181 300117 | 181 300117 (Certificate No.) | Apr-17 | | 181 300118 | 181 300118 (Certificate No.) | Apr-17 | | 181 300119 | 181 300119 (Certificate No.) | Apr-17 | | 181 300120 | 181 300120 (Certificate No.) | Apr-17 | | 181 300121 | 181 300121 (Certificate No.) | Apr-17 | | 181 300122 | 181 300122 (Certificate No.) | Apr-17 | | 181 300123 | 181 300123 (Certificate No.) | Apr-17 | | 181 300124 | 181 300124 (Certificate No.) | Apr-17 | | 181 300125 | 181 300125 (Certificate No.) | Apr-17 | | 181 300126 | 181 300126 (Certificate No.) | Apr-17 | | 181 300127 | 181 300127 (Certificate No.) | Apr-17 | | 181 300128 | 181 300128 (Certificate No.) | Apr-17 | | 181 300129 | 181 300129 (Certificate No.) | Apr-17 | | 181 300130 | 181 300130 (Certificate No.) | Apr-17 | | 181 300131 | 181 300131 (Certificate No.) | Apr-17 | | 181 300132 | 181 300132 (Certificate No.) | Apr-17 | | 181 300133 | 181 300133 (Certificate No.) | Apr-17 | | 181 300134 | 181 300134 (Certificate No.) | Apr-17 | | 181 300135 | 181 300135 (Certificate No.) | Apr-17 | | 181 300136 | 181 300136 (Certificate No.) | Apr-17 | | 181 300137 | 181 300137 (Certificate No.) | Apr-17 | | 181 300138 | 181 300138 (Certificate No.) | Apr-17 | | 181 300139 | 181 300139 (Certificate No.) | Apr-17 | | 181 300140 | 181 300140 (Certificate No.) | Apr-17 | | 181 300141 | 181 300141 (Certificate No.) | Apr-17 | | 181 300142 | 181 300142 (Certificate No.) | Apr-17 | | 181 300143 | 181 300143 (Certificate No.) | Apr-17 | | 181 300144 | 181 300144 (Certificate No.) | Apr-17 | | 181 300145 | 181 300145 (Certificate No.) | Apr-17 | | 181 300146 | 181 300146 (Certificate No.) | Apr-17 | | 181 300147 | 181 300147 (Certificate No.) | Apr-17 | | 181 300148 | 181 300148 (Certificate No.) | Apr-17 | | 181 300149 | 181 300149 (Certificate No.) | Apr-17 | | 181 300150 | 181 300150 (Certificate No.) | Apr-17 | | 181 300151 | 181 300151 (Certificate No.) | Apr-17 | | 181 300152 | 181 300152 (Certificate No.) | Apr-17 | | 181 300153 | 181 300153 (Certificate No.) | Apr-17 | | 181 300154 | 181 300154 (Certificate No.) | Apr-17 | | 181 300155 | 181 300155 (Certificate No.) | Apr-17 | | 181 300156 | 181 300156 (Certificate No.) | Apr-17 | | 181 300157 | 181 300157 (Certificate No.) | Apr-17 | | 181 300158 | 181 300158 (Certificate No.) | Apr-17 | | 181 300159 | 181 300159 (Certificate No.) | Apr-17 | | 181 300160 | 181 300160 (Certificate No.) | Apr-17 | | 181 300161 | 181 300161 (Certificate No.) | Apr-17 | | 181 300162 | 181 300162 (Certificate No.) | Apr-17 | | 181 300163 | 181 300163 (Certificate No.) | Apr-17 | | 181 300164 | 181 300164 (Certificate No.) | Apr-17 | | 181 300165 | 181 300165 (Certificate No.) | Apr-17 | | 181 300166 | 181 300166 (Certificate No.) | Apr-17 | | 181 300167 | 181 300167 (Certificate No.) | Apr-17 | | 181 300168 | 181 300168 (Certificate No.) | Apr-17 | | 181 300169 | 181 300169 (Certificate No.) | Apr-17 | | 181 300170 | 181 300170 (Certificate No.) | Apr-17 | | 181 300171 | 181 300171 (Certificate No.) | Apr-17 | | 181 300172 | 181 300172 (Certificate No.) | Apr-17 | | 181 300173 | 181 300173 (Certificate No.) | Apr-17 | | 181 300174 | 181 300174 (Certificate No.) | Apr-17 | | 181 300175 | 181 300175 (Certificate No.) | Apr-17 | | 181 300176 | 181 300176 (Certificate No.) | Apr-17 | | 181 300177 | 181 300177 (Certificate No.) | Apr-17 | | 181 300178 | 181 300178 (Certificate No.) | Apr-17 | | 181 300179 | 181 300179 (Certificate No.) | Apr-17 | | 181 300180 | 181 300180 (Certificate No.) | Apr-17 | | 181 300181 | 181 300181 (Certificate No.) | Apr-17 | | 181 300182 | 181 300182 (Certificate No.) | Apr-17 | | 181 300183 | 181 300183 (Certificate No.) | Apr-17 | | 181 300184 | 181 300184 (Certificate No.) | Apr-17 | | 181 300185 | 181 300185 (Certificate No.) | Apr-17 | | 181 300186 | 181 300186 (Certificate No.) | Apr-17 | | 181 300187 | 181 300187 (Certificate No.) | Apr-17 | | 181 300188 | 181 300188 (Certificate No.) | Apr-17 | | 181 300189 | 181 300189 (Certificate No.) | Apr-17 | | 181 300190 | 181 300190 (Certificate No.) | Apr-17 | | 181 300191 | 181 300191 (Certificate No.) | Apr-17 | | 181 300192 | 181 300192 (Certificate No.) | Apr-17 | | 181 300193 | 181 300193 (Certificate No.) | Apr-17 | | 181 300194 | 181 300194 (Certificate No.) | Apr-17 | | 181 300195 | 181 300195 (Certificate No.) | Apr-17 | | 18 |
|--|------------------------------|------------------|-----------------------|------------------|---------|------------|------------------------------|--------|-----------------------|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|------------|------------------------------|--------|--|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| Part Number | Part Name | Calibration Date | Remarks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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D2450V2 Sn:738

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| <p>DASYS Validation Report for Head TSL</p> <p>Date: 25.01.2016</p> <p>Test Laboratory: SPEAG, Zurich, Switzerland</p> <p>DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2-SN:738</p> <p>Communication System IED 0 - CW; Frequency: 2450 MHz Medium parameters soil $\epsilon = 2850 \text{ pF/m}$, $\sigma = 1.87 \text{ S/m}$, $\zeta = 30.2$, $\rho = 1000 \text{ kg/m}^3$ Phantom series: Flat Series Measurement Standard: DASYS (IEEE/OSI/ANALYSIS 19-2011)</p> <p>DASYS Configuration:</p> <ul style="list-style-type: none"> • Probe: ECID914 - RNT309, Case(7.72, 7.72, 7.72); Calibrated: 15.06.2016; • Sensor-Surface: 1.4-mm (Mechanical Surface Detection) • Electronic: DASYS 5001; Calibrated: 30.12.2013 • Phantom: Flat Phantom 5.0 (Front); Type: QD000PS0A; Serial: 1001 • SAR01: 52.8(A1290) SEMCAD X 14.6.0(2332) <p>Dipole Calibration for Head Tissue/Power=200 mW, d=10mm/Zoom Scale (7x7x7)/Cube 0: Measurement grid: d=5mm, d=5mm, d=5mm Reference Value = 11.7 V/m; Power Distr = <0.01 dB Peak SAR (calculated) = 26.4 W/kg SAR01(g) = 13.1 W/kg; SAR02(g) = 6.87 W/kg Minimum value of SAR (measured) = 21.4 W/kg</p> <p></p> | <p>Impedance Measurement Plot for Head TSL</p> <p>Impedance Measurement Plot for Head TSL</p> <p>Plot showing Impedance (Ω) vs Frequency (MHz). The plot shows a minimum impedance point around 2450 MHz.</p> <p></p> |
| <p>Certificate No: 32400000-738_0404</p> <p>Page 5 of 8</p> | <p>Certificate No: 32400000-738_0410</p> <p>Page 6 of 8</p> |



The State Radio Monitoring Center Testing Center

国家无线电监测中心检测中心

No.: SRTC2017-9004(F)-17111001(H)
FCC ID: 2AD0BL675PRO

New calibrate documents

DAE4 Sn:546

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| CALIBRATION CERTIFICATE | | | | | |
| Object: DAE4 - SN: 546 | | | | | |
| Calibration Procedure(s): FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAE) | | | | | |
| Calibration date: September 15, 2017 | | | | | |
| This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. | | | | | |
| All calibrations have been conducted in the closed laboratory facility, environment temperature(22±3)°C and humidity<70%. | | | | | |
| Calibration Equipment used (M&TE critical for calibration) | | | | | |
| Primary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration | | |
| Process Calibrator 753 | 1971018 | 27-Jun-17 (CTTL, No.J17X05859) | June-18 | | |
| Calibrated by: | Name: Yu Zongying | Function: SAR Test Engineer | Signature: | | |
| Reviewed by: | Lin Hao | | SAR Test Engineer | | |
| Approved by: | Qi Diyanuan | | SAR Project Leader | | |
| Issued: September 18, 2017 | | | | | |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. | | | | | |

Certificate No: Z17-97141

Page 1 of 3

Certificate No: Z17-97141

Page 2 of 3

| | | | |
|---|-----------------------|-----------------------|-----------------------|
| In Collaboration with TTL s p e a g CALIBRATION LABORATORY | | | |
| Add: No.51 Xuyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209 E-mail: cttl@chinatll.com Http://www.chinatll.com | | | |
| DC Voltage Measurement A/D - Counter Resolution: nominal High Range: 1LSB = 6.1μV, full range = -100...+300 mV Low Range: 1LSB = 0.1mV, full range = -1...+3mV DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec | | | |
| Calibration Factors | X | Y | Z |
| High Range | 405.337 ± 0.15% (k=2) | 404.085 ± 0.15% (k=2) | 404.215 ± 0.15% (k=2) |
| Low Range | 3.98726 ± 0.7% (k=2) | 3.95731 ± 0.7% (k=2) | 3.97839 ± 0.7% (k=2) |

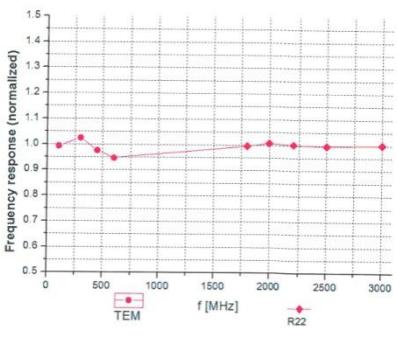
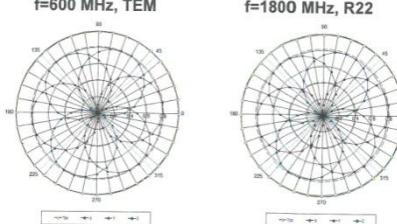
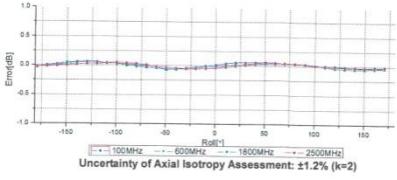
Connector Angle

