



SAR TEST REPORT

For

Shenzhen Hollyland Technology Co.,Ltd

Hollyland VenusLiv V2 All-in-one Streaming Camera

Test Model: VenusLiv V2

Prepared for : Shenzhen Hollyland Technology Co.,Ltd
Address : 8F,Building 5D,Skyworth Innovation Valley, Tangtou Road.
Shiyan Street, Baoan District Shenzhen, China.

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample : May 22, 2024
Number of tested samples : 1
Sample number : A240520122-1
Serial number : Prototype
Date of Test : May 22, 2024 ~ May 29, 2024
Date of Report : May 30, 2024





| SAR TEST REPORT | |
|---|--|
| Report Reference No.....: | LCSA05224023E |
| Date Of Issue | May 30, 2024 |
| Testing Laboratory Name.....: | Shenzhen LCS Compliance Testing Laboratory Ltd. |
| Address | 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China |
| Testing Location/ Procedure | Full application of Harmonised standards <input checked="" type="checkbox"/> Partial application of Harmonised standards <input type="checkbox"/> Other standard testing method <input type="checkbox"/> |
| Applicant's Name | Shenzhen Hollyland Technology Co.,Ltd |
| Address | 8F,Building 5D,Skyworth Innovation Valley, Tangtou Road. Shiyan Street, Baoan District Shenzhen, China. |
| Test Specification: | |
| Standard.....: | FCC 47CFR §2.1093, ANSI/IEEE C95.1-2019, IEEE 1528-2013 |
| Test Report Form No.....: | LCSEMC-1.0 |
| TRF Originator.....: | Shenzhen LCS Compliance Testing Laboratory Ltd. |
| Master TRF | Dated 2014-09 |
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| Test Item Description.: | Hollyland VenusLiv V2 All-in-one Streaming Camera |
| Trade Mark.....: | HOLLYLAND |
| Model/Type Reference | VenusLiv V2 |
| Ratings | DC 7.4V by Rechargeable Li-ion Battery, 4000mAh |
| Result | Positive |

Compiled by:

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Jay Zhan/ File administrators

Supervised by:

Cary Luo

Cary Luo / Technique principal

Approved by:

Gavin Liang

Gavin Liang/ Manager





SAR -- TEST REPORT

| | | |
|--------------------------|----------------------|-------------------------------|
| Test Report No. : | LCSA05224023E | May 30, 2024 Date of issue |
|--------------------------|----------------------|-------------------------------|

| | |
|--------------------------|--|
| EUT..... | : Hollyland VenusLiv V2 All-in-one Streaming Camera |
| Type/Model | : VenusLiv V2 |
| Applicant..... | : Shenzhen Hollyland Technology Co.,Ltd |
| Address..... | : 8F,Building 5D,Skyworth Innovation Valley, Tangtou Road. Shiyan Street, Baoan District Shenzhen, China. |
| Telephone..... | : / |
| Fax..... | : / |
| Manufacturer..... | : Shenzhen Hollyland Technology Co.,Ltd |
| Address..... | : 8F,Building 5D,Skyworth Innovation Valley, Tangtou Road. Shiyan Street, Baoan District Shenzhen, China. |
| Telephone..... | : / |
| Fax..... | : / |
| Factory..... | : Shenzhen Hollyland Technology Co.,Ltd |
| Address..... | : 8F,Building 5D,Skyworth Innovation Valley, Tangtou Road. Shiyan Street, Baoan District Shenzhen, China. |
| Telephone..... | : / |
| Fax..... | : / |

| | |
|--------------------|-----------------|
| Test Result | Positive |
|--------------------|-----------------|

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.





Revision History

| Revision | Issue Date | Revision Content | Revised By |
|----------|--------------|------------------|------------|
| 000 | May 30, 2024 | Initial Issue | --- |
| | | | |
| | | | |





TABLE OF CONTENTS

- 1. TEST STANDARDS AND TEST DESCRIPTION.....6**
 - 1.1. STATEMENT OF COMPLIANCE6
 - 1.2. TEST LOCATION.....7
 - 1.3. TEST FACILITY.....7
 - 1.4. TEST LABORATORY ENVIRONMENT.....7
 - 1.5. PRODUCT DESCRIPTION8
 - 1.6. DUT ANTENNA LOCATIONS(REAR VIEW)10
 - 1.7. TEST SPECIFICATION.....11
 - 1.8. RF EXPOSURE LIMITS12
 - 1.9. EQUIPMENT LIST13
- 2. SAR MEASUREMENTS SYSTEM CONFIGURATION14**
 - 2.1. SAR MEASUREMENT SYSTEM14
 - 2.2. ISOTROPIC E-FIELD PROBE EX3DV4.....16
 - 2.3. DATA ACQUISITION ELECTRONICS (DAE).....17
 - 2.4. SAM TWIN PHANTOM17
 - 2.5. ELI PHANTOM18
 - 2.6. DEVICE HOLDER FOR TRANSMITTERS.....19
 - 2.7. MEASUREMENT PROCEDURE.....20
- 3. SAR MEASUREMENT VARIABILITY AND UNCERTAINTY.....24**
 - 3.1. SAR MEASUREMENT VARIABILITY.....24
 - 3.2. SAR MEASUREMENT UNCERTAINTY24
- 4. DESCRIPTION OF TEST POSITION.....25**
 - 4.1. TEST POSITIONS CONFIGURATION25
- 5. SAR SYSTEM VERIFICATION PROCEDURE26**
 - 5.1. TISSUE SIMULATE LIQUID.....26
 - 5.2. SAR SYSTEM CHECK.....28
- 6. SAR MEASUREMENT PROCEDURE30**
 - 6.1. CONDUCTED POWER MEASUREMENT30
 - 6.2. POWER REDUCTION30
 - 6.3. POWER DRIFT30
- 7. TEST CONDITIONS AND RESULTS.....31**
 - 7.1. CONDUCTED POWER RESULTS31
 - 1.1. STAND-ALONE SAR TEST EVALUATION42
 - 1.2. SAR MEASUREMENT RESULTS46
 - 7.2. MULTIPLE TRANSMITTER EVALUATION.....52
- APPENDIX A: DETAILED SYSTEM CHECK RESULTS53**
- APPENDIX B: DETAILED TEST RESULTS58**
- APPENDIX C: CALIBRATION CERTIFICATE.....70**
- APPENDIX D: PHOTOGRAPHS97**





1. TEST STANDARDS AND TEST DESCRIPTION

1.1. Statement of Compliance

The maximum of results of SAR found during testing for VenusLiv V2 are follows:

<Highest Reported standalone SAR Summary>

| Class/Class | Frequency Band | Body (Report SAR1-g (W/kg) (Separation Distance 0mm) | Body (Report SAR1-g (W/kg) (Separation Distance 0mm) ANT1 | Body (Report SAR1-g (W/kg) (Separation Distance 0mm) ANT2 |
|-------------|----------------|--|---|---|
| | | | | |
| DTS | WLAN 2.4G | / | 0.399 | 0.332 |
| NII | WLAN 5.2G | / | 0.216 | 0.201 |
| | WLAN 5.3G | / | 0.238 | 0.231 |
| | WLAN 5.5G | / | 0.169 | 0.112 |
| | WLAN 5.8G | / | 0.168 | 0.145 |
| DTS | BT | 0.319 | / | / |

Note

1) This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013.

