



In Collaboration with
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CALIBRATION LABORATORY

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E-mail: cttl@chinattl.com http://www.chinattl.cn

Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

| | |
|--------------------------------------|---------------|
| Impedance, transformed to feed point | 53.6Ω+ 1.26jΩ |
| Return Loss | - 28.8dB |

General Antenna Parameters and Design

| | |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.066 ns |
|----------------------------------|----------|

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

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



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E-mail: cttl@chinattl.com http://www.chinattl.cn

DASY5 Validation Report for Head TSL

Date: 10.21.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 873

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.809$ S/m; $\epsilon_r = 39.51$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7517; ConvF(7.34, 7.34, 7.34) @ 2450 MHz; Calibrated: 2021-02-03
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2021-01-15
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 108.0 V/m; Power Drift = -0.03 dB

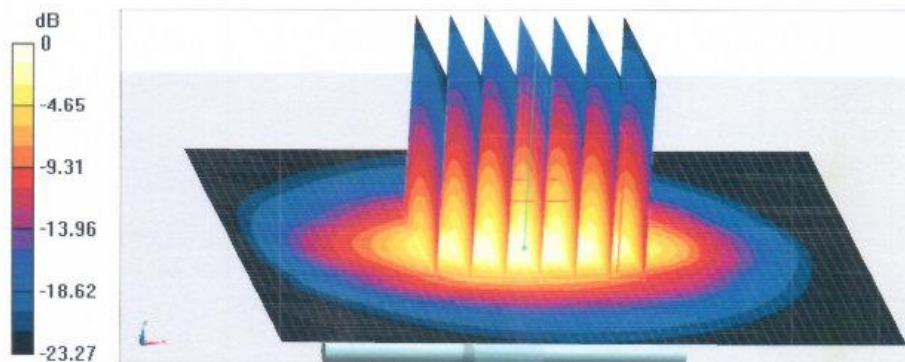
Peak SAR (extrapolated) = 28.0 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.05 W/kg

Smallest distance from peaks to all points 3 dB below = 9.2 mm

Ratio of SAR at M2 to SAR at M1 = 46.9%

Maximum value of SAR (measured) = 22.6 W/kg



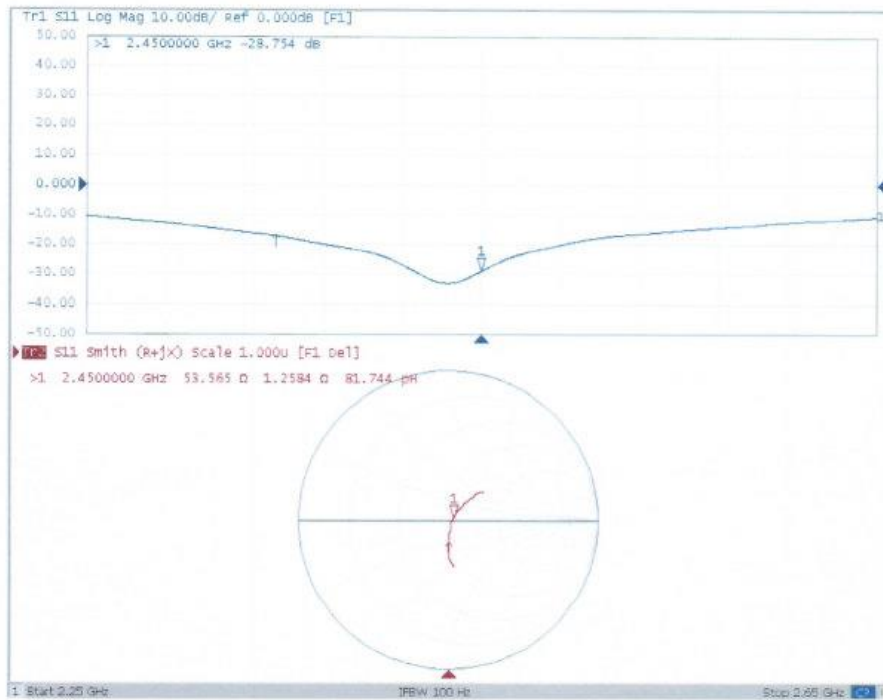
0 dB = 22.6 W/kg = 13.54 dBW/kg



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Impedance Measurement Plot for Head TSL



2550MHz Dipole Calibration Certificate

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





S Schweizerischer Kalibrierdienst
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S Swiss Calibration Service

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

Accreditation No.: SCS 0108

Client TMC-SZ (Auden)