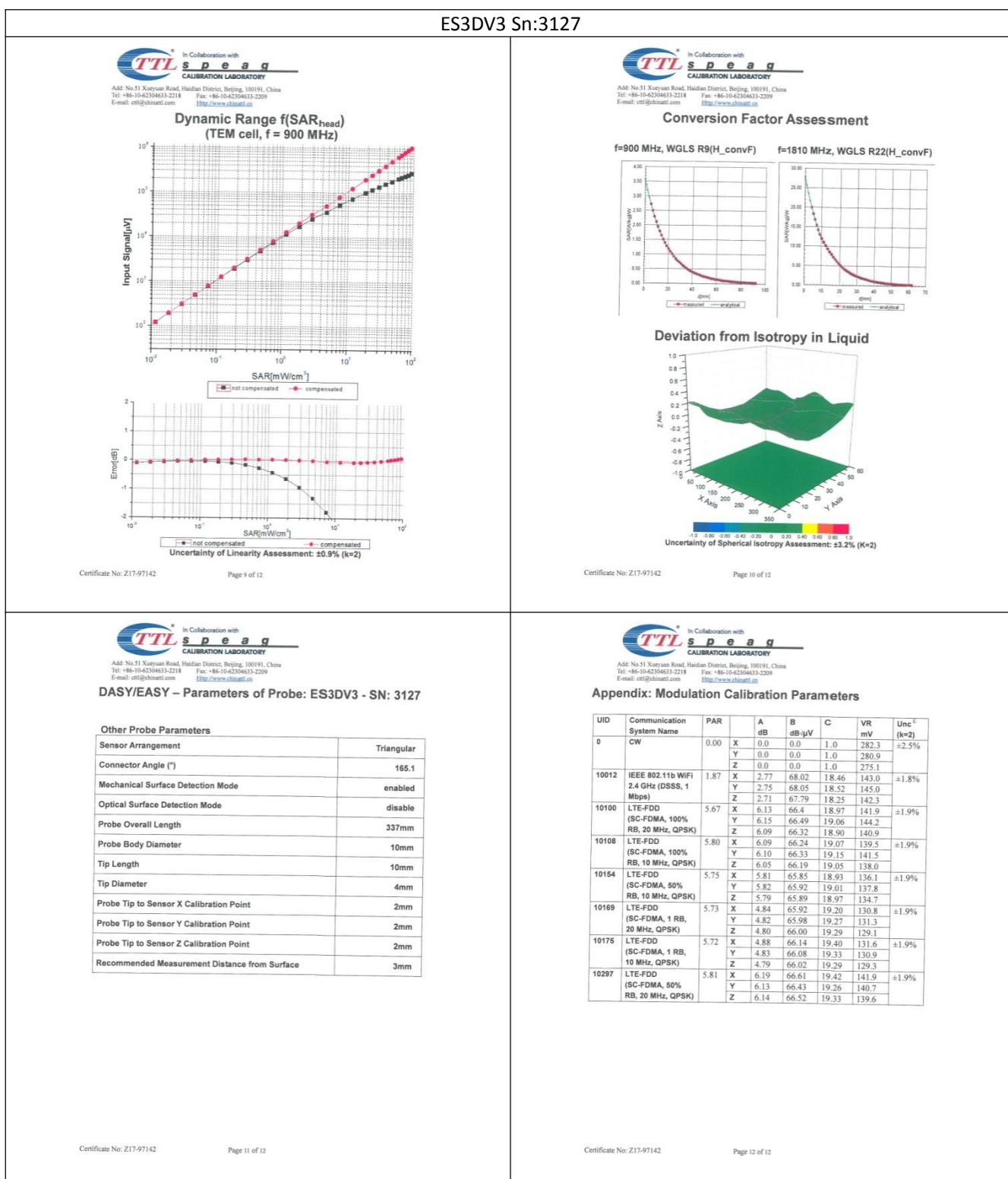
| | |
|---|-------------|
| Connector Angle to be used in DASY system | 236.5° ± 1° |
|---|-------------|

Certificate No: Z17-97141

Page 3 of 3

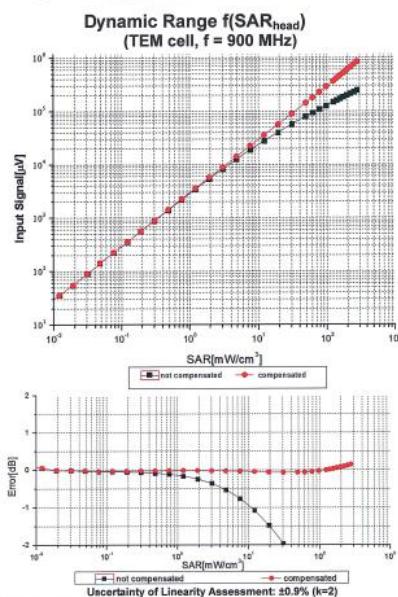
|  ES3DV3 Sn:3127  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|--|--|---------------------------|--|-------------------------------------|--------------------------|---|---|--------------------------------|-------------------|--|---|--------------------------------|--------------|---|---------------------------|--------------------------------|--|------|-------------|---|-------------------------|-------|-------------------|-------------------------------|--|-----------------------|-------------|--|--------|--------------------------------|--------------|--------------------------------------|---------------------|--------------------------------|--|-----------------------|------------------------|--------------------------------|-------------------------|--------------------------------|-------------------------|-------------------------------|-------------------------|--------------------------------|-------------|-------------------------------|------------------------|--|---------|--------------------------------------|------|--|--------|--------------------------------------|---------------------|------|--|-----------------------|------------------------|--|------------|--------------------------------|---|--|------------|--|---|--|--|------|----------|-----------|----------------|-------------|-------------------|--------------|---------|-------------------|--------------|-------------|--------------------|--------------------------|--|--|---|--|--|---|-------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------------------|--|--|--|--|--|--|--|--|--|--|--|---|--|--|
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="background-color: #f2f2f2;">CALIBRATION CERTIFICATE</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Object</td> <td colspan="2" style="padding: 5px;">ES3DV3 - SN 3127</td> </tr> <tr> <td style="padding: 5px;">Calibration Procedure(s)</td> <td colspan="2" style="padding: 5px;">FF-Z11-004-01 Calibration Procedures for Dosimetric E-field Probes</td> </tr> <tr> <td style="padding: 5px;">Calibration date:</td> <td colspan="2" style="padding: 5px;">October 11, 2017</td> </tr> <tr> <td colspan="3" style="padding: 5px;">This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). 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text-align: center;"> Methods Applied and Interpretation of Parameters: </td> </tr> <tr> <td colspan="3" style="padding: 5px; text-align: center;"> • NOR_Mx,y,z: Assessed for E-field polarization $\theta=0$ (f500MHz in TEM-cell, $f>1800MHz$: waveguide). NOR_Mx,y,z are only intermediate values, i.e., the uncertainties of NOR_Mx,y,z does not effect the E^2-field uncertainty inside TSL (see below ConvF). • NOR_MF(x,y,z): NOR_Mx,y,z converted to response (see Frequency Response Chart). This conversion is done in DASY4 software version later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF. • DCP_{x,y,z}: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media. • PAR: PAR is the Peak to Average ratio that is not calibrated but determined based on the signal power spectrum. • Ax,y,z, Bx,y,z, Cx,y,z: Ax,y,z, Bx,y,z, Cx,y,z are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode. • ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for boundary) and inside waveguide using analytical field distributions based on parameters for $f>600MHz$. The parameters are typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NOR_Mx,y,z. ConvF whereby the uncertainty corresponds to that of ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the range from 50MHz to 100MHz. • Spherical isotropy (3D deviation from isotropy) in a field of low gradients realized using a flat phantom exposed by a patch antenna. • Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required. • Connector Angle: The angle is assessed using the information gained by determining the NOR_Mx,y,z (no uncertainty required). </td> </tr> <tr> <td colspan="3" style="padding: 5px; text-align: center;">Certificate No: Z17-97142 Page 2 of 12</td> </tr> </tbody> </table> | CALIBRATION CERTIFICATE | | |  | | |  | | | Add: No.51 Xunyan Road, Haidian District, Beijing 100191, China Tel: +86-10-62336463-3218 Fax: +86-10-62336463-2209 E-mail: ctfl@chinanet.com http://www.chinanet.com | | | Add: No.51 Xunyan Road, Haidian District, Beijing 100191, China Tel: +86-10-62336463-3218 Fax: +86-10-62336463-2209 E-mail: ctfl@chinanet.com http://www.chinanet.com | | | Glossary: | | | TSL tissue simulating liquid NOR _M x,y,z sensitivity in free space NOR _M F sensitivity in TSL / NOR _M x,y,z DCP diode compensation parameter CF crest factor (1/duty_cycle) of the RF signal A,B,C,D modulation dependent linearization parameters Polarization Φ Φ rotation around probe axis Polarization θ θ rotation around probe axis such that it is in the plane normal to probe axis (at measurement center), i.e. 0=0 is normal to probe axis Connector Angle information used in DASY system to align probe sensor X to the robot coordinate system Calibration is Performed According to the Following Standards: a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurements and Analysis", June 2013. b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016. c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010. d) KOB 65564, "SAR Measurement Requirements for 100 MHz to 6 GHz" | | | Methods Applied and Interpretation of Parameters: | | | • NOR _M x,y,z: Assessed for E-field polarization $\theta=0$ (f500MHz in TEM-cell, $f>1800MHz$: waveguide). 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| CALIBRATION CERTIFICATE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Object | ES3DV3 - SN 3127 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Calibration date: | October 11, 2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibration Equipment used (MSTE critical for calibration) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Issued: October 12, 2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CALIBRATION CERTIFICATE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Add: No.51 Xunyan Road, Haidian District, Beijing 100191, China Tel: +86-10-62336463-3218 Fax: +86-10-62336463-2209 E-mail: ctfl@chinanet.com http://www.chinanet.com | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Glossary: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TSL tissue simulating liquid NOR _M x,y,z sensitivity in free space NOR _M F sensitivity in TSL / NOR _M x,y,z DCP diode compensation parameter CF crest factor (1/duty_cycle) of the RF signal A,B,C,D modulation dependent linearization parameters Polarization Φ Φ rotation around probe axis Polarization θ θ rotation around probe axis such that it is in the plane normal to probe axis (at measurement center), i.e. 0=0 is normal to probe axis Connector Angle information used in DASY system to align probe sensor X to the robot coordinate system Calibration is Performed According to the Following Standards: a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurements and Analysis", June 2013. b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016. c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010. d) KOB 65564, "SAR Measurement Requirements for 100 MHz to 6 GHz" | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Methods Applied and Interpretation of Parameters: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| • NOR _M x,y,z: Assessed for E-field polarization $\theta=0$ (f500MHz in TEM-cell, $f>1800MHz$: waveguide). NOR _M x,y,z are only intermediate values, i.e., the uncertainties of NOR _M x,y,z does not effect the E^2 -field uncertainty inside TSL (see below ConvF). • NOR _M F(x,y,z): NOR _M x,y,z converted to response (see Frequency Response Chart). This conversion is done in DASY4 software version later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF. • DCP _{x,y,z} : DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media. • PAR: PAR is the Peak to Average ratio that is not calibrated but determined based on the signal power spectrum. • Ax,y,z, Bx,y,z, Cx,y,z: Ax,y,z, Bx,y,z, Cx,y,z are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode. • ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for boundary) and inside waveguide using analytical field distributions based on parameters for $f>600MHz$. The parameters are typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NOR _M x,y,z. ConvF whereby the uncertainty corresponds to that of ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the range from 50MHz to 100MHz. • Spherical isotropy (3D deviation from isotropy) in a field of low gradients realized using a flat phantom exposed by a patch antenna. • Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required. • Connector Angle: The angle is assessed using the information gained by determining the NOR _M x,y,z (no uncertainty required). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Certificate No: Z17-97142 Page 2 of 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Basic Calibration Parameters | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Norm(μ V/(Vm) 2) ^a | Sensor X | Sensor Y | Sensor Z | Unc (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | 103.2 | 105.3 | 105.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 0 | CW | X 0.0 | 0.0 | 1.0 | 0.00 | 282.3 | +2.5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| ES3DV3 Sn:3127 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|------------------------------------|---------------------------------|---------|---------|--|------------------------------------|---------------------------------|--------------|---------|---------|--------------------|-------------------------|--------------|-----|------|------|------|------|------|------|------|--------|-----|------|------|------|------|------|------|------|--------|------|------|------|------|------|------|------|------|--------|------|------|------|------|------|------|------|------|--------|------|------|------|------|------|------|------|------|--------|------|------|------|------|------|------|------|------|--------|------|------|------|------|------|------|------|------|--------|--|--|--|--|--|--|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|--------------|-----|------|------|------|------|------|------|------|--------|-----|------|------|------|------|------|------|------|--------|------|------|------|------|------|------|------|------|--------|------|------|------|------|------|------|------|------|--------|------|------|------|------|------|------|------|------|--------|------|------|------|------|------|------|------|------|--------|------|------|------|------|------|------|------|------|--------|
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| Calibration Parameter Determined in Head Tissue Simulating Media <table border="1"> <thead> <tr> <th>f [MHz]^c</th><th>Relative Permittivity^d</th><th>Conductivity [S/m]^e</th><th>ConvF X</th><th>ConvF Y</th><th>ConvF Z</th><th>Alpha^f</th><th>Depth^g [mm]</th><th>Uncrt. (k=2)</th></tr> </thead> <tbody> <tr><td>750</td><td>41.9</td><td>0.89</td><td>6.26</td><td>6.26</td><td>6.26</td><td>0.60</td><td>1.20</td><td>±12.1%</td></tr> <tr><td>900</td><td>41.5</td><td>0.97</td><td>6.15</td><td>6.15</td><td>6.15</td><td>0.37</td><td>1.62</td><td>±12.1%</td></tr> <tr><td>1810</td><td>40.0</td><td>1.40</td><td>5.08</td><td>5.06</td><td>5.06</td><td>0.67</td><td>1.23</td><td>±12.1%</td></tr> <tr><td>2000</td><td>40.0</td><td>1.40</td><td>4.88</td><td>4.88</td><td>4.88</td><td>0.67</td><td>1.23</td><td>±12.1%</td></tr> <tr><td>2300</td><td>39.5</td><td>1.67</td><td>4.71</td><td>4.71</td><td>4.71</td><td>0.90</td><td>1.06</td><td>±12.1%</td></tr> <tr><td>2450</td><td>39.2</td><td>1.80</td><td>4.58</td><td>4.58</td><td>4.58</td><td>0.90</td><td>1.10</td><td>±12.1%</td></tr> <tr><td>2600</td><td>39.0</td><td>1.96</td><td>4.32</td><td>4.32</td><td>4.32</td><td>0.90</td><td>1.09</td><td>±12.1%</td></tr> </tbody> </table> | | | | | f [MHz] ^c | Relative Permittivity ^d | Conductivity [S/m] ^e | ConvF X | ConvF Y | ConvF Z | Alpha ^f | Depth ^g [mm] | Uncrt. (k=2) | 750 | 41.9 | 0.89 | 6.26 | 6.26 | 6.26 | 0.60 | 1.20 | ±12.1% | 900 | 41.5 | 0.97 | 6.15 | 6.15 | 6.15 | 0.37 | 1.62 | ±12.1% | 1810 | 40.0 | 1.40 | 5.08 | 5.06 | 5.06 | 0.67 | 1.23 | ±12.1% | 2000 | 40.0 | 1.40 | 4.88 | 4.88 | 4.88 | 0.67 | 1.23 | ±12.1% | 2300 | 39.5 | 1.67 | 4.71 | 4.71 | 4.71 | 0.90 | 1.06 | ±12.1% | 2450 | 39.2 | 1.80 | 4.58 | 4.58 | 4.58 | 0.90 | 1.10 | ±12.1% | 2600 | 39.0 | 1.96 | 4.32 | 4.32 | 4.32 | 0.90 | 1.09 | ±12.1% | Calibration Parameter Determined in Body Tissue Simulating Media <table border="1"> <thead> <tr> <th>f [MHz]^c</th><th>Relative Permittivity^d</th><th>Conductivity [S/m]^e</th><th>ConvF X</th><th>ConvF Y</th><th>ConvF Z</th><th>Alpha^f</th><th>Depth^g [mm]</th><th>Uncrt. (k=2)</th></tr> </thead> <tbody> <tr><td>750</td><td>55.5</td><td>0.96</td><td>6.18</td><td>6.18</td><td>6.18</td><td>0.45</td><td>1.45</td><td>±12.1%</td></tr> <tr><td>900</td><td>55.0</td><td>1.05</td><td>6.06</td><td>6.06</td><td>6.06</td><td>0.46</td><td>1.48</td><td>±12.1%</td></tr> <tr><td>1810</td><td>53.3</td><td>1.52</td><td>4.83</td><td>4.83</td><td>4.83</td><td>0.65</td><td>1.29</td><td>±12.1%</td></tr> <tr><td>2000</td><td>53.3</td><td>1.52</td><td>4.69</td><td>4.69</td><td>4.69</td><td>0.44</td><td>1.69</td><td>±12.1%</td></tr> <tr><td>2300</td><td>52.9</td><td>1.81</td><td>4.43</td><td>4.43</td><td>4.43</td><td>0.90</td><td>1.15</td><td>±12.1%</td></tr> <tr><td>2450</td><td>52.7</td><td>1.95</td><td>4.28</td><td>4.28</td><td>4.28</td><td>0.72</td><td>1.34</td><td>±12.1%</td></tr> <tr><td>2600</td><td>52.5</td><td>2.16</td><td>4.07</td><td>4.07</td><td>4.07</td><td>0.90</td><td>1.16</td><td>±12.1%</td></tr> </tbody> </table> | | | | | | f [MHz] ^c | Relative Permittivity ^d | Conductivity [S/m] ^e | ConvF X | ConvF Y | ConvF Z | Alpha ^f | Depth ^g [mm] | Uncrt. (k=2) | 750 | 55.5 | 0.96 | 6.18 | 6.18 | 6.18 | 0.45 | 1.45 | ±12.1% | 900 | 55.0 | 1.05 | 6.06 | 6.06 | 6.06 | 0.46 | 1.48 | ±12.1% | 1810 | 53.3 | 1.52 | 4.83 | 4.83 | 4.83 | 0.65 | 1.29 | ±12.1% | 2000 | 53.3 | 1.52 | 4.69 | 4.69 | 4.69 | 0.44 | 1.69 | ±12.1% | 2300 | 52.9 | 1.81 | 4.43 | 4.43 | 4.43 | 0.90 | 1.15 | ±12.1% | 2450 | 52.7 | 1.95 | 4.28 | 4.28 | 4.28 | 0.72 | 1.34 | ±12.1% | 2600 | 52.5 | 2.16 | 4.07 | 4.07 | 4.07 | 0.90 | 1.16 | ±12.1% |
| f [MHz] ^c | Relative Permittivity ^d | Conductivity [S/m] ^e | ConvF X | ConvF Y | ConvF Z | Alpha ^f | Depth ^g [mm] | Uncrt. (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 750 | 41.9 | 0.89 | 6.26 | 6.26 | 6.26 | 0.60 | 1.20 | ±12.1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 900 | 41.5 | 0.97 | 6.15 | 6.15 | 6.15 | 0.37 | 1.62 | ±12.1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1810 | 40.0 | 1.40 | 5.08 | 5.06 | 5.06 | 0.67 | 1.23 | ±12.1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2000 | 40.0 | 1.40 | 4.88 | 4.88 | 4.88 | 0.67 | 1.23 | ±12.1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2300 | 39.5 | 1.67 | 4.71 | 4.71 | 4.71 | 0.90 | 1.06 | ±12.1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2450 | 39.2 | 1.80 | 4.58 | 4.58 | 4.58 | 0.90 | 1.10 | ±12.1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2600 | 39.0 | 1.96 | 4.32 | 4.32 | 4.32 | 0.90 | 1.09 | ±12.1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| f [MHz] ^c | Relative Permittivity ^d | Conductivity [S/m] ^e | ConvF X | ConvF Y | ConvF Z | Alpha ^f | Depth ^g [mm] | Uncrt. (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 750 | 55.5 | 0.96 | 6.18 | 6.18 | 6.18 | 0.45 | 1.45 | ±12.1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 900 | 55.0 | 1.05 | 6.06 | 6.06 | 6.06 | 0.46 | 1.48 | ±12.1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1810 | 53.3 | 1.52 | 4.83 | 4.83 | 4.83 | 0.65 | 1.29 | ±12.1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2000 | 53.3 | 1.52 | 4.69 | 4.69 | 4.69 | 0.44 | 1.69 | ±12.1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2300 | 52.9 | 1.81 | 4.43 | 4.43 | 4.43 | 0.90 | 1.15 | ±12.1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2450 | 52.7 | 1.95 | 4.28 | 4.28 | 4.28 | 0.72 | 1.34 | ±12.1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2600 | 52.5 | 2.16 | 4.07 | 4.07 | 4.07 | 0.90 | 1.16 | ±12.1% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <small>^c Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.</small> | | | | | <small>^c Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.</small> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <small>^d At frequency below 3 GHz, the validity of tissue parameters (<i>c</i> and <i>o</i>) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (<i>c</i> and <i>o</i>) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.</small> | | | | | <small>^d At frequency below 3 GHz, the validity of tissue parameters (<i>c</i> and <i>o</i>) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (<i>c</i> and <i>o</i>) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.</small> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <small>^e Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.</small> | | | | | <small>^e Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.</small> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Certificate No: Z17-97142 | Page 5 of 12 | | | | Certificate No: Z17-97142 | Page 6 of 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  <p>In Collaboration with: TTI speag CALIBRATION LABORATORY</p> <p>Add: No.51 Xuyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209 E-mail: ctif@chinatii.com http://www.chinatii.com</p> | | | | |  <p>In Collaboration with: TTI speag CALIBRATION LABORATORY</p> <p>Add: No.51 Xuyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209 E-mail: ctif@chinatii.com http://www.chinatii.com</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Frequency Response of E-Field (TEM-Cell: ifi110 EXX, Waveguide: R22) | | | | | Receiving Pattern (Φ, $\theta=0^\circ$) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  <p>Uncertainty of Frequency Response of E-field: ±7.4% (k=2)</p> | | | | |  <p>f=600 MHz, TEM</p> <p>f=1800 MHz, R22</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  <p>Uncertainty of Axial Isotropy Assessment: ±1.2% (k=2)</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Certificate No: Z17-97142 | Page 7 of 12 | | | | Certificate No: Z17-97142 | Page 8 of 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