<Highest Reported simultaneous SAR Summary>

| Exposure Position | Frequency Band | Body (Report SAR _{1-g} (W/kg) | Highest Reported Simultaneous Transmission SAR _{1-g} (W/kg) |
|-------------------|----------------|--|--|
| Body | WLAN 2.4G ANT1 | 0.399 | 1.050 |
| | WLAN 2.4G ANT2 | 0.332 | |
| | BT | 0.319 | |



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Scan code to check authenticity



1.2. Test Location

Company: Shenzhen LCS Compliance Testing Laboratory Ltd.
 Address: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
 Telephone: (86)755-82591330
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 Web: www.LCS-cert.com
 E-mail: webmaster@LCS-cert.com

1.3. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

Site Description
 SAR Lab. : NVLAP Accreditation Code is 600167-0.
 FCC Designation Number is CN5024.
 CAB identifier is CN0071.
 CNAS Registration Number is L4595.
 Test Firm Registration Number: 254912.

1.4. Test Laboratory Environment

| | |
|---|---------------------------|
| Temperature | Min. = 18°C, Max. = 25 °C |
| Relative humidity | Min. = 30%, Max. = 70% |
| Ground system resistance | < 0.5 Ω |
| Atmospheric pressure: | 950-1050mbar |
| Ambient noise is checked and found very low and in compliance with requirement of standards. | |
| Reflection of surrounding objects is minimized and in compliance with requirement of standards. | |





1.5. Product Description

The **Shenzhen Hollyland Technology Co.,Ltd** 's Model: VenusLiv V2 or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

| | |
|---------------------|--|
| EUT | : Hollyland VenusLiv V2 All-in-one Streaming Camera |
| Test Model | : VenusLiv V2 |
| Power Supply | : DC 7.4V by Rechargeable Li-ion Battery, 4000mAh |
| Hardware Version | : V18 |
| Software Version | : V2.1.0.23 |
| Bluetooth | : |
| Frequency Range | : 2402MHz~2480MHz |
| Channel Number | : 79 channels for Bluetooth V5.1(DSS) 40 channels for Bluetooth V5.1 (DTS) |
| Channel Spacing | : 1MHz for Bluetooth V5.1 (DSS) 2MHz for Bluetooth V5.1 (DTS) |
| Modulation Type | : GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V5.1(DSS) GFSK for Bluetooth V5.1 (DTS) |
| Bluetooth Version | : V5.1 |
| Antenna Description | : Chip antenna, 2.71dBi(Max.) |
| WIFI(2.4G Band) | : |
| Frequency Range | : 2412MHz~2462MHz |
| Channel Spacing | : 5MHz |
| Channel Number | : 11 Channels for 20MHz bandwidth (2412~2462MHz) 7 Channels for 40MHz bandwidth (2422~2452MHz) |
| Modulation Type | : IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) |
| Antenna Description | : ANT1:Dipole Antenna, 3.47dBi(Max.) ANT2:Dipole Antenna, 3.47dBi(Max.) |
| WIFI(5.2G Band) | : |
| Frequency Range | : 5180MHz~5240MHz |
| Channel Number | : 4 Channels for 20MHz bandwidth(5180MHz~5240MHz) 2 channels for 40MHz bandwidth(5190MHz~5230MHz) 1 channels for 80MHz bandwidth(5210MHz) |
| Modulation Type | : IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK) |
| Antenna Description | : ANT1:Dipole Antenna, 3.79dBi(Max.) ANT2:Dipole Antenna, 3.79dBi(Max.) |
| WIFI(5.3G Band) | : |
| Frequency Range | : 5260MHz~5320MHz |
| Channel Number | : 4 Channels for 20MHz bandwidth(5260MHz~5320MHz) 2 channels for 40MHz bandwidth(5270MHz~5310MHz) 1 channels for 80MHz bandwidth(5290MHz) |





Modulation Type : IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)

Antenna Description : ANT1:Dipole Antenna, 3.79dBi(Max.)
ANT2:Dipole Antenna, 3.79dBi(Max.)

WIFI(5.5G Band) :

Frequency Range : 5500MHz~5700MHz

Channel Number : 11 Channels for 20MHz bandwidth(5500MHz~5700MHz)
5 Channels for 40MHz bandwidth(5510MHz~5670MHz)
2 Channels for 80MHz bandwidth(5530MHz, 5610MHz)

Modulation Type : IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)

Antenna Description : ANT1:Dipole Antenna, 3.79dBi(Max.)
ANT2:Dipole Antenna, 3.79dBi(Max.)

WIFI(5.8G Band) :

Frequency Range : 5745MHz~5825MHz

Channel Number : 5 channels for 20MHz bandwidth(5745MHz~5825MHz)
2 channels for 40MHz bandwidth(5755MHz~5795MHz)
1 channels for 80MHz bandwidth(5775MHz)

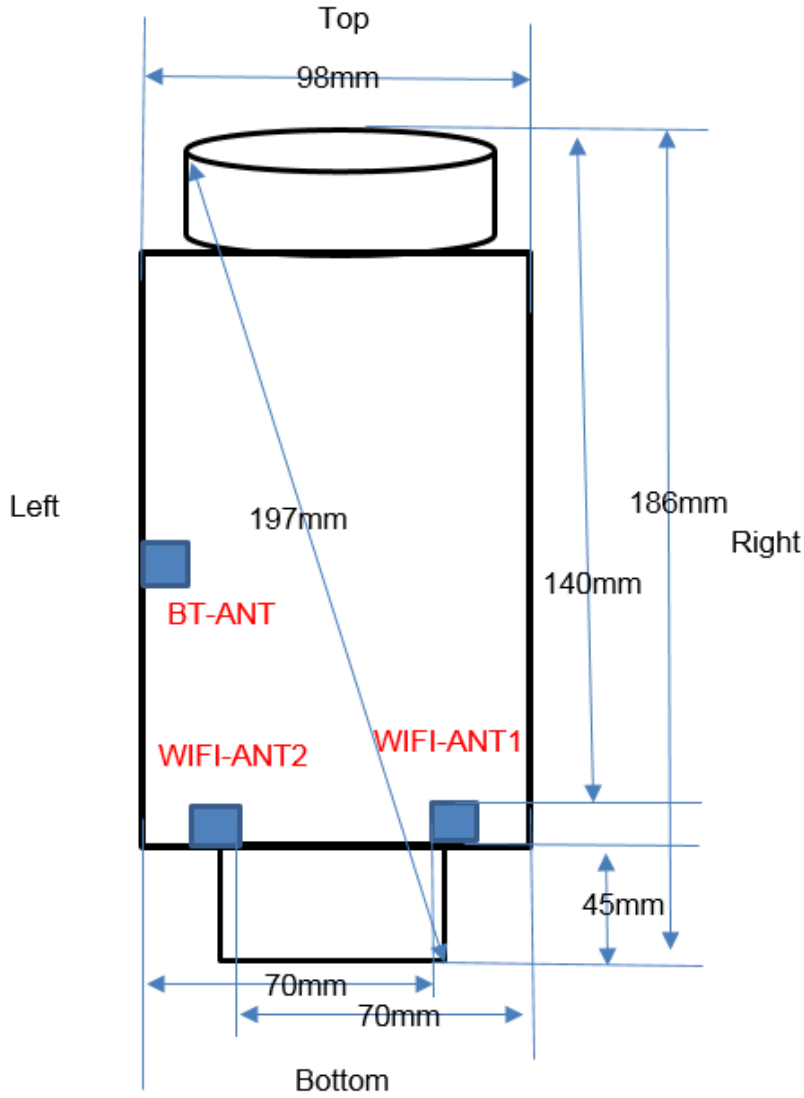
Modulation Type : IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)

Antenna Description : ANT1:Dipole Antenna, 3.52dBi(Max.)
ANT2:Dipole Antenna, 3.52dBi(Max.)