Certificate No: D2550V2-1010_May21

| CALIBRATION CERTIFICATE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|-----------------------------------|--|-------------------|------|----------------------------|-----------------------|-----------------|------------|---------------------------------|--------|----------------------|------------|---------------------------|--------|----------------------|------------|---------------------------|--------|----------------------------|------------------|---------------------------|--------|-----------------------------|--------------------|---------------------------|--------|------------------------|----------|---------------------------------|--------|------|---------|---------------------------------|--------|---------------------|------|-----------------------|-----------------|--------------------|----------------|-----------------------------------|------------------------|-----------------------|----------------|-----------------------------------|------------------------|-----------------------|----------------|-----------------------------------|------------------------|-------------------------|------------|-----------------------------------|------------------------|---------------------------------|----------------|-----------------------------------|------------------------|
| Object | D2550V2 - SN:1010 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibration procedure(s) | QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibration date: | May 21, 2021 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <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 (Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Power meter NRP</td> <td>SN: 104778</td> <td>09-Apr-21 (No. 217-03291/03292)</td> <td>Apr-22</td> </tr> <tr> <td>Power sensor NRP-Z91</td> <td>SN: 103244</td> <td>09-Apr-21 (No. 217-03291)</td> <td>Apr-22</td> </tr> <tr> <td>Power sensor NRP-Z91</td> <td>SN: 103245</td> <td>09-Apr-21 (No. 217-03292)</td> <td>Apr-22</td> </tr> <tr> <td>Reference 20 dB Attenuator</td> <td>SN: BH9394 (20k)</td> <td>09-Apr-21 (No. 217-03343)</td> <td>Apr-22</td> </tr> <tr> <td>Type-N mismatch combination</td> <td>SN: 310982 / 06327</td> <td>09-Apr-21 (No. 217-03344)</td> <td>Apr-22</td> </tr> <tr> <td>Reference Probe EX3DV4</td> <td>SN: 7349</td> <td>28-Dec-20 (No. EX3-7349, Dec20)</td> <td>Dec-21</td> </tr> <tr> <td>DAE4</td> <td>SN: 601</td> <td>02-Nov-20 (No. DAE4-601, Nov20)</td> <td>Nov-21</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Secondary Standards</th> <th>ID #</th> <th>Check Date (in house)</th> <th>Scheduled Check</th> </tr> </thead> <tbody> <tr> <td>Power meter E4419B</td> <td>SN: GB39512475</td> <td>30-Oct-14 (in house check Oct-20)</td> <td>In house check: Oct-22</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>SN: US37292783</td> <td>07-Oct-15 (in house check Oct-20)</td> <td>In house check: Oct-22</td> </tr> <tr> <td>Power sensor HP 8481A</td> <td>SN: MY41092317</td> <td>07-Oct-15 (in house check Oct-20)</td> <td>In house check: Oct-22</td> </tr> <tr> <td>RF generator R&S SMT-06</td> <td>SN: 100972</td> <td>15-Jun-15 (in house check Oct-20)</td> <td>In house check: Oct-22</td> </tr> <tr> <td>Network Analyzer Agilent E8358A</td> <td>SN: US41080477</td> <td>31-Mar-14 (in house check Oct-20)</td> <td>In house check: Oct-21</td> </tr> </tbody> </table> | | | | Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration | Power meter NRP | SN: 104778 | 09-Apr-21 (No. 217-03291/03292) | Apr-22 | Power sensor NRP-Z91 | SN: 103244 | 09-Apr-21 (No. 217-03291) | Apr-22 | Power sensor NRP-Z91 | SN: 103245 | 09-Apr-21 (No. 217-03292) | Apr-22 | Reference 20 dB Attenuator | SN: BH9394 (20k) | 09-Apr-21 (No. 217-03343) | Apr-22 | Type-N mismatch combination | SN: 310982 / 06327 | 09-Apr-21 (No. 217-03344) | Apr-22 | Reference Probe EX3DV4 | SN: 7349 | 28-Dec-20 (No. EX3-7349, Dec20) | Dec-21 | DAE4 | SN: 601 | 02-Nov-20 (No. DAE4-601, Nov20) | Nov-21 | Secondary Standards | ID # | Check Date (in house) | Scheduled Check | Power meter E4419B | SN: GB39512475 | 30-Oct-14 (in house check Oct-20) | In house check: Oct-22 | Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (in house check Oct-20) | In house check: Oct-22 | Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (in house check Oct-20) | In house check: Oct-22 | RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Oct-20) | In house check: Oct-22 | Network Analyzer Agilent E8358A | SN: US41080477 | 31-Mar-14 (in house check Oct-20) | In house check: Oct-21 |
| Primary Standards | ID # | Cal Date (Certificate No.) | Scheduled Calibration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power meter NRP | SN: 104778 | 09-Apr-21 (No. 217-03291/03292) | Apr-22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power sensor NRP-Z91 | SN: 103244 | 09-Apr-21 (No. 217-03291) | Apr-22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power sensor NRP-Z91 | SN: 103245 | 09-Apr-21 (No. 217-03292) | Apr-22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reference 20 dB Attenuator | SN: BH9394 (20k) | 09-Apr-21 (No. 217-03343) | Apr-22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Type-N mismatch combination | SN: 310982 / 06327 | 09-Apr-21 (No. 217-03344) | Apr-22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reference Probe EX3DV4 | SN: 7349 | 28-Dec-20 (No. EX3-7349, Dec20) | Dec-21 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DAE4 | SN: 601 | 02-Nov-20 (No. DAE4-601, Nov20) | Nov-21 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Secondary Standards | ID # | Check Date (in house) | Scheduled Check | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power meter E4419B | SN: GB39512475 | 30-Oct-14 (in house check Oct-20) | In house check: Oct-22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power sensor HP 8481A | SN: US37292783 | 07-Oct-15 (in house check Oct-20) | In house check: Oct-22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power sensor HP 8481A | SN: MY41092317 | 07-Oct-15 (in house check Oct-20) | In house check: Oct-22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| RF generator R&S SMT-06 | SN: 100972 | 15-Jun-15 (in house check Oct-20) | In house check: Oct-22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Network Analyzer Agilent E8358A | SN: US41080477 | 31-Mar-14 (in house check Oct-20) | In house check: Oct-21 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Calibrated by: | Name Jeffrey Katzman | Function Laboratory Technician | Signature  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Approved by: | Name Katja Pokovic | Function Technical Manager | Signature  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Issued: May 21, 2021 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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



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S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

- 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
- 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
- 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

| | | |
|------------------------------|------------------------|-------------|
| DASY Version | DASY5 | V52.10.4 |
| Extrapolation | Advanced Extrapolation | |
| Phantom | Modular Flat Phantom | |
| Distance Dipole Center - TSL | 10 mm | with Spacer |
| Zoom Scan Resolution | dx, dy, dz = 5 mm | |
| Frequency | 2550 MHz \pm 1 MHz | |

Head TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---------------------|----------------|----------------------|
| Nominal Head TSL parameters | 22.0 °C | 39.1 | 1.91 mho/m |
| Measured Head TSL parameters | (22.0 \pm 0.2) °C | 37.4 \pm 6 % | 1.99 mho/m \pm 6 % |
| Head TSL temperature change during test | < 0.5 °C | --- | --- |

SAR result with Head TSL

| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | |
|---|--------------------|--|
| SAR measured | 250 mW input power | 14.4 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 55.9 W/kg \pm 17.0 % (k=2) |

| SAR averaged over 10 cm ³ (10 g) of Head TSL | condition | |
|---|--------------------|--|
| SAR measured | 250 mW input power | 6.42 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 25.2 W/kg \pm 16.5 % (k=2) |

Body TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---------------------|----------------|----------------------|
| Nominal Body TSL parameters | 22.0 °C | 52.6 | 2.09 mho/m |
| Measured Body TSL parameters | (22.0 \pm 0.2) °C | 50.8 \pm 6 % | 2.16 mho/m \pm 6 % |
| Body TSL temperature change during test | < 0.5 °C | --- | --- |

SAR result with Body TSL

| SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | |
|---|--------------------|--|
| SAR measured | 250 mW input power | 13.4 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 52.4 W/kg \pm 17.0 % (k=2) |

| SAR averaged over 10 cm ³ (10 g) of Body TSL | condition | |
|---|--------------------|--|
| SAR measured | 250 mW input power | 6.04 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 23.8 W/kg \pm 16.5 % (k=2) |

Appendix (Additional assessments outside the scope of SCS 0108)**Antenna Parameters with Head TSL**

| | |
|--------------------------------------|---------------------------------|
| Impedance, transformed to feed point | 52.8 Ω - 3.8 $\mu\Omega$ |
| Return Loss | - 26.8 dB |

Antenna Parameters with Body TSL

| | |
|--------------------------------------|---------------------------------|
| Impedance, transformed to feed point | 49.3 Ω - 1.8 $\mu\Omega$ |
| Return Loss | - 34.3 dB |