EX3DV4 Sn:3708

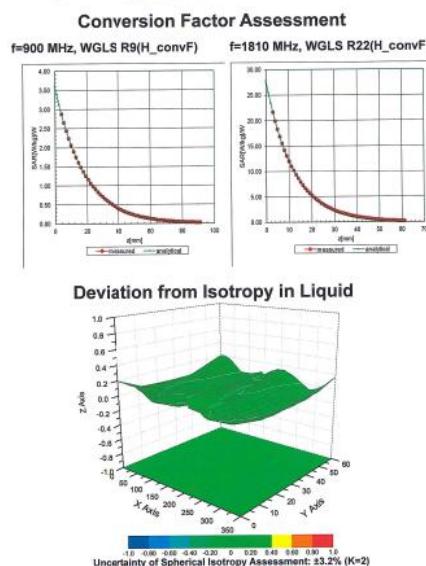
In Collaboration with
TTL speag
CALIBRATION LABORATORY
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Page 9 of 12

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Page 10 of 12

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E-mail: ctt@ttltest.com <http://www.ttltest.com>

DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3708

| Other Probe Parameters | |
|---|------------|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | 177.2 |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disable |
| Probe Overall Length | 337mm |
| Probe Body Diameter | 10mm |
| Tip Length | 9mm |
| Tip Diameter | 2.5mm |
| Probe Tip to Sensor X Calibration Point | 1mm |
| Probe Tip to Sensor Y Calibration Point | 1mm |
| Probe Tip to Sensor Z Calibration Point | 1mm |
| Recommended Measurement Distance from Surface | 1.4mm |

Certificate No: Z17-97214

Page 11 of 12

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Appendix (Additional assessments outside the scope of FCC approved dual-logo scope)

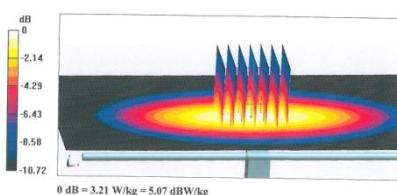
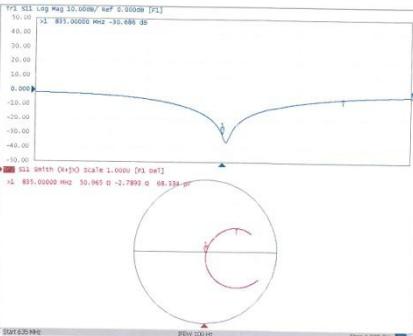
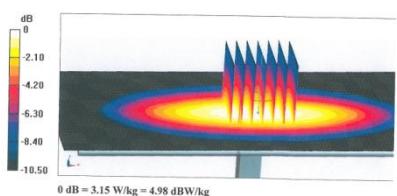
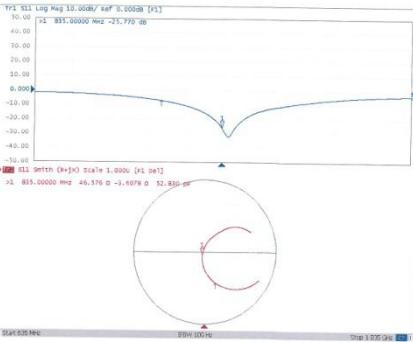
Modulation Calibration Parameters

| UID | Communication System Name | PAR | A dB | B dB·µV | C mV | VR mV | Unc (%) |
|-------|---|------|--------|---------|-------|-------|-------------|
| 0 | CW | 0.00 | X 0.0 | 0.0 | 1.0 | 95.9 | $\pm 3.1\%$ |
| | | | Y 0.0 | 0.0 | 1.0 | 149.0 | |
| | | | Z 0.0 | 0.0 | 1.0 | 169.4 | |
| 10011 | UMTS-FDD (WCDMA) | 2.91 | X 2.97 | 64.29 | 16.82 | 147.4 | $\pm 1.8\%$ |
| | | | Y 3.15 | 66.44 | 17.98 | 144.1 | |
| | | | Z 3.21 | 67.23 | 18.44 | 141.7 | |
| 10021 | GSM-FDD (TDMA) (GMSK) | 9.39 | X 0.95 | 57.62 | 9.60 | 48.2 | $\pm 2.4\%$ |
| | | | Y 1.22 | 59.57 | 9.93 | 44.1 | |
| | | | Z 1.13 | 59.66 | 9.94 | 43.4 | |
| 10062 | IEEE 802.11a/b WiFi 5 GHz (OFDM 6 Mbps) | 8.68 | X 9.01 | 65.22 | 19.38 | 92.1 | $\pm 2.1\%$ |
| | | | Y 8.26 | 63.95 | 18.73 | 71.9 | |
| | | | Z 8.53 | 64.77 | 19.13 | 85.3 | |