Exposure category : Uncontrolled Environment General Population



1.6. DUT Antenna Locations(Rear View)



| Distance from the antenna to the EUT edge(mm) | | | | | | |
|---|-------|------|------|-------|-----|--------|
| Mode | Front | Back | Left | Right | Top | Bottom |
| WIFI ANT1 | 5 | 5 | 70 | 5 | 140 | 45 |
| WIFI ANT2 | 5 | 5 | 5 | 70 | 140 | 45 |
| BT ANT | 5 | 5 | 5 | 95 | 105 | 78 |





1.7. Test Specification

| Identity | Document Title |
|----------------------|---|
| FCC 47CFR §2.1093 | Radiofrequency Radiation Exposure Evaluation: Portable Devices |
| ANSI/IEEE C95.1-2019 | IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz. |
| IEEE 1528-2013 | Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques |
| KDB 248227 D01 | SAR Guidance for IEEE 802 11 Wi-Fi SAR v02r02 |
| KDB 447498 D01 | General RF Exposure Guidance v06 |
| KDB 865664 D01 | SAR Measurement 100 MHz to 6 GHz v01r04 |
| KDB 865664 D02 | RF Exposure Reporting v01r02 |





1.8. RF exposure limits

| Human Exposure | Uncontrolled Environment General Population | Controlled Environment Occupational |
|--|--|--|
| Spatial Peak SAR* (Brain*Trunk) | 1.60 mW/g | 8.00 mW/g |
| Spatial Average SAR** (Whole Body) | 0.08 mW/g | 0.40 mW/g |
| Spatial Peak SAR*** (Hands/Feet/Ankle/Wrist) | 4.00 mW/g | 20.00 mW/g |

Notes:

* The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time

** The Spatial Average value of the SAR averaged over the whole body.

*** The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation.)





1.9. Equipment list

| Test Platform | | SPEAG DASY5 Professional | | | | |
|-------------------------------------|--------------------------------------|---|-----------|---------------|------------------|-------------------------|
| Description | | SAR Test System (Frequency range 300MHz-6GHz) | | | | |
| Software Reference | | DASY52; SEMCAD X | | | | |
| Hardware Reference | | | | | | |
| Equipment | | Manufacturer | Model | Serial Number | Calibration Date | Due date of calibration |
| <input checked="" type="checkbox"/> | PC | Lenovo | NA | NA | NA | NA |
| <input checked="" type="checkbox"/> | Twin Phantom | SPEAG | SAM V5.0 | 1850 | NCR | NCR |
| <input checked="" type="checkbox"/> | ELI Phantom | SPEAG | ELI V6.0 | 2010 | NCR | NCR |
| <input checked="" type="checkbox"/> | DAE | SPEAG | DAE3 | 373 | 2024/1/3 | 2025/1/2 |
| <input checked="" type="checkbox"/> | E-Field Probe | SPEAG | EX3DV4 | 3805 | 2023/11/23 | 2024/11/22 |
| <input checked="" type="checkbox"/> | Validation Kits | SPEAG | D2450V2 | 808 | 2023/10/23 | 2026/10/22 |
| <input checked="" type="checkbox"/> | Validation Kits | SPEAG | D5GHzV2 | 1046 | 2023/10/23 | 2026/10/22 |
| <input checked="" type="checkbox"/> | Agilent Network Analyzer | Agilent | 8753E | SU38432944 | 2023/6/9 | 2024/6/8 |
| <input checked="" type="checkbox"/> | Dielectric Probe Kit | SPEAG | DAK3.5 | 1425 | NCR | NCR |
| <input checked="" type="checkbox"/> | Universal Radio Communication Tester | R&S | CMW500 | 42115 | 2023/10/29 | 2024/10/28 |
| <input checked="" type="checkbox"/> | Directional Coupler | MCLI/USA | 4426-20 | 03746 | 2023/6/9 | 2024/6/8 |
| <input checked="" type="checkbox"/> | Power meter | Agilent | E4419B | MY45104493 | 2023/10/29 | 2024/10/28 |
| <input checked="" type="checkbox"/> | Power meter | Agilent | E4419B | MY45100308 | 2023/10/29 | 2024/10/28 |
| <input checked="" type="checkbox"/> | Power sensor | Agilent | E9301H | MY41495616 | 2023/10/29 | 2024/10/28 |
| <input checked="" type="checkbox"/> | Power sensor | Agilent | E9301H | MY41495234 | 2023/10/29 | 2024/10/28 |
| <input checked="" type="checkbox"/> | Signal Generator | Agilent | E4438C | MY49072627 | 2023/6/9 | 2024/6/8 |
| <input checked="" type="checkbox"/> | Broadband Preamplifier | / | BP-01M18G | P190501 | 2023/6/15 | 2024/6/14 |
| <input checked="" type="checkbox"/> | DC POWER SUPPLY | I-SHENG | SP-504 | NA | NCR | NCR |
| <input checked="" type="checkbox"/> | Speed reading thermometer | HTC-1 | NA | LCS-E-138 | 2023/6/13 | 2024/6/12 |

Note: All the equipments are within the valid period when the tests are performed.



2. SAR MEASUREMENTS SYSTEM CONFIGURATION

2.1. SAR Measurement System

This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY5 professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation $SAR = \sigma (|E|)^2 / \rho$ where σ and ρ are the conductivity and mass density of the tissue-Simulate.

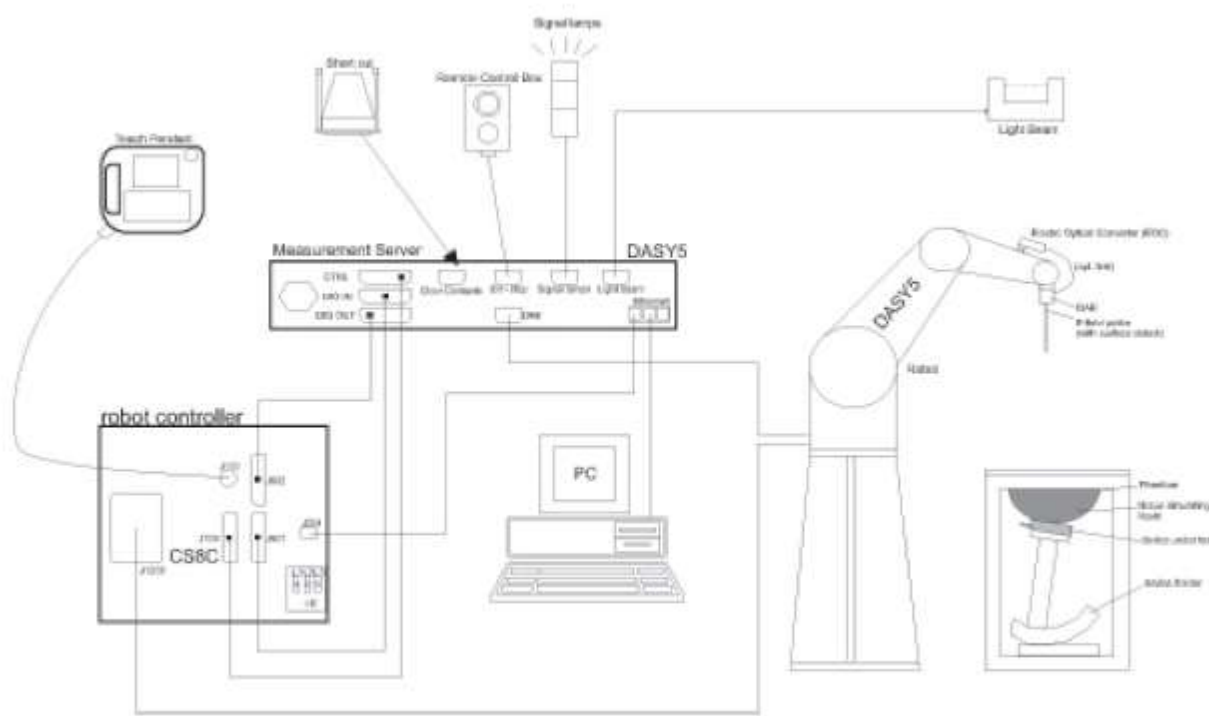
The DASY5 system for performing compliance tests consists of the following items:

A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software .An arm extension for accommodation the data acquisition electronics (DAE).

A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.



F-1. SAR Measurement System Configuration






- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 7.
- DASY5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand, right-hand and Body Worn usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validating the proper functioning of the system.

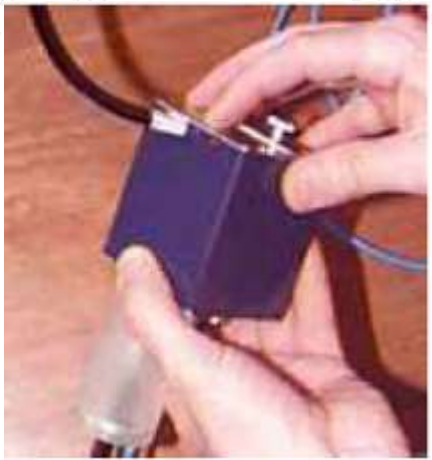


2.2. Isotropic E-field Probe EX3DV4

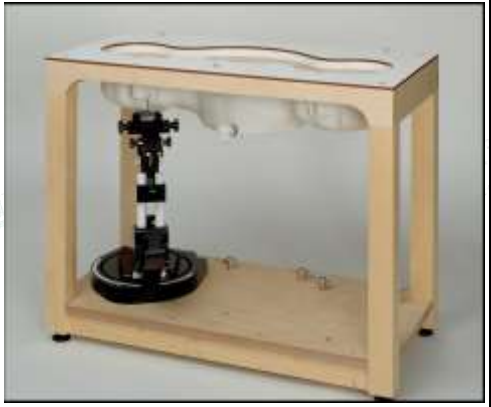
| | |
|---|--|
|  | <p>Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)</p> |
| <p>Calibration</p> | <p>ISO/IEC 17025 calibration service available.</p> |
| <p>Frequency</p> | <p>10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)</p> |
| <p>Directivity</p> | <p>± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)</p> |
| <p>Dynamic Range</p> | <p>10 μW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μW/g)</p> |
| <p>Dimensions</p> | <p>Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm</p> |
| <p>Application</p> | <p>High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.</p> |
| <p>Compatibility</p> | <p>DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI</p> |



2.3. Data Acquisition Electronics (DAE)

| | | |
|-----------------------------|--|--|
| Model | DAE |  |
| Construction | Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop. | |
| Measurement Range | -100 to +300 mV (16 bit resolution and two range settings: 4mV,400mV) | |
| Input Offset Voltage | < 5µV (with auto zero) | |
| Input Bias Current | < 50 f A | |
| Dimensions | 60 x 60 x 68 mm | |

2.4. SAM Twin Phantom


| | | |
|--|---|---|
| Material | Vinylester, glass fiber reinforced (VE-GF) |  |
| Liquid Compatibility | Compatible with all SPEAG tissue simulating liquids (incl. DGBE type) | |
| Shell Thickness | 2 ± 0.2 mm (6 ± 0.2 mm at ear point) | |
| Dimensions (incl. Wooden Support) | Length: 1000 mm Width: 500 mm Height: adjustable feet | |
| Filling Volume | approx. 25 liters | |
| Wooden Support | SPEAG standard phantom table | |

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.



2.5. ELI Phantom

| | | |
|-----------------------------|---|--|
| Material | Vinylester, glass fiber reinforced (VE-GF) |  |
| Liquid Compatibility | Compatible with all SPEAG tissue simulating liquids (incl. DGBE type) | |
| Shell Thickness | 2.0 ± 0.2 mm (bottom plate) | |
| Dimensions | Major axis: 600 mm Minor axis: 400 mm | |
| Filling Volume | approx. 30 liters | |
| Wooden Support | SPEAG standard phantom table | |

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.

ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure.



2.6. Device Holder for Transmitters



F-2. Device Holder for Transmitters

- The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centres for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.
- The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity $\epsilon=3$ and loss tangent $\delta=0.02$. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.



2.7. Measurement procedure

2.7.1. Scanning procedure

Step 1: Power reference measurement

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure.

Step 2: Area scan

The SAR distribution at the exposed side of the head was measured at a distance of 4mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm*15mm or 12mm*12mm or 10mm*10mm. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

Step 3: Zoom scan

Around this point, a volume of 32mm*32mm*30mm ($f \leq 2\text{GHz}$), 30mm*30mm*30mm (f for 2-3GHz) and 24mm*24mm*22mm (f for 5-6GHz) was assessed by measuring 5x5x7 points ($f \leq 2\text{GHz}$), 7x7x7 points (f for 2-3GHz) and 7x7x12 points (f for 5-6GHz). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

The data at the surface was extrapolated, since the centre of the dipoles is 2.0mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. (This can be variable. Refer to the probe specification). The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The volume was integrated with the trapezoidal algorithm. One thousand points were interpolated to calculate the average. All neighbouring volumes were evaluated until no neighboring volume with a higher average value was found.

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements. Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std. 1528-2013.



| | | ≤ 3 GHz | > 3 GHz |
|--|------------------------------------|---|---|
| Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface | | 5 ± 1 mm | $\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm |
| Maximum probe angle from probe axis to phantom surface normal at the measurement location | | 30° ± 1° | 20° ± 1° |
| Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area} | | ≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm | 3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm |
| | | When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device. | |
| Maximum zoom scan spatial resolution: Δx_{Zoom} , Δy_{Zoom} | | ≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm* | 3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm* |
| Maximum zoom scan spatial resolution, normal to phantom surface | uniform grid: $\Delta z_{Zoom}(n)$ | ≤ 5 mm | 3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm |
| | graded grid | $\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface | ≤ 4 mm 3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm |
| | | $\Delta z_{Zoom}(n>1)$: between subsequent points | ≤ 1.5 · $\Delta z_{Zoom}(n-1)$ |
| Minimum zoom scan volume | x, y, z | ≥ 30 mm | 3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm |

Step 4: Power reference measurement (drift)

The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The indicated drift is mainly the variation of the DUT’s output power and should vary max. ± 5 %

2.7.2. Data Storage

The DASY software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension “.DAE4”. The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated. The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [m W/g], [m W/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.