General Antenna Parameters and Design

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

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

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

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

Additional EUT Data

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

DASY5 Validation Report for Head TSL

Date: 21.05.2021

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2550 MHz; Type: D2550V2; Serial: D2550V2 - SN:1010

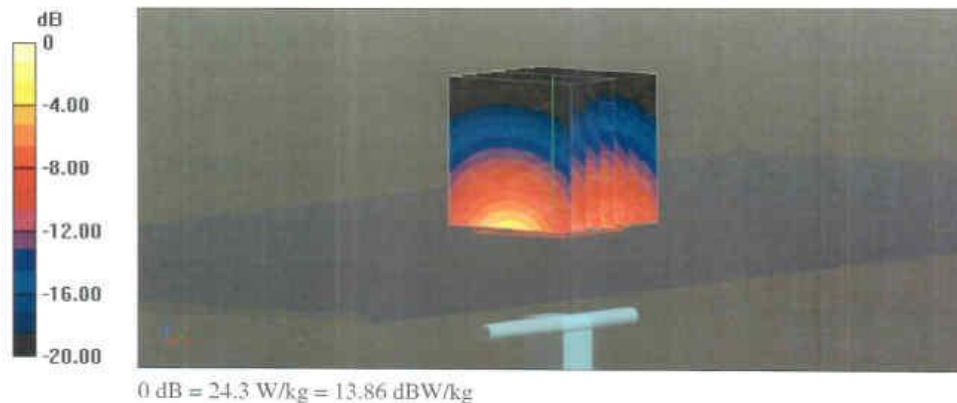
Communication System: UID 0 - CW; Frequency: 2550 MHz
 Medium parameters used: $f = 2550$ MHz; $\sigma = 1.99$ S/m; $\epsilon_r = 37.4$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

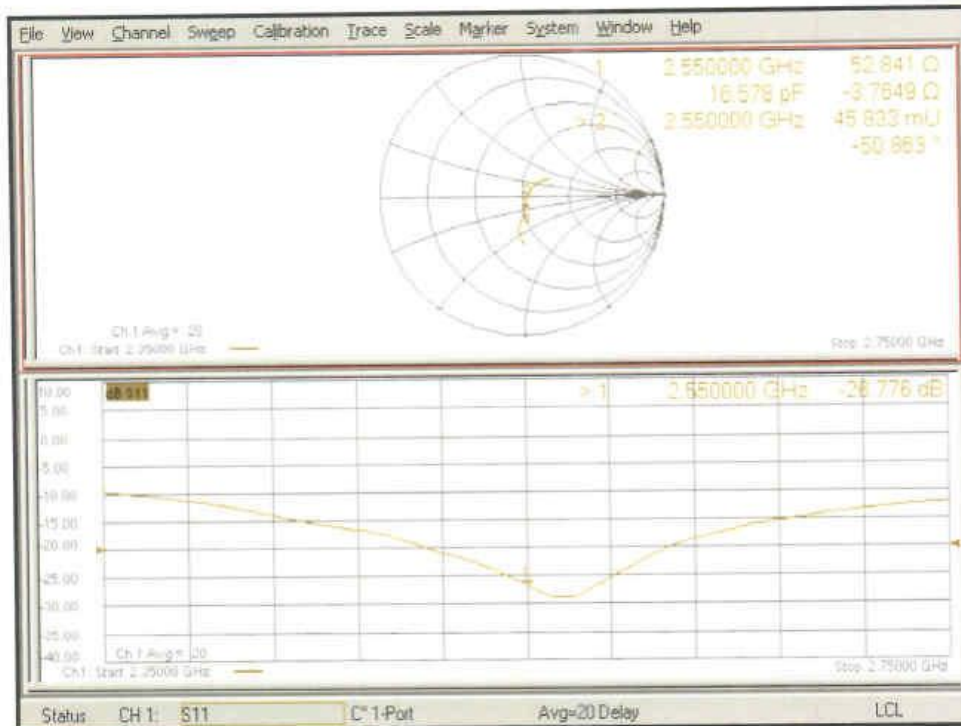
- Probe: EX3DV4 - SN7349; ConvF(7.85, 7.85, 7.85) @ 2550 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 119.0 V/m; Power Drift = 0.05 dB
 Peak SAR (extrapolated) = 29.6 W/kg
SAR(1 g) = 14.4 W/kg; SAR(10 g) = 6.42 W/kg
 Smallest distance from peaks to all points 3 dB below = 8.9 mm
 Ratio of SAR at M2 to SAR at M1 = 48.2%
 Maximum value of SAR (measured) = 24.3 W/kg



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 21.05.2021

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2550 MHz; Type: D2550V2; Serial: D2550V2 - SN:1010

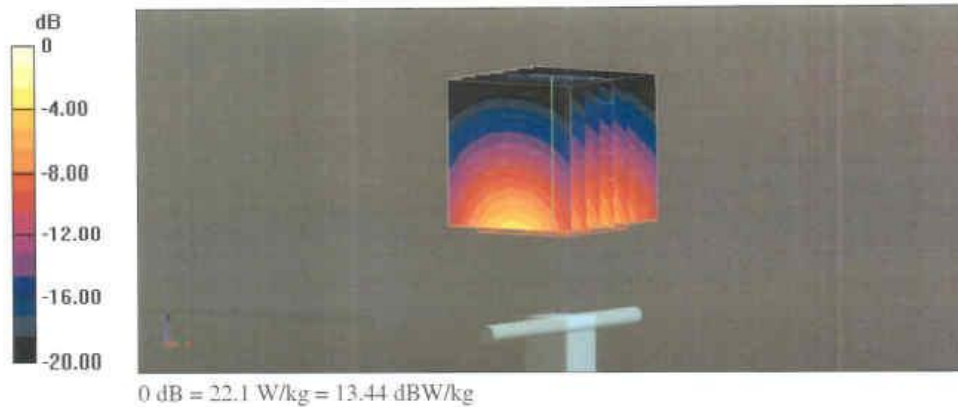
Communication System: UID 0 - CW; Frequency: 2550 MHz
 Medium parameters used: $f = 2550$ MHz; $\sigma = 2.16$ S/m; $\epsilon_r = 50.8$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