Certificate No: Z17-97214

Page 12 of 12

| D835V2 Sn:4d023 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--------------------------|---|---|--------------|--|-----------------------|--------------------------------------|--------------|--------------------------------|--------------------------|----------------------------------|------------------------------|--------------------------------|-------------|---|-------------------|------------------------------------|-----------|-----------------|---------|------------------------------------|-------------|---------------------|--------------|--|-----------------------|-------------------------|------------|--------------------------------|-----------------|-------------------------|------------------|---|---------|----------------|------|---|-----------|--------------|--------------------|---|-------------------------------------|------------------|--------------------------|---|---|--------------|--------------------|--------------------|---|--|--------------------------|--|-------------|--------------|--------------|-----------------------------|---------|------|------------|------------------------------|-----------------|------------|------------------|---|---------|------|------|---|-----------|--------------|--------------------|-----------|-------------------------------------|------------------|--------------------------|---|-----------|--------------|--------------------|-----------|-------------------------------------|------------------|--------------------------|---|
|   <p>In Collaboration with s p e a g CALIBRATION LABORATORY Add: No.51 Xuyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ctif@chinatl.cn http://www.chinatl.cn</p> <p>中国认可 国际互认 CNAS CALIBRATION CNAS L0570</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Client SRTC Certificate No: Z17-97135 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CALIBRATION CERTIFICATE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Object D835V2 - SN: 4d023</p> <p>Calibration Procedure(s) FF-Z11-003-01 Calibration Procedures for dipole validation kits</p> <p>Calibration date: September 13, 2017</p> <p>This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility environment temperature(22±3)°C and humidity<70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p> <table border="1"> <thead> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date/Calibrated by, Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power Meter NRV/D</td> <td>102196</td> <td>02-Mar-17 (CTTL, No.J17X01254)</td> <td>Mar-18</td> </tr> <tr> <td>Power sensor NRV-ZS</td> <td>100598</td> <td>02-Mar-17 (CTTL, No.J17X01254)</td> <td>Mar-18</td> </tr> <tr> <td>Reference Probe EX3D04</td> <td>SN 7433</td> <td>26-Sep-16(SPEAG No EX3-7433_Sep16)</td> <td>Sep-17</td> </tr> <tr> <td>DAE4</td> <td>SN 1331</td> <td>19-Jan-17(CTTL-SPEAG No J17-97015)</td> <td>Jan-18</td> </tr> <tr> <td>Secondary Standards</td> <td>ID #</td> <td>Cal Date/Calibrated by, Certificate No.)</td> <td>Scheduled Calibration</td> </tr> <tr> <td>Signal Generator E4438C</td> <td>MY49071430</td> <td>13-Jan-17 (CTTL, No.J17X00286)</td> <td>Jan-18</td> </tr> <tr> <td>Network Analyzer E5071C</td> <td>MY46110673</td> <td>13-Jan-17 (CTTL, No.J17X00285)</td> <td>Jan-18</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Calibrated by:</th> <th>Name</th> <th>Function</th> <th>Signature</th> </tr> </thead> <tbody> <tr> <td>Zhao Jing</td> <td>SAR Test Engineer</td> <td></td> <td></td> </tr> <tr> <td>Reviewed by:</td> <td>Yu Zongying</td> <td>SAR Test Engineer</td> <td></td> </tr> <tr> <td>Approved by:</td> <td>Qi Dianyuan</td> <td>SAR Project Leader</td> <td></td> </tr> </tbody> </table> <p>Issued: September 18, 2017</p> <p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p> | | | Primary Standards | ID # | Cal Date/Calibrated by, Certificate No.) | Scheduled Calibration | Power Meter NRV/D | 102196 | 02-Mar-17 (CTTL, No.J17X01254) | Mar-18 | Power sensor NRV-ZS | 100598 | 02-Mar-17 (CTTL, No.J17X01254) | Mar-18 | Reference Probe EX3D04 | SN 7433 | 26-Sep-16(SPEAG No EX3-7433_Sep16) | Sep-17 | DAE4 | SN 1331 | 19-Jan-17(CTTL-SPEAG No J17-97015) | Jan-18 | Secondary Standards | ID # | Cal Date/Calibrated by, Certificate No.) | Scheduled Calibration | Signal Generator E4438C | MY49071430 | 13-Jan-17 (CTTL, No.J17X00286) | Jan-18 | Network Analyzer E5071C | MY46110673 | 13-Jan-17 (CTTL, No.J17X00285) | Jan-18 | Calibrated by: | Name | Function | Signature | Zhao Jing | SAR Test Engineer |  | | Reviewed by: | Yu Zongying | SAR Test Engineer |  | Approved by: | Qi Dianyuan | SAR Project Leader |  |  <p>In Collaboration with s p e a g CALIBRATION LABORATORY Add: No.51 Xuyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ctif@chinatl.cn http://www.chinatl.cn</p> <p>Glossary: TSL tissue simulating liquid ConvF sensitivity in TSL / NORMx,y,z N/A not applicable or not measured</p> <p>Calibration is Performed According to the Following Standards:</p> <ol style="list-style-type: none"> IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices. Measurement Techniques", June 2013 IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016 IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010 KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz <p>Additional Documentation: e) DASY4/5 System Handbook</p> <p>Methods Applied and Interpretation of Parameters:</p> <ul style="list-style-type: none"> Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated. Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis. Feed Point Impedance and Return Loss: These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required. Electrical Delay: One-way delay between the SMA connector and the antenna feed point. No uncertainty required. SAR measured: SAR measured at the stated antenna input power. SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector. SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result. <p>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%.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Primary Standards | ID # | Cal Date/Calibrated by, Certificate No.) | Scheduled Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power Meter NRV/D | 102196 | 02-Mar-17 (CTTL, No.J17X01254) | Mar-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power sensor NRV-ZS | 100598 | 02-Mar-17 (CTTL, No.J17X01254) | Mar-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reference Probe EX3D04 | SN 7433 | 26-Sep-16(SPEAG No EX3-7433_Sep16) | Sep-17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DAE4 | SN 1331 | 19-Jan-17(CTTL-SPEAG No J17-97015) | Jan-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Secondary Standards | ID # | Cal Date/Calibrated by, Certificate No.) | Scheduled Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Signal Generator E4438C | MY49071430 | 13-Jan-17 (CTTL, No.J17X00286) | Jan-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Network Analyzer E5071C | MY46110673 | 13-Jan-17 (CTTL, No.J17X00285) | Jan-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibrated by: | Name | Function | Signature | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Zhao Jing | SAR Test Engineer |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reviewed by: | Yu Zongying | SAR Test Engineer |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Approved by: | Qi Dianyuan | SAR Project Leader |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Certificate No: Z17-97135 | | Page 1 of 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Certified No: Z17-97135</p> <p>Page 2 of 8</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  <p>In Collaboration with s p e a g CALIBRATION LABORATORY Add: No.51 Xuyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ctif@chinatl.cn http://www.chinatl.cn</p> <p>Measurement Conditions: DASY system configuration, as far as not given on page 1.</p> <table border="1"> <thead> <tr> <th>DASY Version</th> <th>DASY52</th> <th>52.10.0.1448</th> </tr> </thead> <tbody> <tr> <td>Extrapolation</td> <td>Advanced Extrapolation</td> <td></td> </tr> <tr> <td>Phantom</td> <td>Triple Flat Phantom 5.1C</td> <td></td> </tr> <tr> <td>Distance Dipole Center - TSL</td> <td>15 mm</td> <td>with Spacer</td> </tr> <tr> <td>Zoom Scan Resolution</td> <td>dx, dy, dz = 5 mm</td> <td></td> </tr> <tr> <td>Frequency</td> <td>835 MHz ± 1 MHz</td> <td></td> </tr> </tbody> </table> <p>Head TSL parameters The following parameters and calculations were applied.</p> <table border="1"> <thead> <tr> <th></th> <th>Temperature</th> <th>Permittivity</th> <th>Conductivity</th> </tr> </thead> <tbody> <tr> <td>Nominal Head TSL parameters</td> <td>22.0 °C</td> <td>41.5</td> <td>0.90 mho/m</td> </tr> <tr> <td>Measured Head TSL parameters</td> <td>(22.0 ± 0.2) °C</td> <td>41.3 ± 6 %</td> <td>0.90 mho/m ± 6 %</td> </tr> <tr> <td>Head TSL temperature change during test</td> <td><1.0 °C</td> <td>----</td> <td>----</td> </tr> </tbody> </table> <p>SAR result with Head TSL</p> <table border="1"> <thead> <tr> <th>SAR averaged over 1 cm³ (1 g) of Head TSL</th> <th>Condition</th> </tr> </thead> <tbody> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>2.35 mW/g</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>9.37 mW/g ± 18.8 % (k=2)</td> </tr> <tr> <td>SAR averaged over 10 cm³ (10 g) of Head TSL</td> <td>Condition</td> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>1.52 mW/g</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>6.06 mW/g ± 18.7 % (k=2)</td> </tr> </tbody> </table> <p>Body TSL parameters The following parameters and calculations were applied.</p> <table border="1"> <thead> <tr> <th></th> <th>Temperature</th> <th>Permittivity</th> <th>Conductivity</th> </tr> </thead> <tbody> <tr> <td>Nominal Body TSL parameters</td> <td>22.0 °C</td> <td>55.2</td> <td>0.97 mho/m</td> </tr> <tr> <td>Measured Body TSL parameters</td> <td>(22.0 ± 0.2) °C</td> <td>55.7 ± 6 %</td> <td>0.98 mho/m ± 6 %</td> </tr> <tr> <td>Body TSL temperature change during test</td> <td><1.0 °C</td> <td>----</td> <td>----</td> </tr> </tbody> </table> <p>SAR result with Body TSL</p> <table border="1"> <thead> <tr> <th>SAR averaged over 1 cm³ (1 g) of Body TSL</th> <th>Condition</th> </tr> </thead> <tbody> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>2.34 mW/g</td> </tr> <tr> <td>SAR for nominal Body TSL parameters</td> <td>normalized to 1W</td> <td>9.47 mW/g ± 18.8 % (k=2)</td> </tr> <tr> <td>SAR averaged over 10 cm³ (10 g) of Body TSL</td> <td>Condition</td> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>1.53 mW/g</td> </tr> <tr> <td>SAR for nominal Body TSL parameters</td> <td>normalized to 1W</td> <td>6.17 mW/g ± 18.7 % (k=2)</td> </tr> </tbody> </table> | | | DASY Version | DASY52 | 52.10.0.1448 | Extrapolation | Advanced Extrapolation | | Phantom | Triple Flat Phantom 5.1C | | Distance Dipole Center - TSL | 15 mm | with Spacer | Zoom Scan Resolution | dx, dy, dz = 5 mm | | Frequency | 835 MHz ± 1 MHz | | | Temperature | Permittivity | Conductivity | Nominal Head TSL parameters | 22.0 °C | 41.5 | 0.90 mho/m | Measured Head TSL parameters | (22.0 ± 0.2) °C | 41.3 ± 6 % | 0.90 mho/m ± 6 % | Head TSL temperature change during test | <1.0 °C | ---- | ---- | SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | SAR measured | 250 mW input power | 2.35 mW/g | SAR for nominal Head TSL parameters | normalized to 1W | 9.37 mW/g ± 18.8 % (k=2) | SAR averaged over 10 cm ³ (10 g) of Head TSL | Condition | SAR measured | 250 mW input power | 1.52 mW/g | SAR for nominal Head TSL parameters | normalized to 1W | 6.06 mW/g ± 18.7 % (k=2) | | Temperature | Permittivity | Conductivity | Nominal Body TSL parameters | 22.0 °C | 55.2 | 0.97 mho/m | Measured Body TSL parameters | (22.0 ± 0.2) °C | 55.7 ± 6 % | 0.98 mho/m ± 6 % | Body TSL temperature change during test | <1.0 °C | ---- | ---- | SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | SAR measured | 250 mW input power | 2.34 mW/g | SAR for nominal Body TSL parameters | normalized to 1W | 9.47 mW/g ± 18.8 % (k=2) | SAR averaged over 10 cm ³ (10 g) of Body TSL | Condition | SAR measured | 250 mW input power | 1.53 mW/g | SAR for nominal Body TSL parameters | normalized to 1W | 6.17 mW/g ± 18.7 % (k=2) | <p>Certified No: Z17-97135</p> <p>Page 3 of 8</p> |
| DASY Version | DASY52 | 52.10.0.1448 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Extrapolation | Advanced Extrapolation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phantom | Triple Flat Phantom 5.1C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Distance Dipole Center - TSL | 15 mm | with Spacer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Zoom Scan Resolution | dx, dy, dz = 5 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Frequency | 835 MHz ± 1 MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Temperature | Permittivity | Conductivity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nominal Head TSL parameters | 22.0 °C | 41.5 | 0.90 mho/m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 41.3 ± 6 % | 0.90 mho/m ± 6 % | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Head TSL temperature change during test | <1.0 °C | ---- | ---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR measured | 250 mW input power | 2.35 mW/g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR for nominal Head TSL parameters | normalized to 1W | 9.37 mW/g ± 18.8 % (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR averaged over 10 cm ³ (10 g) of Head TSL | Condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR measured | 250 mW input power | 1.52 mW/g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR for nominal Head TSL parameters | normalized to 1W | 6.06 mW/g ± 18.7 % (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Temperature | Permittivity | Conductivity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nominal Body TSL parameters | 22.0 °C | 55.2 | 0.97 mho/m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 55.7 ± 6 % | 0.98 mho/m ± 6 % | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Body TSL temperature change during test | <1.0 °C | ---- | ---- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR measured | 250 mW input power | 2.34 mW/g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR for nominal Body TSL parameters | normalized to 1W | 9.47 mW/g ± 18.8 % (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR averaged over 10 cm ³ (10 g) of Body TSL | Condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR measured | 250 mW input power | 1.53 mW/g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR for nominal Body TSL parameters | normalized to 1W | 6.17 mW/g ± 18.7 % (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  <p>In Collaboration with s p e a g CALIBRATION LABORATORY Add: No.51 Xuyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ctif@chinatl.cn http://www.chinatl.cn</p> <p>Appendix (Additional assessments outside the scope of CNAS L0570)</p> <p>Antenna Parameters with Head TSL</p> <table border="1"> <thead> <tr> <th>Impedance, transformed to feed point</th> <th>51.0Ω-2.7ΩjΩ</th> </tr> </thead> <tbody> <tr> <td>Return Loss</td> <td>-30.7dB</td> </tr> </tbody> </table> <p>Antenna Parameters with Body TSL</p> <table border="1"> <thead> <tr> <th>Impedance, transformed to feed point</th> <th>48.6Ω-3.61jΩ</th> </tr> </thead> <tbody> <tr> <td>Return Loss</td> <td>-25.8dB</td> </tr> </tbody> </table> <p>General Antenna Parameters and Design</p> <table border="1"> <thead> <tr> <th>Electrical Delay (one direction)</th> <th>1.495 ns</th> </tr> </thead> </table> <p>After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.</p> <p>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 dipole arms and the feedline, there are two dipole arms in order to improve matching when loaded according to the position as explained in the "Matching" 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.</p> <p>Additional EUT Data</p> <table border="1"> <thead> <tr> <th>Manufactured by</th> <th>SPEAG</th> </tr> </thead> </table> | | | Impedance, transformed to feed point | 51.0Ω-2.7ΩjΩ | Return Loss | -30.7dB | Impedance, transformed to feed point | 48.6Ω-3.61jΩ | Return Loss | -25.8dB | Electrical Delay (one direction) | 1.495 ns | Manufactured by | SPEAG | <p>Certified No: Z17-97135</p> <p>Page 4 of 8</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Impedance, transformed to feed point | 51.0Ω-2.7ΩjΩ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Return Loss | -30.7dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Impedance, transformed to feed point | 48.6Ω-3.61jΩ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Return Loss | -25.8dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Electrical Delay (one direction) | 1.495 ns | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Manufactured by | SPEAG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| D835V2 Sn:4d023 | |
|--|--|
|  <p>DASYS Validation Report for Head TSL Test Laboratory: CTTI, Beijing, China DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d023 Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium parameters used: $\epsilon = 835 \text{ MHz}$; $\sigma = 0.903 \text{ S/m}$; $\epsilon_r = 41.34$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Left Section Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007) DASYS Configuration:<ul style="list-style-type: none">• Probe: EX3DV4 - SN7433; ConvF(9.82, 9.82, 9.82); Calibrated: 9/26/2016;• Sensor-Surface: 1.4mm (Mechanical Surface Detection)• Electronics: DAE4 Sn1331; Calibrated: 1/19/2017• Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1• Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 56.28V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 3.66 W/kg SAR(1 g) = 1.35 W/kg; SAR(10 g) = 1.52 W/kg Maximum value of SAR (measured) = 3.21 W/kg</p>  <p>0 dB = 3.21 W/kg = 5.07 dBW/kg</p> |  <p>In Collaboration with TTL CALIBRATION LABORATORY</p> <p>Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: cttl@chinattl.com http://www.chinattl.cn</p> <p>Impedance Measurement Plot for Head TSL</p>  <p>Y-axis: Impedance (Ω) from 0.000 to 50.000. X-axis: Frequency (MHz) from 835.00000 to 835.00000. The plot shows a single resonance dip centered around 835 MHz.</p> |
| Certificate No: Z17-97135 | Page 5 of 8 |
| Certificate No: Z17-97135 | Page 6 of 8 |
|  <p>DASYS Validation Report for Body TSL Test Laboratory: CTTI, Beijing, China DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d023 Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium parameters used: $\epsilon = 835 \text{ MHz}$; $\sigma = 0.958 \text{ S/m}$; $\epsilon_r = 55.68$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Center Section Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007) DASYS Configuration:<ul style="list-style-type: none">• Probe: EX3DV4 - SN7433; ConvF(9.5, 9.5, 9.5); Calibrated: 9/26/2016;• Sensor-Surface: 1.4mm (Mechanical Surface Detection)• Electronics: DAE4 Sn1331; Calibrated: 1/19/2017• Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1• Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 56.17 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 3.57 W/kg SAR(1 g) = 2.34 W/kg; SAR(10 g) = 1.53 W/kg Maximum value of SAR (measured) = 3.15 W/kg</p>  <p>0 dB = 3.15 W/kg = 4.98 dBW/kg</p> |  <p>In Collaboration with TTL CALIBRATION LABORATORY</p> <p>Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: cttl@chinattl.com http://www.chinattl.cn</p> <p>Impedance Measurement Plot for Body TSL</p>  <p>Y-axis: Impedance (Ω) from 0.000 to 50.000. X-axis: Frequency (MHz) from 835.00000 to 835.00000. The plot shows a single resonance dip centered around 835 MHz.</p> |
| Certificate No: Z17-97135 | Page 7 of 8 |
| Certificate No: Z17-97135 | Page 8 of 8 |