2.7.3. Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

| | | |
|---------------------------|----------------|----------------------|
| Probe parameters: | - Sensitivity | Normi, ai0, ai1, ai2 |
| - Conversion factor | ConvFi | |
| - Diode compression point | Dcpi | |
| Device parameters: | - Frequency | f |
| - Crest factor | cf | |
| Media parameters: | - Conductivity | ϵ |
| - Density | ρ | |

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf / dcp_i$$

With V_i = compensated signal of channel i ($i = x, y, z$)

U_i = input signal of channel i ($i = x, y, z$)

cf = crest factor of exciting field (DASY parameter)

dcp i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes:

$$E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$$



H-field probes:

$$H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1}f + a_{i2}f^2) / f$$

With V_i = compensated signal of channel i ($i = x, y, z$)

N_{ormi} = sensor sensitivity of channel i ($i = x, y, z$)

[mV/(V/m)²] for E-field Probes

ConvF = sensitivity enhancement in solution

a_{ij} = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

E_i = electric field strength of channel i in V/m

H_i = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_x^2 + E_y^2 + E_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (E_{tot}^2 \cdot \sigma) / (\epsilon \cdot 1000)$$

with SAR = local specific absorption rate in mW/g

E_{tot} = total field strength in V/m

σ = conductivity in [mho/m] or [Siemens/m]

ϵ = equivalent tissue density in g/cm³

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \quad \text{or} \quad P_{pwe} = H_{tot}^2 \cdot 37.7$$

with P_{pwe} = equivalent power density of a plane wave in mW/cm²

E_{tot} = total electric field strength in V/m

H_{tot} = total magnetic field strength in A/m





3. SAR measurement variability and uncertainty

3.1. SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

- 1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
- 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

3.2. SAR measurement uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.





4. Description of Test Position

4.1. Test Positions Configuration

Per FCC KDB616217 D04, The required minimum test separation distance for incorporating transmitters and antennas into laptop, notebook and netbook computer displays is determined with the display screen opened at an angle of 90° to the keyboard compartment. If a computer has other operating configurations that require a different or more conservative display to keyboard angle for normal use, a KDB inquiry should be submitted to determine the test requirements. When antennas are incorporated in the keyboard section of a laptop computer, SAR is required for the bottom surface of the keyboard.

Provided tablet use conditions are not supported by the laptop computer, SAR tests for bystander exposure from the edges of the keyboard and display screen of laptop computers are generally not required. However, when edge testing is necessary, the similar concerns for simultaneous transmission on adjacent or multiple edges described for tablets also apply.

For this device, the transmit antenna are located at the screen section.

Body operating configurations are tested with the device bottom side positioned against a flat phantom with test separation distance of 0mm in a normal use configuration.





5. SAR System Verification Procedure

5.1. Tissue Simulate Liquid

5.1.1. Recipes for Tissue Simulate Liquid

The following tables give the recipes for tissue simulating liquids to be used in different frequency bands:

| Ingredients (% by weight) | Frequency (MHz) | | | | |
|---|-----------------|---------|-----------------------------|-----------|-----------|
| | 450 | 700-900 | 1750-2000 | 2300-2500 | 2500-2700 |
| Water | 38.56 | 40.30 | 55.24 | 55.00 | 54.92 |
| Salt (NaCl) | 3.95 | 1.38 | 0.31 | 0.2 | 0.23 |
| Sucrose | 56.32 | 57.90 | 0 | 0 | 0 |
| HEC | 0.98 | 0.24 | 0 | 0 | 0 |
| Bactericide | 0.19 | 0.18 | 0 | 0 | 0 |
| Tween | 0 | 0 | 44.45 | 44.80 | 44.85 |
| Salt: 99+% Pure Sodium Chloride | | | Sucrose: 98+% Pure Sucrose | | |
| Water: De-ionized, 16 MΩ+ resistivity | | | HEC: Hydroxyethyl Cellulose | | |
| Tween: Polyoxyethylene (20) sorbitan monolaurate | | | | | |
| HSL5GHz is composed of the following ingredients: | | | | | |
| Water: 50-65% | | | | | |
| Mineral oil: 10-30% | | | | | |
| Emulsifiers: 8-25% | | | | | |
| Sodium salt: 0-1.5% | | | | | |

Table 1: Recipe of Tissue Simulate Liquid





5.1.2. Measurement for Tissue Simulate Liquid

The dielectric properties for this Tissue Simulate Liquids were measured by using the DAKS. The Conductivity (σ) and Permittivity (ρ) are listed in bellow table. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was $22\pm 2^{\circ}\text{C}$.

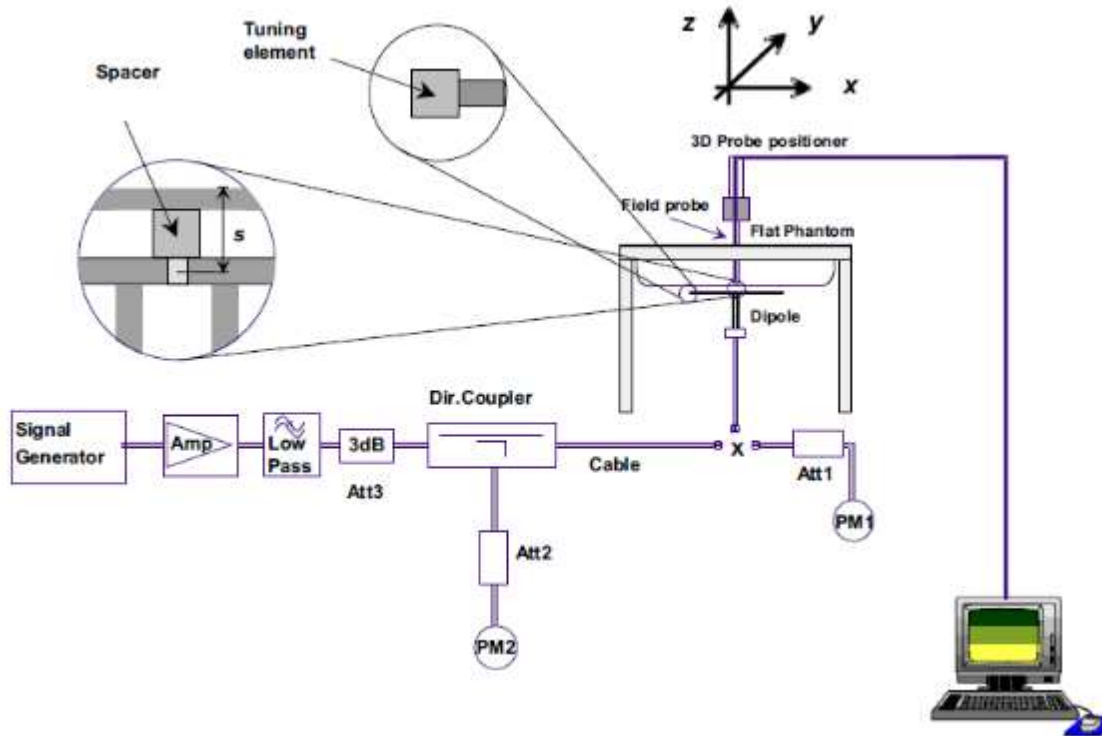
| Tissue Type | Measured Frequency (MHz) | Target Tissue ($\pm 5\%$) | | Measured Tissue | | Liquid Temp. ($^{\circ}\text{C}$) | Measured Date |
|-------------|--------------------------|-----------------------------|----------------------|-----------------|----------------------|-------------------------------------|---------------|
| | | ϵ_r | $\sigma(\text{S/m})$ | ϵ_r | $\sigma(\text{S/m})$ | | |
| 2450 Head | 2450 | 39.2 (37.24~41.16) | 1.8 (1.71~1.89) | 37.999 | 1.855 | 22.4 | May 22, 2024 |
| 5250Head | 5250 | 36.0 (34.20~37.80) | 4.66 (4.43~4.89) | 35.778 | 4.803 | 22.7 | May 29, 2024 |
| 5600 Head | 5600 | 35.5 (33.73~37.28) | 5.07 (4.82~5.32) | 35.311 | 5.123 | 22.7 | May 29, 2024 |
| 5750 Head | 5750 | 35.3 (33.54~37.07) | 5.27 (5.01~5.53) | 35.344 | 5.252 | 22.7 | May 29, 2024 |