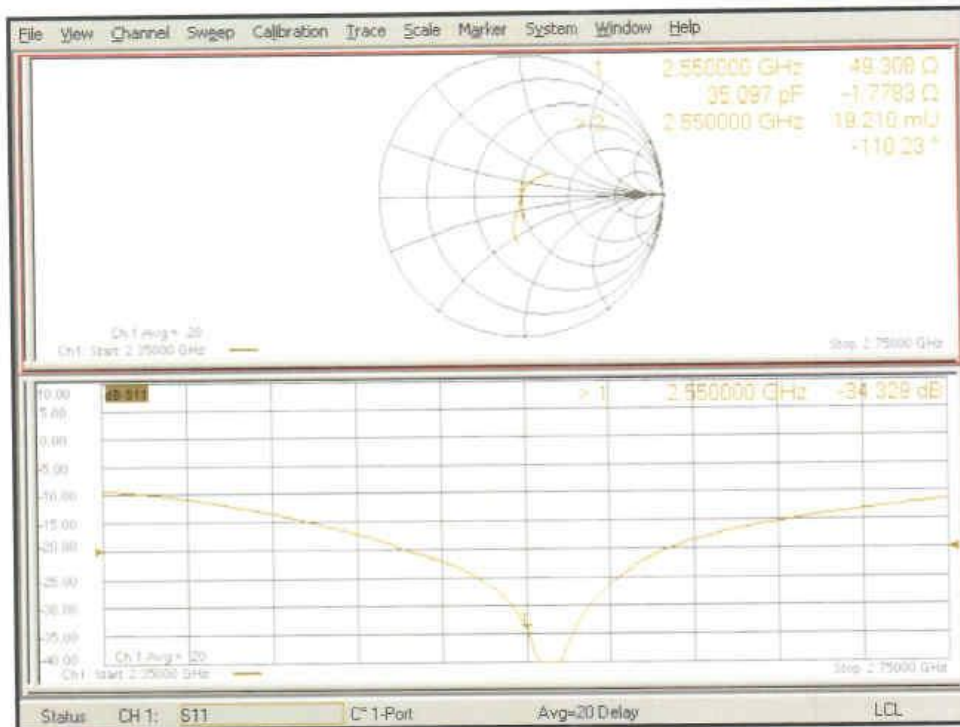
- Probe: EX3DV4 - SN7349; ConvF(7.98, 7.98, 7.98) @ 2550 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm
 Reference Value = 110.2 V/m; Power Drift = -0.01 dB
 Peak SAR (extrapolated) = 26.1 W/kg
SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.04 W/kg
 Smallest distance from peaks to all points 3 dB below = 8 mm
 Ratio of SAR at M2 to SAR at M1 = 51.9%
 Maximum value of SAR (measured) = 22.1 W/kg



Impedance Measurement Plot for Body TSL





5GHz Dipole Calibration Certificate



Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
E-mail: ctll@chinattl.com http://www.chinattl.cn



中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Client CTTL(South Branch)

Certificate No: Z19-60293

CALIBRATION CERTIFICATE

Object D5GHzV2 - SN: 1238

Calibration Procedure(s) FF-Z11-003-01
Calibration Procedures for dipole validation kits

Calibration date: August 29, 2019

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)

Table with 4 columns: Primary Standards, ID #, Cal Date(Calibrated by, Certificate No.), Scheduled Calibration. Includes rows for Power Meter NRP2, Power sensor NRP6A, ReferenceProbe EX3DV4 DAE4, Secondary Standards, Signal Generator E4438C, and NetworkAnalyzerE5071C.

Table with 4 columns: Name, Function, Signature. Rows for Calibrated by: Zhao Jing (SAR Test Engineer), Reviewed by: Lin Hao (SAR Test Engineer), and Approved by: Qi Dianyuan (SAR Project Leader).

Issued: September 2, 2019

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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Glossary:

| | |
|-------|--|
| TSL | tissue simulating liquid |
| ConvF | sensitivity in TSL / NORM _{x,y,z} |
| N/A | not applicable or not measured |

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Measurement procedure for 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

Additional Documentation:

- e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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



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Measurement Conditions

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

| | | |
|------------------------------|--|----------------------------------|
| DASY Version | DASY52 | V52.10.2 |
| Extrapolation | Advanced Extrapolation | |
| Phantom | Triple Flat Phantom 5.1C | |
| Distance Dipole Center - TSL | 10 mm | with Spacer |
| Zoom Scan Resolution | dx, dy = 4 mm, dz = 1.4 mm | Graded Ratio = 1.4 (Z direction) |
| Frequency | 5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz | |

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 35.9 | 4.71 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 35.7 ± 6 % | 4.69 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C | ---- | ---- |

SAR result with Head TSL at 5250 MHz

| | | |
|---|--------------------|---------------------------------|
| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | |
| SAR measured | 100 mW input power | 7.81 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 78.0 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm ³ (10 g) of Head TSL | Condition | |
| SAR measured | 100 mW input power | 2.23 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 22.3 W/kg ± 24.2 % (k=2) |



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Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 35.5 | 5.07 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 35.4 ± 6 % | 4.99 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C | ---- | ---- |

SAR result with Head TSL at 5600 MHz

| | | |
|---|--------------------|---------------------------------|
| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | |
| SAR measured | 100 mW input power | 7.96 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 79.5 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm ³ (10 g) of Head TSL | Condition | |
| SAR measured | 100 mW input power | 2.27 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 22.7 W/kg ± 24.2 % (k=2) |

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 35.4 | 5.22 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 35.1 ± 6 % | 5.10 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C | ---- | ---- |

SAR result with Head TSL at 5750 MHz

| | | |
|---|--------------------|---------------------------------|
| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | |
| SAR measured | 100 mW input power | 7.86 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 78.4 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm ³ (10 g) of Head TSL | Condition | |
| SAR measured | 100 mW input power | 2.23 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 22.2 W/kg ± 24.2 % (k=2) |



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Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Body TSL parameters | 22.0 °C | 48.9 | 5.36 mho/m |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 48.1 ± 6 % | 5.40 mho/m ± 6 % |
| Body TSL temperature change during test | <1.0 °C | ---- | ---- |

SAR result with Body TSL at 5250 MHz

| | | |
|---|--------------------|---------------------------------|
| SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | |
| SAR measured | 100 mW input power | 7.17 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 71.5 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm ³ (10 g) of Body TSL | Condition | |
| SAR measured | 100 mW input power | 2.04 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 20.3 W/kg ± 24.2 % (k=2) |

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Body TSL parameters | 22.0 °C | 48.5 | 5.77 mho/m |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 47.6 ± 6 % | 5.70 mho/m ± 6 % |
| Body TSL temperature change during test | <1.0 °C | ---- | ---- |

SAR result with Body TSL at 5600 MHz

| | | |
|---|--------------------|---------------------------------|
| SAR averaged over 1 cm ³ (1 g) of Body TSL | Condition | |
| SAR measured | 100 mW input power | 7.62 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 75.9 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm ³ (10 g) of Body TSL | Condition | |
| SAR measured | 100 mW input power | 2.18 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 21.7 W/kg ± 24.2 % (k=2) |