D1900V2 Sn:5d113



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国际互认
校准
CALIBRATION
CNAS L0570

Client: SRTC

Certificate No: Z17-97139

CALIBRATION CERTIFICATE

| | | | | | | |
|---|--|--|-----------------------|--|--|--|
| Object | D1900V2 - SN: 5d113 | | | | | |
| Calibration Procedure(s) | FF-Z11-003-01 Calibration Procedures for dipole validation kits | | | | | |
| Calibration date: | September 15, 2017 | | | | | |
| This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. | | | | | | |
| All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%. | | | | | | |
| Calibration Equipment used (M&TE critical for calibration) | | | | | | |
| Primary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration | | | |
| Power Meter NRV-D | 102196 | 02-Mar-17 (CTLL, No.J17X01254) | Mar-18 | | | |
| Power sensor NRV-Z5 | 100596 | 02-Mar-17 (CTLL, No.J17X01254) | Mar-18 | | | |
| Reference Probe EX30DV4 | SN 7433 | 26-Sep-16(SPEAG, No.EX3-3617_Sep16) | Sep-17 | | | |
| DAEA4 | SN 1331 | 19-Jan-17(CTLL-SPEAG, No.Z17-97015) | Jan-18 | | | |
| Secondary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration | | | |
| Signal Generator E4438C | MY49071430 | 13-Jan-17 (CTLL, No.J17X00286) | Jan-18 | | | |
| Network Analyzer E5071C | MY46110673 | 13-Jan-17 (CTLL, No.J17X00285) | Jan-18 | | | |
| Calibrated by: | Name | Function | Signature | | | |
| Zhao Jing | SAR Test Engineer | | | | | |
| Reviewed by: | Yu Zongying | SAR Test Engineer | | | | |
| Approved by: | Qi Dianyuan | SAR Project Leader | | | | |
| Issued: September 18, 2017 | | | | | | |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. | | | | | | |

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Page 1 of 8



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Glossary:
TSL tissue simulating liquid
ConvF sensitivity in TSL / NORMx,y,z
N/A not applicable or not measured

Calibration is performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz
- e) DASY4/5 System Handbook

Additional Documentation:

- e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- **Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- **Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- **Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned in a water filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- **Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- **SAR measured:** SAR measured at the stated antenna input power.
- **SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- **SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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

Certificate No: Z17-97139

Page 2 of 8



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Measurement Conditions

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

| DASY Version | DASY52 | 52.10.1446 |
|------------------------------|--------------------------|-------------|
| Extrapolation | Advanced Extrapolation | |
| Phantom | Triple Flat Phantom 5.1C | |
| Distance Dipole Center - TSL | 10 mm | with Spacer |
| Zoom Scan Resolution | dx, dy, dz = 5 mm | |
| Frequency | 1900 MHz ± 1 MHz | |

Head TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 40.0 | 1.40 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 40.3 ± 6 % | 1.42 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C | — | — |
| SAR result with Head TSL | | | |

SAR averaged over 1 cm³ (1 g) of Head TSL

| | Condition |
|-------------------------------------|--------------------|
| SAR measured | 250 mW input power |
| SAR for nominal Head TSL parameters | normalized to 1W |

SAR averaged over 10 cm³ (10 g) of Head TSL

| | Condition |
|-------------------------------------|--------------------|
| SAR measured | 250 mW input power |
| SAR for nominal Head TSL parameters | normalized to 1W |

Body TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Body TSL parameters | 22.0 °C | 53.3 | 1.52 mho/m |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 53.1 ± 6 % | 1.51 mho/m ± 6 % |
| Body TSL temperature change during test | <1.0 °C | — | — |
| SAR result with Body TSL | | | |

SAR averaged over 1 cm³ (1 g) of Body TSL

| | Condition |
|-------------------------------------|--------------------|
| SAR measured | 250 mW input power |
| SAR for nominal Body TSL parameters | normalized to 1W |

SAR averaged over 10 cm³ (10 g) of Body TSL

| | Condition |
|-------------------------------------|--------------------|
| SAR measured | 250 mW input power |
| SAR for nominal Body TSL parameters | normalized to 1W |

Certificate No: Z17-97139

Page 2 of 8



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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

| | |
|--------------------------------------|-----------------|
| Impedance, transformed to feed point | 50.1 Q ± 5.57 Q |
| Return Loss | -25.0 dB |

Antenna Parameters with Body TSL

| | |
|--------------------------------------|-----------------|
| Impedance, transformed to feed point | 47.6 Q ± 5.70 Q |
| Return Loss | -24.0 dB |

General Antenna Parameters and Design

| | |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.309 ns |
|----------------------------------|----------|

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

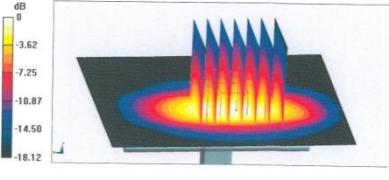
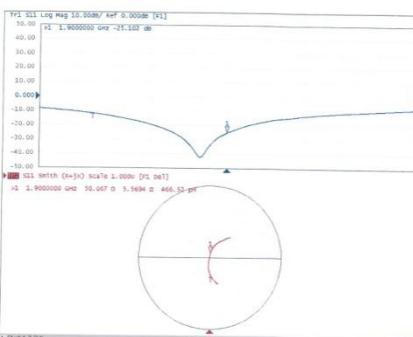
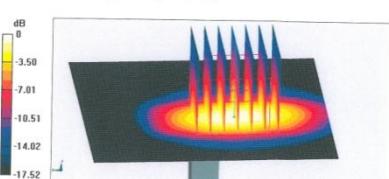
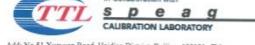
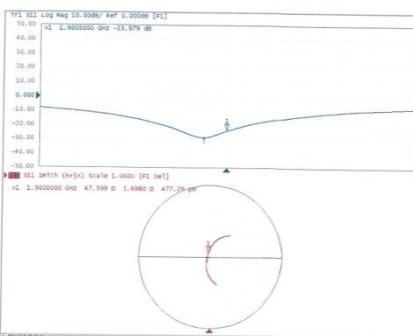
The dipole is made of standard semi rigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching 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