Table 2: Measurement result of Tissue electric parameters



5.2. SAR System Check

The microwave circuit arrangement for system Check is sketched in F-1. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the following table (A power level of 250mW (below 3GHz) or 100mW (3-6GHz) was input to the dipole antenna). During the tests, the ambient temperature of the laboratory was in the range $22\pm 2^{\circ}\text{C}$, the relative humidity was in the range 60% and the liquid depth above the ear reference points was above 15 ± 0.5 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



F-1. the microwave circuit arrangement used for SAR system check

5.2.1. Justification for Extended SAR Dipole Calibrations

1) Referring to KDB865664 D01 requirements for dipole calibration, instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.

- There is no physical damage on the dipole;
- System check with specific dipole is within 10% of calibrated value;
- Return-loss is within 20% of calibrated measurement;
- Impedance is within 5Ω from the previous measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.





5.2.2. Summary System Check Result(s)

| Validation Kit | | Measured SAR 250mW | Measured SAR 250mW | Measured SAR (normalized to 1W) | Measured SAR (normalized to 1W) | Target SAR (normalized to 1W) (±10%) | Target SAR (normalized to 1W) (±10%) | Liquid Temp. (°C) | Measured Date |
|----------------|-------------------|-----------------------|-----------------------|---------------------------------------|---------------------------------------|---|---|-------------------------|------------------|
| | | 1g (W/kg) | 10g (W/kg) | 1g (W/kg) | 10g (W/kg) | 1-g(W/kg) | 10-g(W/kg) | | |
| D2450V2 | Head | 13.00 | 5.97 | 52.00 | 23.88 | 53.5 (48.15~58.85) | 24.8 (22.32~27.28) | 22.4 | May 22, 2024 |
| Validation Kit | | Measured SAR 100mW | Measured SAR 100mW | Measured SAR (normalized to 1W) | Measured SAR (normalized to 1W) | Target SAR (normalized to 1W) (±10%) | Target SAR (normalized to 1W) (±10%) | Liquid Temp. (°C) | Measured Date |
| | | 1g (W/kg) | 10g (W/kg) | 1g (W/kg) | 10g (W/kg) | 1-g(W/kg) | 10-g(W/kg) | | |
| D5GHzV2 | Head (5.25GHz) | 7.89 | 2.31 | 78.90 | 23.10 | 78.1 (70.29~85.91) | 22.2 (19.98~24.42) | 22.7 | May 29, 2024 |
| | Head (5.6GHz) | 8.30 | 2.30 | 83.00 | 23.00 | 81.9 (73.71~90.09) | 23.1 (20.79~25.41) | 22.7 | May 29, 2024 |
| | Head (5.75GHz) | 8.05 | 2.21 | 80.50 | 22.10 | 77.4 (69.66~85.14) | 21.6 (19.44~23.76) | 22.7 | May 29, 2024 |

Table 3: Please see the Appendix A





6. SAR measurement procedure

The measurement procedures are as follows:

6.1. Conducted power measurement

- a. For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously Transmission, at maximum RF power in each supported wireless interface and frequency band.
- b. Connect EUT RF port through RF cable to the power meter, and measure WLAN/BT output power.

6.2. Power Reduction

The product without any power reduction.

6.3. Power Drift

To control the output power stability during the SAR test, SAR system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. This ensures that the power drift during one measurement is within $\pm 0.2\text{dB}$.





7. TEST CONDITIONS AND RESULTS

7.1. Conducted Power Results

According KDB 447498 D01 General RF Exposure Guidance v06 Section 4.1 2) states that "Unless it is specified differently in the published RF exposure KDB procedures, these requirements also apply to test reduction and test exclusion considerations. Time-averaged maximum conducted output power applies to SAR and, as required by § 2.1091(c), time-averaged ERP applies to MPE.

7.1.1. Conducted Power Measurement Results(WIFI 2.4G)

| Test Mode | Antenna | Freq(MHz) | Conducted Power (dBm) | Tune up (dBm) |
|-----------|---------|-----------|-----------------------|---------------|
| 11B | Ant1 | 2412 | 12.907 | 13.00 |
| | | 2437 | 12.151 | 13.00 |
| | | 2462 | 15.452 | 16.00 |
| 11G | Ant1 | 2412 | 14.323 | 15.00 |
| | | 2437 | 12.558 | 13.00 |
| | | 2462 | 16.033 | 17.00 |
| 11N20SISO | Ant1 | 2412 | 11.197 | 12.00 |
| | | 2437 | 9.465 | 10.00 |
| | | 2462 | 13.004 | 14.00 |
| 11N40SISO | Ant1 | 2422 | 8.136 | 9.00 |
| | | 2437 | 8.415 | 9.00 |
| | | 2452 | 10.237 | 11.00 |

| Test Mode | Antenna | Freq(MHz) | Conducted Power (dBm) | Tune up (dBm) |
|-----------|---------|-----------|-----------------------|---------------|
| 11B | Ant2 | 2412 | 13.83 | 14.00 |
| | | 2437 | 13.96 | 14.00 |
| | | 2462 | 14.015 | 14.50 |
| 11G | Ant2 | 2412 | 14.066 | 14.50 |
| | | 2437 | 13.936 | 14.00 |
| | | 2462 | 14.339 | 15.00 |
| 11N20SISO | Ant2 | 2412 | 10.944 | 11.00 |
| | | 2437 | 10.788 | 11.00 |
| | | 2462 | 11.113 | 12.00 |
| 11N40SISO | Ant2 | 2422 | 8.939 | 9.00 |
| | | 2437 | 8.969 | 9.00 |
| | | 2452 | 9.07 | 10.00 |

MIMO

| Condition | Mode | Frequency (MHz) | Total Power (dBm) | | | Tune up (dBm) |
|-----------|------|-----------------|-------------------|--------|-----------|---------------|
| | | | ANT1 | ANT2 | ANT1+ANT2 | |
| NVNT | n20 | 2412 | 11.197 | 10.944 | 14.08 | 15.00 |
| NVNT | n20 | 2437 | 9.465 | 10.788 | 13.19 | 14.00 |
| NVNT | n20 | 2462 | 13.004 | 11.113 | 15.17 | 16.00 |
| NVNT | n40 | 2422 | 8.136 | 8.939 | 11.57 | 12.00 |
| NVNT | n40 | 2437 | 8.415 | 8.969 | 11.71 | 12.00 |
| NVNT | n40 | 2452 | 10.237 | 9.07 | 12.70 | 13.00 |



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Scan code to check authenticity



Note:

- a) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.
- b) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.
- 1) When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.
- 2) When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.
- c) For each transmission mode configuration, power must be measured for the highest and lowest channels; and at the mid-band channel(s) when there are at least 3 channels. For configurations with multiple mid-band channels, due to an even number of channels, both channels should be measured.