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Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|-----------------|--------------|------------------|
| Nominal Body TSL parameters | 22.0 °C | 48.3 | 5.94 mho/m |
| Measured Body TSL parameters | (22.0 ± 0.2) °C | 47.5 ± 6 % | 5.78 mho/m ± 6 % |
| Body TSL temperature change during test | <1.0 °C | ---- | ---- |

SAR result with Body TSL at 5750 MHz

| | | |
|---|--------------------|---------------------------------|
| SAR averaged over 1 cm³ (1 g) of Body TSL | Condition | |
| SAR measured | 100 mW input power | 7.39 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 73.6 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm³ (10 g) of Body TSL | Condition | |
| SAR measured | 100 mW input power | 2.10 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | 20.9 W/kg ± 24.2 % (k=2) |



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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL at 5250 MHz

| | |
|--------------------------------------|----------------|
| Impedance, transformed to feed point | 48.8Ω - 4.65jΩ |
| Return Loss | - 26.2dB |

Antenna Parameters with Head TSL at 5600 MHz

| | |
|--------------------------------------|----------------|
| Impedance, transformed to feed point | 49.2Ω + 0.58jΩ |
| Return Loss | - 40.0dB |

Antenna Parameters with Head TSL at 5750 MHz

| | |
|--------------------------------------|----------------|
| Impedance, transformed to feed point | 50.3Ω + 1.08jΩ |
| Return Loss | - 39.0dB |

Antenna Parameters with Body TSL at 5250 MHz

| | |
|--------------------------------------|----------------|
| Impedance, transformed to feed point | 48.8Ω - 2.02jΩ |
| Return Loss | - 32.5dB |

Antenna Parameters with Body TSL at 5600 MHz

| | |
|--------------------------------------|----------------|
| Impedance, transformed to feed point | 51.3Ω + 3.94jΩ |
| Return Loss | - 27.8dB |

Antenna Parameters with Body TSL at 5750 MHz

| | |
|--------------------------------------|----------------|
| Impedance, transformed to feed point | 52.2Ω + 4.77jΩ |
| Return Loss | - 25.8dB |



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General Antenna Parameters and Design

| | |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.059 ns |
|----------------------------------|----------|

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

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



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DASY5 Validation Report for Head TSL

Date: 08.28.2019

Test Laboratory: CTTT, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1238

Communication System: CW; Frequency: 5250 MHz, Frequency: 5600 MHz,
Frequency: 5750 MHz,

Medium parameters used: $f = 5250$ MHz; $\sigma = 4.692$ S/m; $\epsilon_r = 35.71$; $\rho = 1000$ kg/m³,
Medium parameters used: $f = 5600$ MHz; $\sigma = 4.992$ S/m; $\epsilon_r = 35.42$; $\rho = 1000$ kg/m³,
Medium parameters used: $f = 5750$ MHz; $\sigma = 5.096$ S/m; $\epsilon_r = 35.13$; $\rho = 1000$ kg/m³,

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(5.39, 5.39, 5.39) @ 5250 MHz; ConvF(5.06, 5.06, 5.06) @ 5600 MHz; ConvF(5.07, 5.07, 5.07) @ 5750 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/22/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Dipole Calibration /Pin=100mW, d=10mm, f=5250 MHz/Zoom Scan,**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 69.41 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 32.8 W/kg

SAR(1 g) = 7.81 W/kg; SAR(10 g) = 2.23 W/kg

Maximum value of SAR (measured) = 18.7 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan,**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 70.02 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 35.7 W/kg

SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.27 W/kg

Maximum value of SAR (measured) = 19.2 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan,**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 68.55 V/m; Power Drift = 0.02 dB

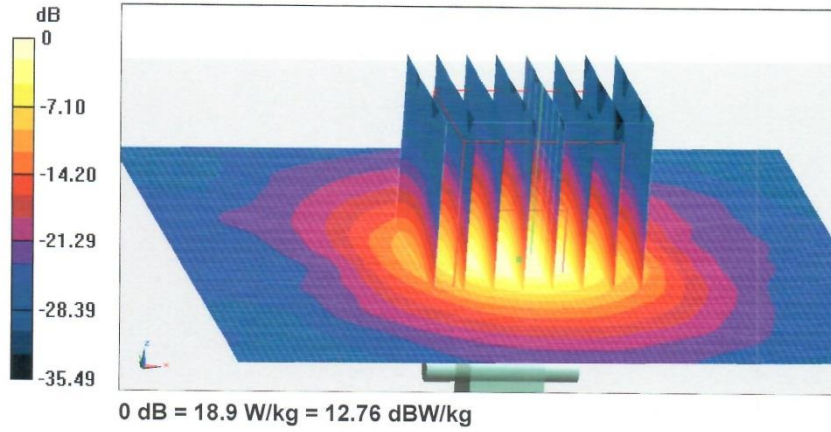
Peak SAR (extrapolated) = 36.5 W/kg

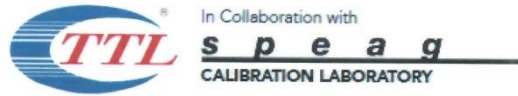
SAR(1 g) = 7.86 W/kg; SAR(10 g) = 2.23 W/kg

Maximum value of SAR (measured) = 18.9 W/kg



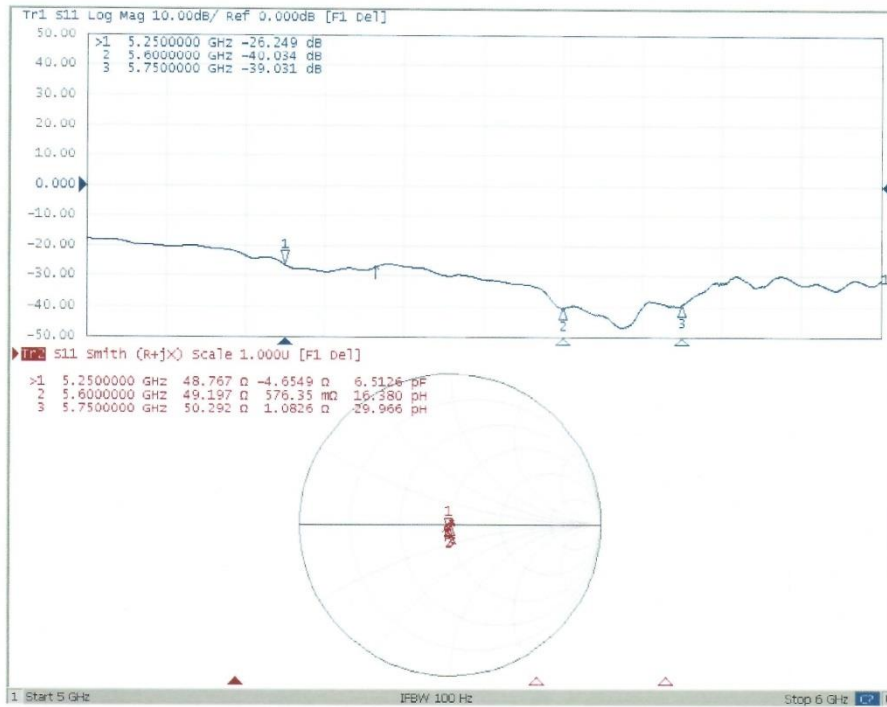
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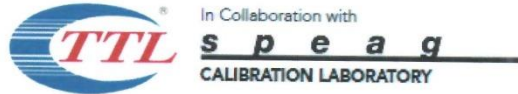