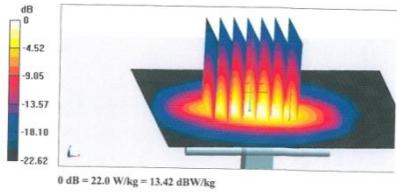
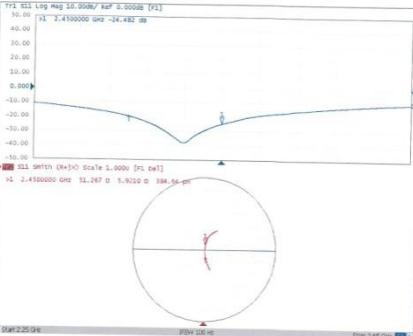
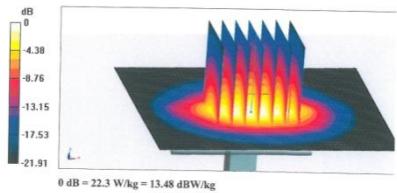
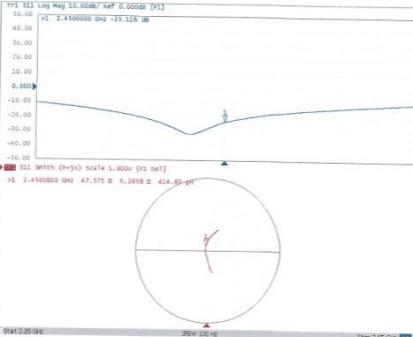
| | |
|-----------------|-------|
| Manufactured by | SPEAG |
|-----------------|-------|

Certificate No: Z17-97139

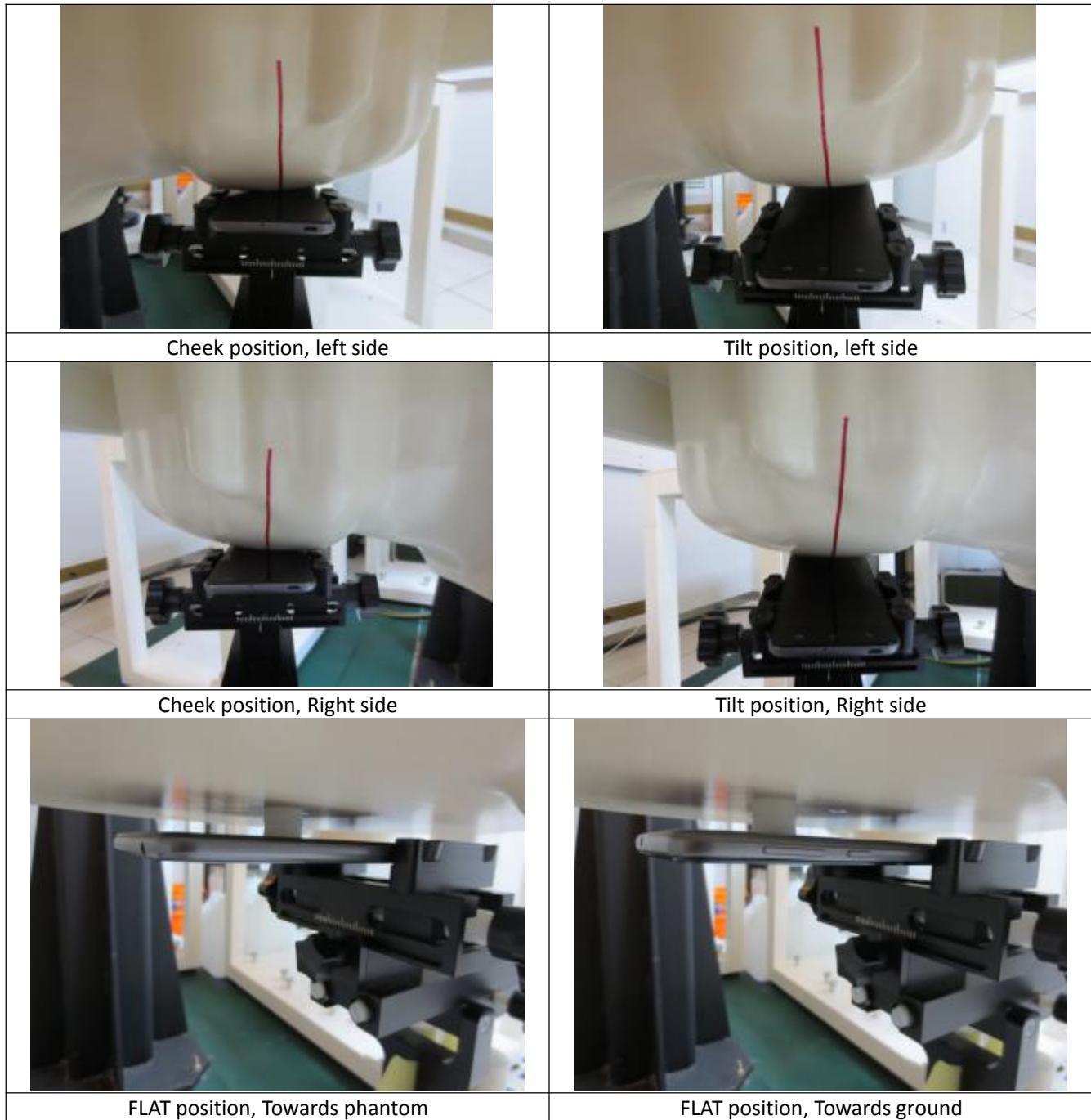
Page 4 of 8

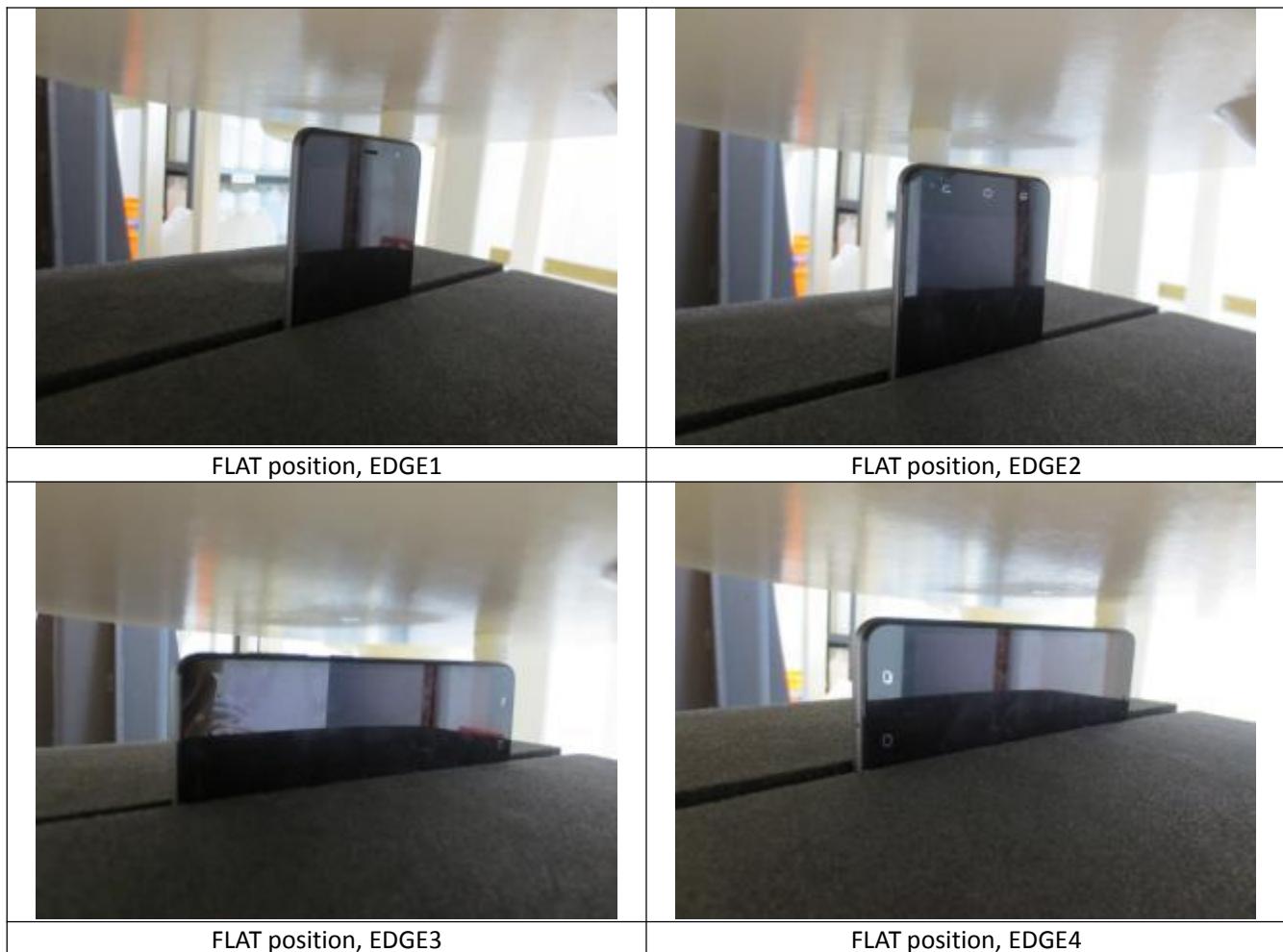
| <h3 style="text-align: center;">D1900V2 Sn:5d113</h3> | |
|--|--|
| <p>DASYS Validation Report for Head TSL Test Laboratory: CTTL, Beijing, China DUT: Dipole 1900 MHz; Type: D1900V2 - Serial: D1900V2 - SN: 5d113 Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1 Medium parameters used: $\epsilon' = 1900 \text{ MHz}$; $\sigma = 1.419 \text{ S/m}$; $\tau_r = 40.32$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Left Section Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007) DASYS Configuration:</p> <ul style="list-style-type: none"> Probe: EX3DV4 - SN7433; ConvF(7.98, 7.98, 7.98); Calibrated: 9/26/2016; Sensor-Surface: 1.4mm (Mechanical Surface Detection) Electronics: DA4E Sn1331; Calibrated: 1/19/2017 Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1 Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417) <p>System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 96.29 V/m; Power Drift = -0.03 dB Peak SAR (extrapolated) = 19.6 W/kg SAR(1 g) = 10.2 W/kg; SAR(10 g) = 5.27 W/kg Maximum value of SAR (measured) = 16.1 W/kg</p>  <p>0 dB = 16.1 W/kg = 12.07 dBW/kg</p> <p>Certificate No: Z17-97139 Page 5 of 8</p> | <p>In Collaboration with  Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304613-2079 Fax: +86-10-62304633-2504 E-mail: ctll@cttai.com http://www.cttai.com</p> <p>Impedance Measurement Plot for Head TSL</p>  <p>Y1L SLL Long Mag 10.000000 kohm 0.00000 [k1] Y1L 1.9000000 GHz -25.153 dB SLL Smith (+x)=> Scale 1.0000 [r1 det] x1 1.9000000 GHz 30.007 ohm 3.5694 ohm 466.52 pF Start 0.7 GHz Stop 1.0 GHz</p> <p>Certificate No: Z17-97139 Page 6 of 8</p> |
| <p>DASYS Validation Report for Body TSL Test Laboratory: CTTL, Beijing, China DUT: Dipole 1900 MHz; Type: D1900V2 - Serial: D1900V2 - SN: 5d113 Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1 Medium parameters used: $\epsilon' = 1900 \text{ MHz}$; $\sigma = 1.507 \text{ S/m}$; $\tau_r = 53.06$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Center Section Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007) DASYS Configuration:</p> <ul style="list-style-type: none"> Probe: EX3DV4 - SN7433; ConvF(7.7, 7.7, 7.7); Calibrated: 9/26/2016; Sensor-Surface: 1.4mm (Mechanical Surface Detection) Electronics: DA4E Sn1331; Calibrated: 1/19/2017 Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1 Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417) <p>System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 87.42 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 18.6 W/kg SAR(1 g) = 10 W/kg; SAR(10 g) = 5.21 W/kg Maximum value of SAR (measured) = 15.6 W/kg</p>  <p>0 dB = 15.6 W/kg = 11.93 dBW/kg</p> <p>Certificate No: Z17-97139 Page 7 of 8</p> | <p>In Collaboration with  Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304613-2079 Fax: +86-10-62304633-2504 E-mail: ctll@cttai.com http://www.cttai.com</p> <p>Impedance Measurement Plot for Body TSL</p>  <p>Y1L SLL Long Mag 10.000000 kohm 0.00000 [k1] Y1L 1.9000000 GHz -23.979 dB SLL Smith (+x)=> Scale 1.0000 [r1 det] x1 1.9000000 GHz 47.159 ohm 3.6980 ohm 477.29 pF Start 0.7 GHz Stop 1.0 GHz</p> <p>Certificate No: Z17-97139 Page 8 of 8</p> |