7.1.2. Conducted Power Measurement Results(WIFI 5.2G)

| Condition | Mode | Frequency (MHz) | Antenna | Conducted Power (dBm) | Tune up (dBm) |
|-----------|------|-----------------|---------|-----------------------|---------------|
| NVNT | a | 5180 | Ant1 | 13.201 | 14.00 |
| NVNT | a | 5200 | Ant1 | 11.352 | 12.00 |
| NVNT | a | 5240 | Ant1 | 11.936 | 12.00 |
| NVNT | n20 | 5180 | Ant1 | 13.885 | 14.00 |
| NVNT | n20 | 5200 | Ant1 | 14.017 | 14.50 |
| NVNT | n20 | 5240 | Ant1 | 13.768 | 14.00 |
| NVNT | n40 | 5190 | Ant1 | 14.327 | 15.00 |
| NVNT | n40 | 5230 | Ant1 | 13.958 | 14.00 |
| NVNT | ac20 | 5180 | Ant1 | 13.727 | 14.00 |
| NVNT | ac20 | 5200 | Ant1 | 14.032 | 14.50 |
| NVNT | ac20 | 5240 | Ant1 | 13.72 | 14.00 |
| NVNT | ac40 | 5190 | Ant1 | 14.297 | 15.00 |
| NVNT | ac40 | 5230 | Ant1 | 13.835 | 14.00 |
| NVNT | ac80 | 5210 | Ant1 | 14.142 | 14.00 |

| Condition | Mode | Frequency (MHz) | Antenna | Conducted Power (dBm) | Tune up (dBm) |
|-----------|------|-----------------|---------|-----------------------|---------------|
| NVNT | a | 5180 | Ant2 | 12.213 | 13.00 |
| NVNT | a | 5200 | Ant2 | 13.626 | 14.00 |
| NVNT | a | 5240 | Ant2 | 13.626 | 14.00 |
| NVNT | n20 | 5180 | Ant2 | 11.915 | 12.00 |
| NVNT | n20 | 5200 | Ant2 | 13.19 | 14.00 |
| NVNT | n20 | 5240 | Ant2 | 14.164 | 15.00 |
| NVNT | n40 | 5190 | Ant2 | 10.574 | 11.00 |
| NVNT | n40 | 5230 | Ant2 | 13.367 | 14.00 |
| NVNT | ac20 | 5180 | Ant2 | 10.287 | 11.00 |
| NVNT | ac20 | 5200 | Ant2 | 11.157 | 12.00 |
| NVNT | ac20 | 5240 | Ant2 | 13.197 | 14.00 |
| NVNT | ac40 | 5190 | Ant2 | 10.618 | 11.00 |
| NVNT | ac40 | 5230 | Ant2 | 13.409 | 14.00 |
| NVNT | ac80 | 5210 | Ant2 | 12.295 | 13.00 |

MIMO

| Condition | Mode | Frequency (MHz) | Antenna | | Total Power (dBm) | Tune Up (dBm) |
|-----------|------|-----------------|---------|--------|-------------------|---------------|
| | | | Ant1 | Ant2 | | |
| NVNT | n20 | 5180 | 13.885 | 11.915 | 16.021 | 17.00 |
| NVNT | n20 | 5200 | 14.017 | 13.19 | 16.633 | 17.00 |
| NVNT | n20 | 5240 | 13.768 | 14.164 | 16.981 | 17.00 |
| NVNT | n40 | 5190 | 14.327 | 10.574 | 15.854 | 16.00 |
| NVNT | n40 | 5230 | 13.958 | 13.367 | 16.683 | 17.00 |
| NVNT | ac20 | 5180 | 13.727 | 10.287 | 15.349 | 16.00 |
| NVNT | ac20 | 5200 | 14.032 | 11.157 | 15.838 | 16.00 |
| NVNT | ac20 | 5240 | 13.72 | 13.197 | 16.477 | 17.00 |
| NVNT | ac40 | 5190 | 14.297 | 10.618 | 15.846 | 16.00 |



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| | | | | | | |
|------|------|------|--------|--------|--------|-------|
| NVNT | ac40 | 5230 | 13.835 | 13.409 | 16.638 | 17.00 |
| NVNT | ac80 | 5210 | 14.142 | 12.295 | 16.326 | 17.00 |

Note:

- a) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.
- b) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.
 - 1) When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.
 - 2) When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.
- c) For each transmission mode configuration, power must be measured for the highest and lowest channels; and at the mid-band channel(s) when there are at least 3 channels. For configurations with multiple mid-band channels, due to an even number of channels, both channels should be measured.



**7.1.3. Conducted Power Measurement Results(WIFI 5.3G)**

| Condition | Mode | Frequency (MHz) | Antenna | Conducted Power (dBm) | Tune Up (dBm) |
|-----------|------|-----------------|---------|-----------------------|---------------|
| NVNT | a | 5260 | Ant1 | 11.727 | 12.00 |
| NVNT | a | 5300 | Ant1 | 13.089 | 14.00 |
| NVNT | a | 5320 | Ant1 | 13.457 | 14.00 |
| NVNT | n20 | 5260 | Ant1 | 13.696 | 14.00 |
| NVNT | n20 | 5300 | Ant1 | 14.336 | 15.00 |
| NVNT | n20 | 5320 | Ant1 | 14.4 | 15.00 |
| NVNT | n40 | 5270 | Ant1 | 14.328 | 15.00 |
| NVNT | n40 | 5310 | Ant1 | 14.433 | 15.00 |
| NVNT | ac20 | 5260 | Ant1 | 13.497 | 14.00 |
| NVNT | ac20 | 5300 | Ant1 | 14.115 | 15.00 |
| NVNT | ac20 | 5320 | Ant1 | 14.069 | 15.00 |
| NVNT | ac40 | 5270 | Ant1 | 14.191 | 15.00 |
| NVNT | ac40 | 5310 | Ant1 | 14.448 | 15.00 |
| NVNT | ac80 | 5290 | Ant1 | 14.47 | 15.00 |

| Condition | Mode | Frequency (MHz) | Antenna | Conducted Power (dBm) | Tune Up (dBm) |
|-----------|------|-----------------|---------|-----------------------|---------------|
| NVNT | a | 5260 | Ant2 | 12.399 | 13.00 |
| NVNT | a | 5300 | Ant2 | 14.291 | 15.00 |
| NVNT | a | 5320 | Ant2 | 12.389 | 13.00 |
| NVNT | n20 | 5260 | Ant2 | 11.735 | 12.00 |
| NVNT | n20 | 5300 | Ant2 | 14.233 | 14.50 |
| NVNT | n20 | 5320 | Ant2 | 12.759 | 13.00 |
| NVNT | n40 | 5270 | Ant2 | 12.421 | 13.00 |
| NVNT | n40 | 5310 | Ant2 | 12.551 | 13.00 |
| NVNT | ac20 | 5260 | Ant2 | 10.885 | 11.00 |
| NVNT | ac20 | 5300 | Ant2 | 13.077 | 14.00 |
| NVNT | ac20 | 5320 | Ant2 | 11.641 | 12.00 |
| NVNT | ac40 | 5270 | Ant2 | 12.345 | 13.00 |
| NVNT | ac40 | 5310 | Ant2 | 12.54 | 13.00 |
| NVNT | ac80 | 5290 | Ant2 | 12.946 | 13.00 |