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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 08.29.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1238Communication System: CW; Frequency: 5250 MHz, Frequency: 5600 MHz,
Frequency: 5750 MHz,Medium parameters used: $f = 5250$ MHz; $\sigma = 5.402$ S/m; $\epsilon_r = 48.05$; $\rho = 1000$
kg/m³, Medium parameters used: $f = 5600$ MHz; $\sigma = 5.703$ S/m; $\epsilon_r = 47.61$; $\rho =$
1000 kg/m³, Medium parameters used: $f = 5750$ MHz; $\sigma = 5.782$ S/m; $\epsilon_r = 47.49$; $\rho =$
1000 kg/m³,

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(4.76, 4.76, 4.76) @ 5250 MHz; ConvF(4.23, 4.23, 4.23) @ 5600 MHz; ConvF(4.36, 4.36, 4.36) @ 5750 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/22/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

Dipole Calibration /Pin=100mW, d=10mm, f=5250 MHz/Zoom Scan,**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 54.85 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 27.5 W/kg

SAR(1 g) = 7.17 W/kg; SAR(10 g) = 2.04 W/kg

Maximum value of SAR (measured) = 16.4 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan,**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 56.17 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 32.3 W/kg

SAR(1 g) = 7.62 W/kg; SAR(10 g) = 2.18 W/kg

Maximum value of SAR (measured) = 18.4 W/kg

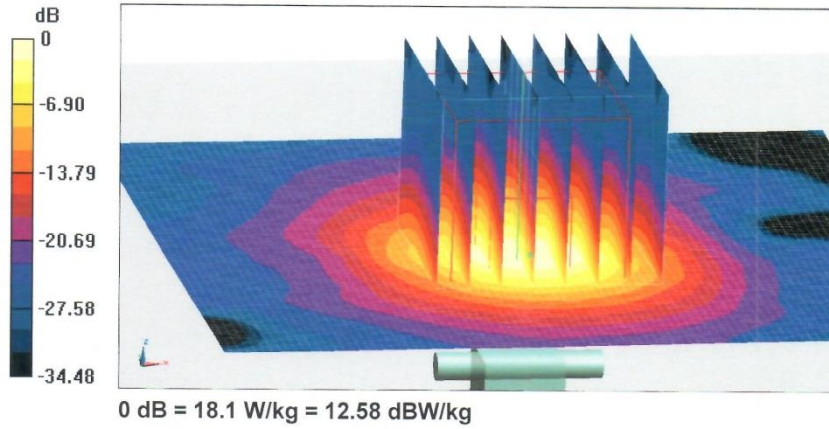
Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan,**dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 55.47 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 33.2 W/kg

SAR(1 g) = 7.39 W/kg; SAR(10 g) = 2.1 W/kg

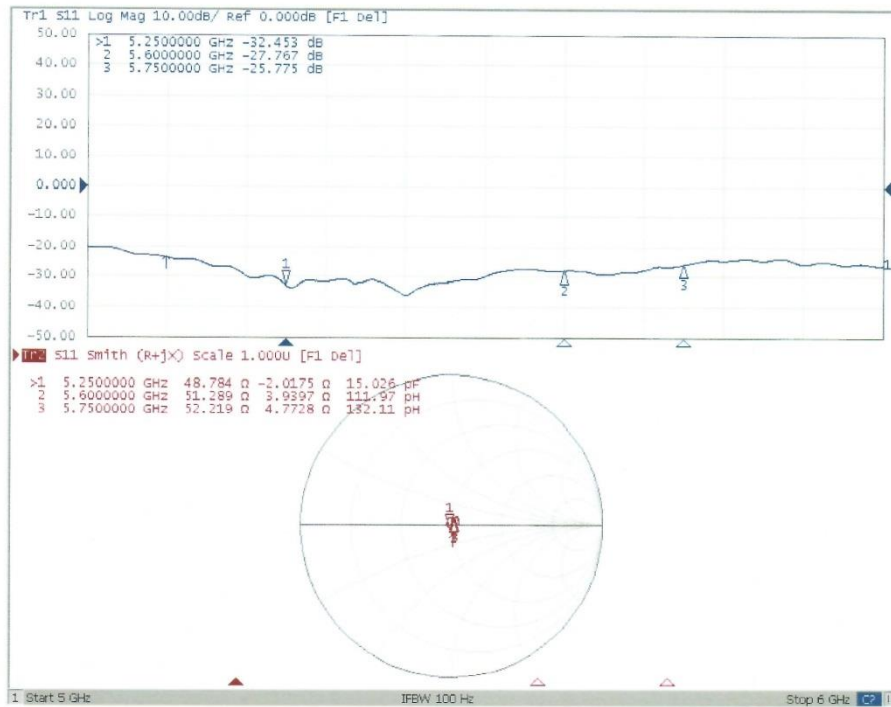
Maximum value of SAR (measured) = 18.1 W/kg





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Impedance Measurement Plot for Body TSL



ANNEX J: Extended Calibration SAR Dipole

Referring to KDB865664 D01, if dipoles are verified in return loss (<-20dBm, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

Justification of Extended Calibration SAR Dipole D750V3– serial no.1163

| Head | | | | | | |
|---------------------|------------------|-----------|----------------------|-------------|----------------------------|--------------|
| Date of Measurement | Return-Loss (dB) | Delta (%) | Real Impedance (ohm) | Delta (ohm) | Imaginary Impedance (johm) | Delta (johm) |
| 2019-09-03 | -26.9 | / | 50.5 | / | -4.53 | / |
| 2020-09-01 | -25.8 | 4.1 | 51.2 | 0.7 | -4.29 | 0.24 |
| 2021-08-30 | -25.2 | 6.3 | 51.7 | 1.2 | -4.16 | 0.37 |

Justification of Extended Calibration SAR Dipole D1750V2– serial no.1152

| Head | | | | | | |
|---------------------|------------------|-----------|----------------------|-------------|----------------------------|--------------|
| Date of Measurement | Return-Loss (dB) | Delta (%) | Real Impedance (ohm) | Delta (ohm) | Imaginary Impedance (johm) | Delta (johm) |
| 2019-08-30 | -38.1 | / | 49.1 | / | -0.84 | / |
| 2020-08-28 | -36.5 | 4.2 | 50.2 | 1.1 | -0.49 | 0.35 |
| 2021-08-26 | -35.7 | 6.3 | 50.8 | 1.7 | -0.42 | 0.42 |