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| <p>D2450V2 Sn:738</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Add: No.51 Xueyan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62394632-2079 Fax: +86-10-62394633-2504 E-mail: ctif@chinatc.com http://www.chinatc.cn</p> </div> <div style="text-align: center;">  <p>中国认可 国际互认 CALIBRATION CNAS L0570</p> </div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>CALIBRATION CERTIFICATE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Object</td> <td colspan="2">D2450V2 - SN: 738</td> </tr> <tr> <td>Calibration Procedure(s)</td> <td colspan="2">FF-Z11-003-01 Calibration Procedures for dipole validation kits</td> </tr> <tr> <td>Calibration date:</td> <td colspan="2">September 18, 2017</td> </tr> <tr> <td colspan="3">This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</td> </tr> <tr> <td colspan="3">All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%.</td> </tr> <tr> <td colspan="3">Calibration Equipment used (M&TE critical for calibration)</td> </tr> <tr> <td>Primary Standards</td> <td>ID #</td> <td>Cal Date/Calibrated by, Certificate No.)</td> <td>Scheduled Calibration</td> </tr> <tr> <td>Power Meter NRV0</td> <td>102196</td> <td>02-Mar-17 (CTTL, No J17X01254)</td> <td>Mar-18</td> </tr> <tr> <td>Power sensor NRV-Z5</td> <td>100599</td> <td>02-Mar-17 (CTTL, No J17X01254)</td> <td>Mar-18</td> </tr> <tr> <td>Reference Probe EX3DV4</td> <td>SN 7433</td> <td>28-Sep-16(SPEAG, No EX3-7433, Sep'16)</td> <td>Sep-17</td> </tr> <tr> <td>DAEA4</td> <td>SN 1331</td> <td>19-Jan-17(CTTL-SPEAG, No Z17-97015)</td> <td>Jan-18</td> </tr> <tr> <td>Secondary Standards</td> <td>ID #</td> <td>Cal Date/Calibrated by, Certificate No.)</td> <td>Scheduled Calibration</td> </tr> <tr> <td>Signal Generator E4438C</td> <td>MY49071430</td> <td>13-Jan-17 (CTTL, No J17X00286)</td> <td>Jan-18</td> </tr> <tr> <td>Network Analyzer E5071C</td> <td>MY46110673</td> <td>13-Jan-17 (CTTL, No J17X00285)</td> <td>Jan-18</td> </tr> <tr> <td>Calibrated by:</td> <td>Name</td> <td>Function</td> <td>Signature</td> </tr> <tr> <td>Zhao Jing</td> <td>SAR Test Engineer</td> <td></td> <td></td> </tr> <tr> <td>Reviewed by:</td> <td>Yu Zongying</td> <td>SAR Test Engineer</td> <td></td> </tr> <tr> <td>Approved by:</td> <td>Qi Dianyuan</td> <td>SAR Project Leader</td> <td></td> </tr> <tr> <td colspan="4" style="text-align: center;">Issued: September 21, 2017</td> </tr> <tr> <td colspan="4">This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</td> </tr> </table> <p>Certificate No: Z17-97140 Page 1 of 8</p> </div> <div style="width: 55%;"> <p>CALIBRATION CERTIFICATE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Object</td> <td colspan="2">D2450V2 - SN: 738</td> </tr> <tr> <td>Calibration Procedure(s)</td> <td colspan="2">FF-Z11-003-01 Calibration Procedures for dipole validation kits</td> </tr> <tr> <td>Calibration date:</td> <td colspan="2">September 18, 2017</td> </tr> <tr> <td colspan="3">This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). 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The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. | | | All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%. | | | Calibration Equipment used (M&TE critical for calibration) | | | Primary Standards | ID # | Cal Date/Calibrated by, Certificate No.) | Scheduled Calibration | Power Meter NRV0 | 102196 | 02-Mar-17 (CTTL, No J17X01254) | Mar-18 | Power sensor NRV-Z5 | 100599 | 02-Mar-17 (CTTL, No J17X01254) | Mar-18 | Reference Probe EX3DV4 | SN 7433 | 28-Sep-16(SPEAG, No EX3-7433, Sep'16) | Sep-17 | DAEA4 | SN 1331 | 19-Jan-17(CTTL-SPEAG, No Z17-97015) | Jan-18 | Secondary Standards | ID # | Cal Date/Calibrated by, Certificate No.) | Scheduled Calibration | Signal Generator E4438C | MY49071430 | 13-Jan-17 (CTTL, No J17X00286) | Jan-18 | Network Analyzer E5071C | MY46110673 | 13-Jan-17 (CTTL, No J17X00285) | Jan-18 | Calibrated by: | Name | Function | Signature | Zhao Jing | SAR Test Engineer | |  | Reviewed by: | Yu Zongying | SAR Test Engineer |  | Approved by: | Qi Dianyuan | SAR Project Leader |  | Issued: September 21, 2017 | | | | This calibration certificate shall not be reproduced except in full without written approval of the laboratory. | | | | Object | D2450V2 - SN: 738 | | Calibration Procedure(s) | FF-Z11-003-01 Calibration Procedures for dipole validation kits | | Calibration date: | September 18, 2017 | | This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). 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All figures stated in the certificate are valid at the frequency indicated. ▪ Antenna Parameters with TSL: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis. ▪ Feed Point Impedance and Return Loss: These parameters are measured with the dipole positioned under the head filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required. ▪ Electrical Delay: One-way delay between the SMA connector and the antenna feed point. No uncertainty required. ▪ SAR measured: SAR measured at the stated antenna input power. ▪ SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector. ▪ SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result. <p>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%.</p> </div> <div style="width: 55%;"> <p>Certificate No: Z17-97140 Page 2 of 8</p> </div> </div> | TSL | tissue simulating liquid | ConvF | sensitivity in TSL / NORMx,y,z | N/A | not applicable or not measured |
| Object | D2450V2 - SN: 738 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibration Procedure(s) | FF-Z11-003-01 Calibration Procedures for dipole validation kits | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibration date: | September 18, 2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Power Meter NRV0 | 102196 | 02-Mar-17 (CTTL, No J17X01254) | Mar-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power sensor NRV-Z5 | 100599 | 02-Mar-17 (CTTL, No J17X01254) | Mar-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reference Probe EX3DV4 | SN 7433 | 28-Sep-16(SPEAG, No EX3-7433, Sep'16) | Sep-17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DAEA4 | SN 1331 | 19-Jan-17(CTTL-SPEAG, No Z17-97015) | Jan-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Secondary Standards | ID # | Cal Date/Calibrated by, Certificate No.) | Scheduled Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Signal Generator E4438C | MY49071430 | 13-Jan-17 (CTTL, No J17X00286) | Jan-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Network Analyzer E5071C | MY46110673 | 13-Jan-17 (CTTL, No J17X00285) | Jan-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibrated by: | Name | Function | Signature | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Zhao Jing | SAR Test Engineer | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reviewed by: | Yu Zongying | SAR Test Engineer |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Approved by: | Qi Dianyuan | SAR Project Leader |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Issued: September 21, 2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Object | D2450V2 - SN: 738 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibration Procedure(s) | FF-Z11-003-01 Calibration Procedures for dipole validation kits | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibration date: | September 18, 2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibration Equipment used (M&TE critical for calibration) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Primary Standards | ID # | Cal Date/Calibrated by, Certificate No.) | Scheduled Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power Meter NRV0 | 102196 | 02-Mar-17 (CTTL, No J17X01254) | Mar-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power sensor NRV-Z5 | 100599 | 02-Mar-17 (CTTL, No J17X01254) | Mar-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reference Probe EX3DV4 | SN 7433 | 28-Sep-16(SPEAG, No EX3-7433, Sep'16) | Sep-17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DAEA4 | SN 1331 | 19-Jan-17(CTTL-SPEAG, No Z17-97015) | Jan-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Secondary Standards | ID # | Cal Date/Calibrated by, Certificate No.) | Scheduled Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Signal Generator E4438C | MY49071430 | 13-Jan-17 (CTTL, No J17X00286) | Jan-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Network Analyzer E5071C | MY46110673 | 13-Jan-17 (CTTL, No J17X00285) | Jan-18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibrated by: | Name | Function | Signature | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Zhao Jing | SAR Test Engineer | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reviewed by: | Yu Zongying | SAR Test Engineer |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Approved by: | Qi Dianyuan | SAR Project Leader |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Issued: September 21, 2017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| TSL | tissue simulating liquid | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ConvF | sensitivity in TSL / NORMx,y,z | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| N/A | not applicable or not measured | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>D2450V2 Sn:738</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Add: No.51 Xueyan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62394632-2079 Fax: +86-10-62394633-2504 E-mail: ctif@chinatc.com http://www.chinatc.cn</p> </div> <div style="text-align: center;">  <p>中国认可 国际互认 CALIBRATION CNAS L0570</p> </div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Measurement Conditions</p> <p>DASY system configuration, as far as not given on page 1.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>DASY Version</td> <td>DASY52</td> <td>52.10.1446</td> </tr> <tr> <td>Extrapolation</td> <td colspan="2">Advanced Extrapolation</td> </tr> <tr> <td>Phantom</td> <td colspan="2">Triple Flat Phantom 5.1C</td> </tr> <tr> <td>Distance Dipole Center - TSL</td> <td>10 mm</td> <td>with Spacer</td> </tr> <tr> <td>Zoom Scan Resolution</td> <td>dx, dy, dz = 5 mm</td> <td></td> </tr> <tr> <td>Frequency</td> <td colspan="2">2450 MHz ± 1 MHz</td> </tr> </table> <p>Head TSL parameters</p> <p>The following parameters and calculations were applied.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Nominal Head TSL parameters</td> <td>Temperature</td> <td>Permittivity</td> <td>Conductivity</td> </tr> <tr> <td>Nominal Head TSL parameters</td> <td>22.0 °C</td> <td>39.2</td> <td>1.80 mho/m</td> </tr> <tr> <td>Measured Head TSL parameters</td> <td>(22.0 ± 0.2) °C</td> <td>38.7 ± 6 %</td> <td>1.79 mho/m ± 6 %</td> </tr> <tr> <td>Head TSL temperature change during test</td> <td><1.0 °C</td> <td>—</td> <td>—</td> </tr> </table> <p>SAR result with Head TSL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>SAR averaged over 1 cm³ (1 g) of Head TSL</td> <td>Condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>13.1 mW/g</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>\$2.4 mW/g ± 18.8 % (k=2)</td> </tr> <tr> <td>SAR averaged over 10 cm³ (10 g) of Head TSL</td> <td>Condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>6.10 mW/g</td> </tr> <tr> <td>SAR for nominal Head TSL parameters</td> <td>normalized to 1W</td> <td>24.4 mW/g ± 18.7 % (k=2)</td> </tr> </table> <p>Body TSL parameters</p> <p>The following parameters and calculations were applied.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Nominal Body TSL parameters</td> <td>Temperature</td> <td>Permittivity</td> <td>Conductivity</td> </tr> <tr> <td>Nominal Body TSL parameters</td> <td>22.0 °C</td> <td>52.7</td> <td>1.95 mho/m</td> </tr> <tr> <td>Measured Body TSL parameters</td> <td>(22.0 ± 0.2) °C</td> <td>52.5 ± 6 %</td> <td>1.98 mho/m ± 6 %</td> </tr> <tr> <td>Body TSL temperature change during test</td> <td><1.0 °C</td> <td>—</td> <td>—</td> </tr> </table> <p>SAR result with Body TSL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>SAR averaged over 1 cm³ (1 g) of Body TSL</td> <td>Condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>13.2 mW/g</td> </tr> <tr> <td>SAR for nominal Body TSL parameters</td> <td>normalized to 1W</td> <td>\$2.3 mW/g ± 18.8 % (k=2)</td> </tr> <tr> <td>SAR averaged over 10 cm³ (10 g) of Body TSL</td> <td>Condition</td> <td></td> </tr> <tr> <td>SAR measured</td> <td>250 mW input power</td> <td>6.10 mW/g</td> </tr> <tr> <td>SAR for nominal Body TSL parameters</td> <td>normalized to 1W</td> <td>24.3 mW/g ± 18.7 % (k=2)</td> </tr> </table> <p>Certificate No: Z17-97140 Page 3 of 8</p> </div> <div style="width: 55%;"> <p>Appendix (Additional assessments outside the scope of CNAS L0570)</p> <p>Antenna Parameters with Head TSL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Impedance, transformed to feed point</td> <td>51.30+ j 5.92Ω</td> </tr> <tr> <td>Return Loss</td> <td>-24.5dB</td> </tr> </table> <p>Antenna Parameters with Body TSL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Impedance, transformed to feed point</td> <td>47.60+ j 3.8Ω</td> </tr> <tr> <td>Return Loss</td> <td>-23.1dB</td> </tr> </table> <p>General Antenna Parameters and Design</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Electrical Delay (one direction)</td> <td>1.268 ns</td> </tr> </table> <p>After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.</p> <p>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 dipole's 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, since 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.</p> <p>Additional EUT Data</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Manufactured by</td> <td>SPEAG</td> </tr> </table> <p>Certificate No: Z17-97140 Page 4 of 8</p> </div> </div> | DASY Version | DASY52 | 52.10.1446 | Extrapolation | Advanced Extrapolation | | Phantom | Triple Flat Phantom 5.1C | | Distance Dipole Center - TSL | 10 mm | with Spacer | Zoom Scan Resolution | dx, dy, dz = 5 mm | | Frequency | 2450 MHz ± 1 MHz | | Nominal Head TSL parameters | Temperature | Permittivity | Conductivity | Nominal Head TSL parameters | 22.0 °C | 39.2 | 1.80 mho/m | Measured Head TSL parameters | (22.0 ± 0.2) °C | 38.7 ± 6 % | 1.79 mho/m ± 6 % | Head TSL temperature change during test | <1.0 °C | — | — | SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | | SAR measured | 250 mW input power | 13.1 mW/g | SAR for nominal Head TSL parameters | normalized to 1W | \$2.4 mW/g ± 18.8 % (k=2) | SAR averaged over 10 cm ³ (10 g) of Head TSL | Condition | | SAR measured | 250 mW input power | 6.10 mW/g | SAR for nominal Head TSL parameters | normalized to 1W | 24.4 mW/g ± 18.7 % (k=2) | Nominal Body TSL parameters | Temperature | Permittivity | Conductivity | Nominal Body TSL parameters | 22.0 °C | 52.7 | 1.95 mho/m | Measured Body TSL parameters | (22.0 ± 0.2) °C | 52.5 ± 6 % | 1.98 mho/m ± 6 % | Body TSL temperature change during test | <1.0 °C | — | — | SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | | SAR measured | 250 mW input power | 13.2 mW/g | SAR for nominal Body TSL parameters | normalized to 1W | \$2.3 mW/g ± 18.8 % (k=2) | SAR averaged over 10 cm ³ (10 g) of Body TSL | Condition | | SAR measured | 250 mW input power | 6.10 mW/g | SAR for nominal Body TSL parameters | normalized to 1W | 24.3 mW/g ± 18.7 % (k=2) | Impedance, transformed to feed point | 51.30+ j 5.92Ω | Return Loss | -24.5dB | Impedance, transformed to feed point | 47.60+ j 3.8Ω | Return Loss | -23.1dB | Electrical Delay (one direction) | 1.268 ns | Manufactured by | SPEAG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DASY Version | DASY52 | 52.10.1446 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Extrapolation | Advanced Extrapolation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Phantom | Triple Flat Phantom 5.1C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Distance Dipole Center - TSL | 10 mm | with Spacer | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Zoom Scan Resolution | dx, dy, dz = 5 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Frequency | 2450 MHz ± 1 MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nominal Head TSL parameters | Temperature | Permittivity | Conductivity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nominal Head TSL parameters | 22.0 °C | 39.2 | 1.80 mho/m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 38.7 ± 6 % | 1.79 mho/m ± 6 % | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Head TSL temperature change during test | <1.0 °C | — | — | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR measured | 250 mW input power | 13.1 mW/g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR for nominal Head TSL parameters | normalized to 1W | \$2.4 mW/g ± 18.8 % (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR averaged over 10 cm ³ (10 g) of Head TSL | Condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR measured | 250 mW input power | 6.10 mW/g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR for nominal Head TSL parameters | normalized to 1W | 24.4 mW/g ± 18.7 % (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nominal Body TSL parameters | Temperature | Permittivity | Conductivity | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nominal Body TSL parameters | 22.0 °C | 52.7 | 1.95 mho/m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 52.5 ± 6 % | 1.98 mho/m ± 6 % | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Body TSL temperature change during test | <1.0 °C | — | — | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR measured | 250 mW input power | 13.2 mW/g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR for nominal Body TSL parameters | normalized to 1W | \$2.3 mW/g ± 18.8 % (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR averaged over 10 cm ³ (10 g) of Body TSL | Condition | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR measured | 250 mW input power | 6.10 mW/g | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SAR for nominal Body TSL parameters | normalized to 1W | 24.3 mW/g ± 18.7 % (k=2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Impedance, transformed to feed point | 51.30+ j 5.92Ω | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Return Loss | -24.5dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Impedance, transformed to feed point | 47.60+ j 3.8Ω | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Return Loss | -23.1dB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Electrical Delay (one direction) | 1.268 ns | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Manufactured by | SPEAG | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