Justification of Extended Calibration SAR Dipole D5GHzV2– serial no.1238

| Head | | | | | | |
|---------------------|------------------|-----------|----------------------|-------------|----------------------------|--------------|
| Date of Measurement | Return-Loss (dB) | Delta (%) | Real Impedance (ohm) | Delta (ohm) | Imaginary Impedance (johm) | Delta (johm) |
| 5250MHz | | | | | | |
| 2019-08-29 | -26.2 | / | 48.8 | / | -4.65 | / |
| 2020-08-28 | -25.1 | 4.2 | 49.7 | 0.9 | -4.26 | 0.39 |
| 2021-08-26 | -24.7 | 5.7 | 50.2 | 1.4 | -4.01 | 0.64 |
| 5600MHz | | | | | | |
| 2019-08-29 | -40.0 | / | 49.2 | / | 0.58 | / |
| 2020-08-28 | -38.1 | 4.8 | 50.3 | 1.1 | 0.85 | 0.27 |
| 2021-08-26 | -37.7 | 5.7 | 50.8 | 1.6 | 0.92 | 0.34 |
| 5750MHz | | | | | | |
| 2019-08-29 | -39.0 | / | 50.3 | / | 1.08 | / |
| 2020-08-28 | -37.7 | 3.3 | 51.1 | 0.8 | 1.44 | 0.36 |
| 2021-08-26 | -37.2 | 4.6 | 51.6 | 1.3 | 1.53 | 0.45 |

The Return-Loss is <-20dB, and within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the value result should support extended cabration.

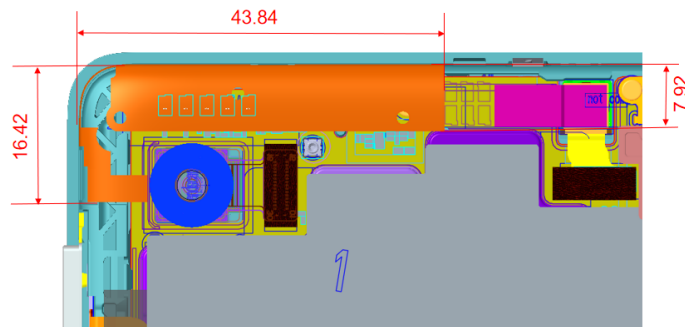
ANNEX K: Sensor Triggering Data Summary

Per FCC KDB Publication 616217 D04, this device was tested by the manufacturer to determine the proximity sensor triggering distances for all applicable sides and edges of the device. The measured output power at distances within ± 5 mm of the triggering points (or until touching the phantom) is included for back side and each applicable edge per Step i) in Section 6.2 of the KDB. The technical descriptions in the filing contain the complete set of triggering data required by Section 6 of FCC KDB Publication 616217 D04.

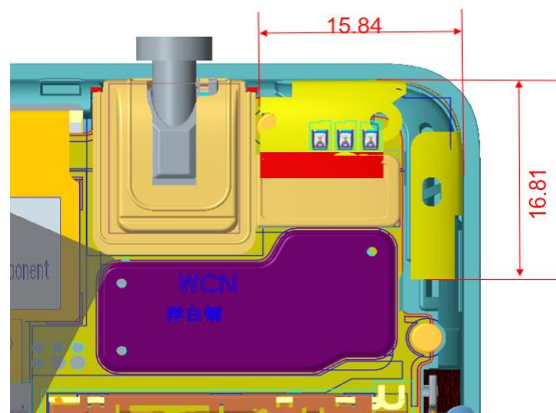
To ensure all production units are compliant, it is necessary to test SAR at a distance 1 mm less than the smallest distance between the device and SAR phantom with the device at the maximum output power (without power reduction). These SAR tests are included in addition to the SAR tests for the device touching the SAR phantom (at the reduced output power level).

The operational description contains information explaining how this device remains compliant in the event of a sensor malfunction.

P-sensor IC have two separator channels connected to WLAN and Cellular antenna show as below.



P-sensor coexisted with Cellular antenna



P-sensor coexisted with WIFI antenna



WWAN Antenna

Rear Side:

Moving device toward the phantom:

| Sensor triggered (YES or NO) | | | | | | | | | | | |
|------------------------------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
| Distance(mm) | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 |
| WWAN Antenna | NO | NO | NO | NO | NO | YES | YES | YES | YES | YES | YES |

Moving device away from the phantom:

| Sensor triggered (YES or NO) | | | | | | | | | | | |
|------------------------------|-----|-----|-----|-----|-----|-----|----|----|----|----|----|
| Distance(mm) | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| WWAN Antenna | YES | YES | YES | YES | YES | YES | NO | NO | NO | NO | NO |

Based on the most conservative measured triggering distance of 15 mm, additional SAR measurements were required at 14 mm from the rear side for the above modes.

Right Side:

Moving device toward the phantom:

| Sensor triggered (YES or NO) | | | | | | | | | | | |
|------------------------------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
| Distance(mm) | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 |
| WWAN Antenna | NO | NO | NO | NO | NO | YES | YES | YES | YES | YES | YES |

Moving device away from the phantom:

| Sensor triggered (YES or NO) | | | | | | | | | | | |
|------------------------------|-----|-----|-----|-----|-----|-----|----|----|----|----|----|
| Distance(mm) | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| WWAN Antenna | YES | YES | YES | YES | YES | YES | NO | NO | NO | NO | NO |

Based on the most conservative measured triggering distance of 10 mm, additional SAR measurements were required at 9 mm from the right side for the above modes.

Top Side:

Moving device toward the phantom:

| Sensor triggered (YES or NO) | | | | | | | | | | | |
|------------------------------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
| Distance(mm) | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 |
| WWAN Antenna | NO | NO | NO | NO | NO | YES | YES | YES | YES | YES | YES |

Moving device away from the phantom:

| Sensor triggered (YES or NO) | | | | | | | | | | | |
|------------------------------|-----|-----|-----|-----|-----|-----|----|----|----|----|----|
| Distance(mm) | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| WWAN Antenna | YES | YES | YES | YES | YES | YES | NO | NO | NO | NO | NO |

Based on the most conservative measured triggering distance of 15 mm, additional SAR measurements were required at 14 mm from the top side for the above modes.

WLAN Antenna

Rear Side:

Moving device toward the phantom:

| Sensor triggered (YES or NO) | | | | | | | | | | | |
|------------------------------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
| Distance(mm) | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 |
| WLAN Antenna | NO | NO | NO | NO | NO | YES | YES | YES | YES | YES | YES |

Moving device away from the phantom:

| Sensor triggered (YES or NO) | | | | | | | | | | | |
|------------------------------|-----|-----|-----|-----|-----|-----|----|----|----|----|----|
| Distance(mm) | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| WLAN Antenna | YES | YES | YES | YES | YES | YES | NO | NO | NO | NO | NO |

Based on the most conservative measured triggering distance of 10 mm, additional SAR measurements were required at 9 mm from the rear side for the above modes.

Left Side:

Moving device toward the phantom:

| Sensor triggered (YES or NO) | | | | | | | | | | | |
|------------------------------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
| Distance(mm) | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 |
| WLAN Antenna | NO | NO | NO | NO | NO | YES | YES | YES | YES | YES | YES |

Moving device away from the phantom:

| Sensor triggered (YES or NO) | | | | | | | | | | | |
|------------------------------|-----|-----|-----|-----|-----|-----|----|----|----|----|----|
| Distance(mm) | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| WLAN Antenna | YES | YES | YES | YES | YES | YES | NO | NO | NO | NO | NO |

Based on the most conservative measured triggering distance of 10 mm, additional SAR measurements were required at 9 mm from the left side for the above modes.

Top Side:

Moving device toward the phantom:

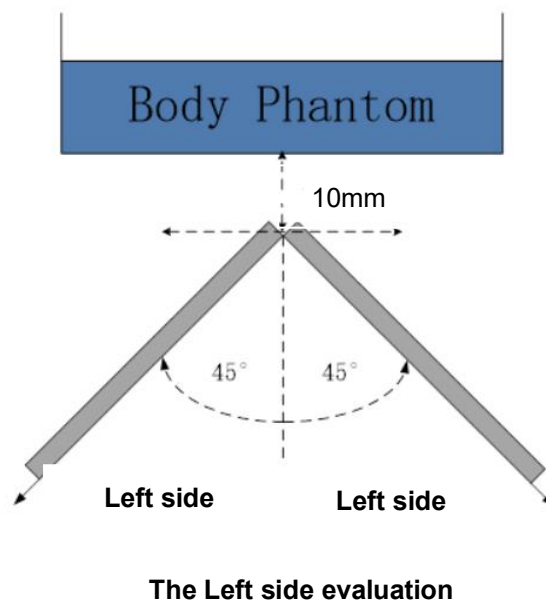
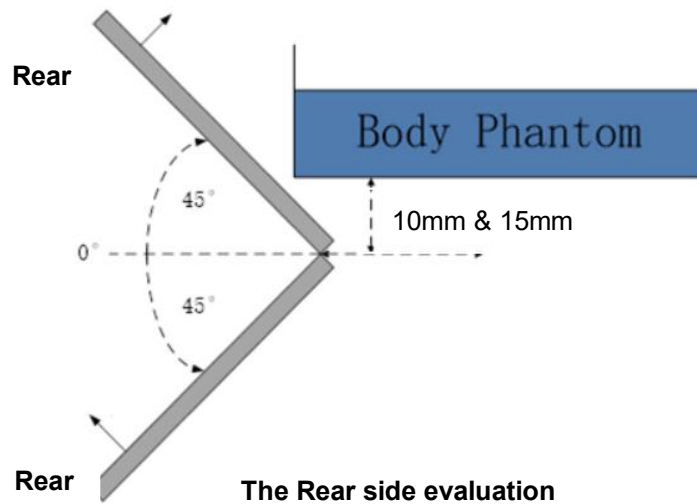
| Sensor triggered (YES or NO) | | | | | | | | | | | |
|------------------------------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
| Distance(mm) | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 |
| WLAN Antenna | NO | NO | NO | NO | NO | YES | YES | YES | YES | YES | YES |

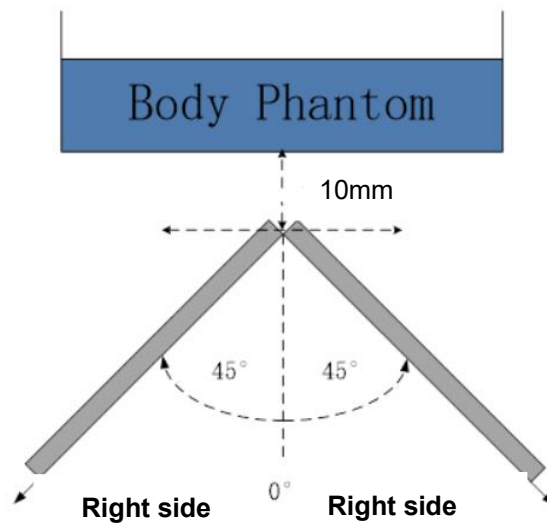
Moving device away from the phantom:

| Sensor triggered (YES or NO) | | | | | | | | | | | |
|------------------------------|-----|-----|-----|-----|-----|-----|----|----|----|----|----|
| Distance(mm) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 10 | 12 |
| WLAN Antenna | YES | YES | YES | YES | YES | YES | NO | NO | NO | NO | NO |

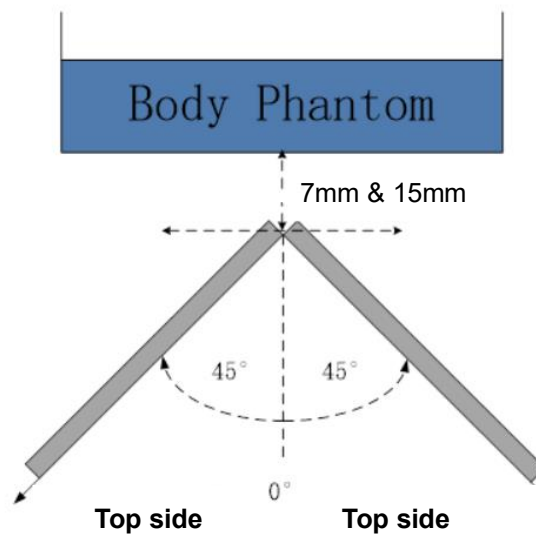
Based on the most conservative measured triggering distance of 7 mm, additional SAR measurements were required at 6 mm from the top side for the above modes.

The influence of table tilt angles to proximity sensor triggering is determined by positioning each edge that contains a transmitting antenna, perpendicular to the flat phantom, at the smallest sensor triggering test distance by rotating the device around the edge next to the phantom in $\leq 10^\circ$ increments until the tablet is $\pm 45^\circ$ or more from the vertical position at 0° .





The Right side evaluation



The Top side evaluation

Based on the above evaluation, we come to the conclusion that the sensor triggering is not released and normal maximum output power is not restored within the $\pm 45^\circ$ range at the smallest sensor triggering test distance declared by manufacturer.

*****END OF REPORT*****