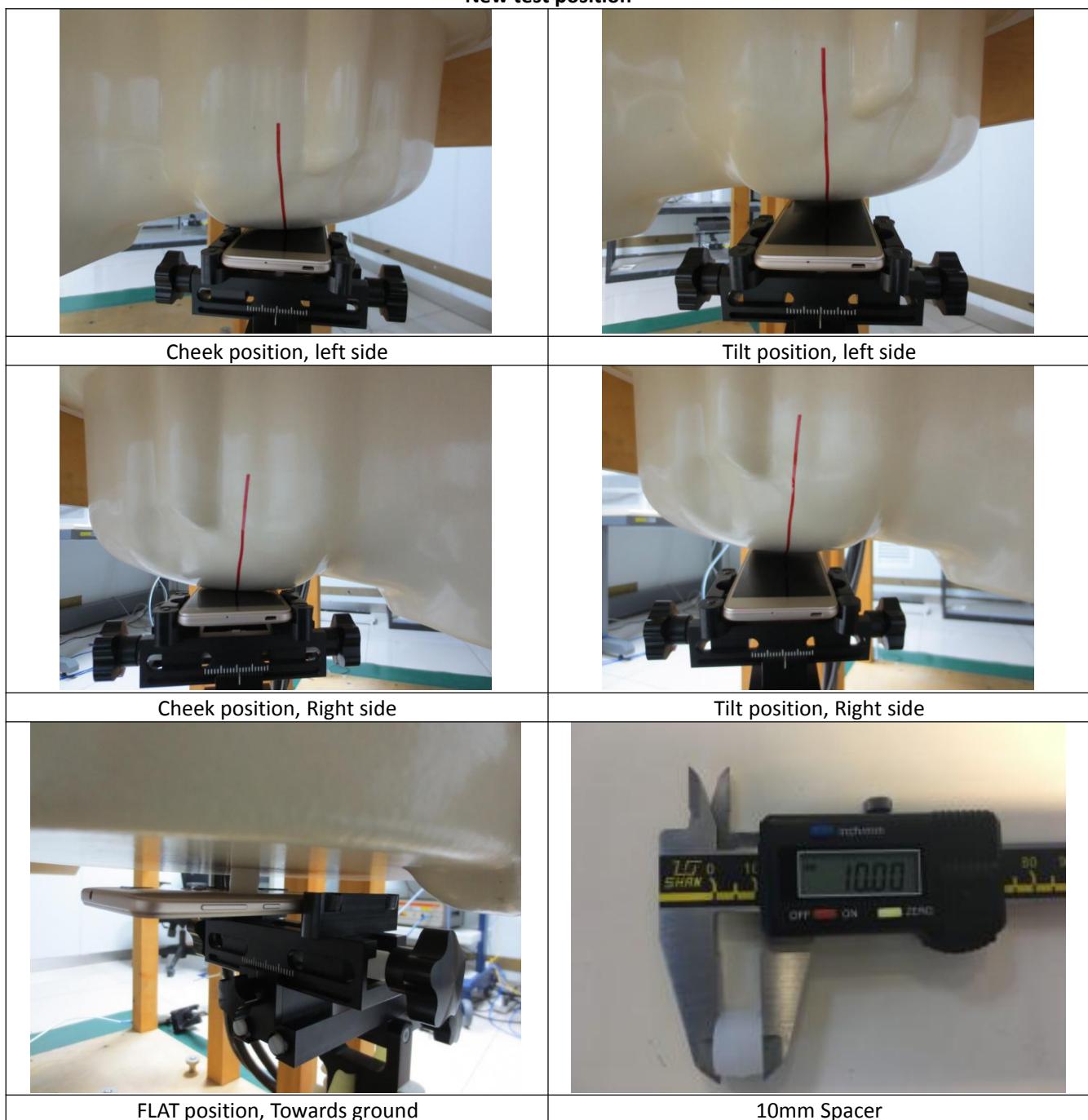
| <h3 style="text-align: center;">D2450V2 Sn:738</h3> | |
|--|---|
|  <p>In Collaboration with TTL speag CALIBRATION LABORATORY</p> <p>Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ctli@chinattl.com http://www.chinattl.cn</p> <p>DASYS Validation Report for Head TSL Test Laboratory: CTTL, Beijing, China DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 738 Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1 Medium parameters used: $f = 2450$ MHz, $\sigma = 1.788$ S/m, $\epsilon_r = 38.67$, $\rho = 1000$ kg/m³ Phantom section: Left Section Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007) DASYS Configuration:<ul style="list-style-type: none">• Probe: EX3DV4 - SN7433; ConvFi(45, 7.45, 7.45); Calibrated: 9/26/2016;• Sensor-Surface: 1.4mm (Mechanical Surface Detection)• Electronics: DAF4 Sn1331; Calibrated: 1/19/2017• Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1• Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 102.1 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 27.8 W/kg SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.1 W/kg Maximum value of SAR (measured) = 22.0 W/kg</p>  <p>0 dB = 22.0 W/kg = 13.42 dBW/kg</p> |  <p>In Collaboration with TTL speag CALIBRATION LABORATORY</p> <p>Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ctli@chinattl.com http://www.chinattl.cn</p> <p>Impedance Measurement Plot for Head TSL</p>  <p>Plot 1: SLL Log Mag 10.00dB/ Ref 0.00008 [f1] x1: 2.4100000 GHz SLL 247 Ω 1.9120 ± 384.54 μH Plot 2: Z0 HE Step 2.05 GHz</p> |
| <p>Certificate No: Z17-97140</p> <p>Page 5 of 8</p> | <p>Certificate No: Z17-97140</p> <p>Page 6 of 8</p> |
|  <p>In Collaboration with TTL speag CALIBRATION LABORATORY</p> <p>Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ctli@chinattl.com http://www.chinattl.cn</p> <p>DASYS Validation Report for Body TSL Test Laboratory: CTTL, Beijing, China DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 738 Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1 Medium parameters used: $f = 2450$ MHz, $\sigma = 1.983$ S/m, $\epsilon_r = 52.51$, $\rho = 1000$ kg/m³ Phantom section: Center Section Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007) DASYS Configuration:<ul style="list-style-type: none">• Probe: EX3DV4 - SN7433; ConvFi(7.46, 7.46, 7.46); Calibrated: 9/26/2016;• Sensor-Surface: 1.4mm (Mechanical Surface Detection)• Electronics: DAF4 Sn1331; Calibrated: 1/19/2017• Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1• Measurement SW: DASYS2, Version 52.10 (0); SEMCAD X Version 14.6.10 (7417)Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 96.41 V/m; Power Drift = -0.03 dB Peak SAR (extrapolated) = 27.8 W/kg SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.1 W/kg Maximum value of SAR (measured) = 22.3 W/kg</p>  <p>0 dB = 22.3 W/kg = 13.48 dBW/kg</p> |  <p>In Collaboration with TTL speag CALIBRATION LABORATORY</p> <p>Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: ctli@chinattl.com http://www.chinattl.cn</p> <p>Impedance Measurement Plot for Body TSL</p>  <p>Plot 1: SLL Log Mag 10.00dB/ Ref 0.00008 [f1] x1: 2.4100000 GHz SLL 47.571 Ω 6.3859 ± 414.82 μH Plot 2: Z0 HE Step 2.05 GHz</p> |
| <p>Certificate No: Z17-97140</p> <p>Page 7 of 8</p> | <p>Certificate No: Z17-97140</p> <p>Page 8 of 8</p> |

ANNEX C – PHOTOGRAPH





New test position



---End of Test Report---