MIMO

| Condition | Mode | Frequency (MHz) | Antenna | | Total Power (dBm) | Tune Up (dBm) |
|-----------|------|-----------------|---------|--------|-------------------|---------------|
| | | | Ant1 | Ant2 | | |
| NVNT | n20 | 5260 | 13.696 | 11.735 | 15.836 | 16.00 |
| NVNT | n20 | 5300 | 14.336 | 14.233 | 17.295 | 18.00 |
| NVNT | n20 | 5320 | 14.4 | 12.759 | 16.667 | 17.00 |
| NVNT | n40 | 5270 | 14.328 | 12.421 | 16.489 | 17.00 |
| NVNT | n40 | 5310 | 14.433 | 12.551 | 16.603 | 17.00 |
| NVNT | ac20 | 5260 | 13.497 | 10.885 | 15.395 | 16.00 |
| NVNT | ac20 | 5300 | 14.115 | 13.077 | 16.637 | 17.00 |
| NVNT | ac20 | 5320 | 14.069 | 11.641 | 16.033 | 17.00 |
| NVNT | ac40 | 5270 | 14.191 | 12.345 | 16.376 | 17.00 |
| NVNT | ac40 | 5310 | 14.448 | 12.54 | 16.608 | 17.00 |
| NVNT | ac80 | 5290 | 14.47 | 12.946 | 16.785 | 17.00 |

Note:



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- a) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.
- b) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.
- 1) When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.
- 2) When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.
- c) For each transmission mode configuration, power must be measured for the highest and lowest channels; and at the mid-band channel(s) when there are at least 3 channels. For configurations with multiple mid-band channels, due to an even number of channels, both channels should be measured.





7.1.4. Conducted Power Measurement Results(WIFI 5.5G)

| Condition | Mode | Frequency (MHz) | Antenna | Conducted Power (dBm) | Tune Up (dBm) |
|-----------|------|-----------------|---------|-----------------------|---------------|
| NVNT | a | 5500 | Ant1 | 14.074 | 15.00 |
| NVNT | a | 5580 | Ant1 | 13.415 | 14.00 |
| NVNT | a | 5700 | Ant1 | 12.552 | 13.00 |
| NVNT | n20 | 5500 | Ant1 | 14.362 | 15.00 |
| NVNT | n20 | 5580 | Ant1 | 14.21 | 15.00 |
| NVNT | n20 | 5700 | Ant1 | 14.191 | 15.00 |
| NVNT | n40 | 5510 | Ant1 | 14.771 | 15.00 |
| NVNT | n40 | 5550 | Ant1 | 14.546 | 15.00 |
| NVNT | n40 | 5670 | Ant1 | 14.241 | 15.00 |
| NVNT | ac20 | 5500 | Ant1 | 14.372 | 15.00 |
| NVNT | ac20 | 5580 | Ant1 | 14.278 | 15.00 |
| NVNT | ac20 | 5700 | Ant1 | 14.274 | 15.00 |
| NVNT | ac40 | 5510 | Ant1 | 14.634 | 15.00 |
| NVNT | ac40 | 5550 | Ant1 | 14.45 | 15.00 |
| NVNT | ac40 | 5670 | Ant1 | 14.179 | 15.00 |
| NVNT | ac80 | 5530 | Ant1 | 14.265 | 14.50 |
| NVNT | ac80 | 5610 | Ant1 | 14.435 | 15.00 |

| Condition | Mode | Frequency (MHz) | Antenna | Conducted Power (dBm) | Tune Up (dBm) |
|-----------|------|-----------------|---------|-----------------------|---------------|
| NVNT | a | 5500 | Ant2 | 13.305 | 14.00 |
| NVNT | a | 5580 | Ant2 | 13.727 | 14.00 |
| NVNT | a | 5700 | Ant2 | 14.773 | 15.00 |
| NVNT | n20 | 5500 | Ant2 | 12.464 | 13.00 |
| NVNT | n20 | 5580 | Ant2 | 12.151 | 13.00 |
| NVNT | n20 | 5700 | Ant2 | 14.425 | 14.50 |
| NVNT | n40 | 5510 | Ant2 | 13.104 | 14.00 |
| NVNT | n40 | 5550 | Ant2 | 13.396 | 14.00 |
| NVNT | n40 | 5670 | Ant2 | 12.738 | 13.00 |
| NVNT | ac20 | 5500 | Ant2 | 12.271 | 13.00 |
| NVNT | ac20 | 5580 | Ant2 | 12.021 | 13.00 |
| NVNT | ac20 | 5700 | Ant2 | 14.274 | 14.50 |
| NVNT | ac40 | 5510 | Ant2 | 13.155 | 14.00 |
| NVNT | ac40 | 5550 | Ant2 | 13.403 | 14.00 |
| NVNT | ac40 | 5670 | Ant2 | 12.77 | 13.00 |
| NVNT | ac80 | 5530 | Ant2 | 13.129 | 14.00 |
| NVNT | ac80 | 5610 | Ant2 | 13.929 | 14.00 |

MIMO

| Condition | Mode | Frequency (MHz) | Antenna | | Total Power (dBm) | Tune Up (dBm) |
|-----------|------|-----------------|---------|--------|-------------------|---------------|
| | | | Ant1 | Ant2 | | |
| NVNT | n20 | 5500 | 14.362 | 12.464 | 16.526 | 17.00 |
| NVNT | n20 | 5580 | 14.21 | 12.151 | 16.312 | 17.00 |
| NVNT | n20 | 5700 | 14.191 | 14.425 | 17.32 | 18.00 |
| NVNT | n40 | 5510 | 14.771 | 13.104 | 17.027 | 18.00 |
| NVNT | n40 | 5550 | 14.546 | 13.396 | 17.019 | 18.00 |
| NVNT | n40 | 5670 | 14.241 | 12.738 | 16.564 | 17.00 |





| | | | | | | |
|------|------|------|--------|--------|--------|-------|
| NVNT | ac20 | 5500 | 14.372 | 12.271 | 16.458 | 17.00 |
| NVNT | ac20 | 5580 | 14.278 | 12.021 | 16.305 | 17.00 |
| NVNT | ac20 | 5700 | 14.274 | 14.274 | 17.284 | 18.00 |
| NVNT | ac40 | 5510 | 14.634 | 13.155 | 16.967 | 17.00 |
| NVNT | ac40 | 5550 | 14.45 | 13.403 | 16.968 | 17.00 |
| NVNT | ac40 | 5670 | 14.179 | 12.77 | 16.542 | 17.00 |
| NVNT | ac80 | 5530 | 14.265 | 13.129 | 16.744 | 17.00 |
| NVNT | ac80 | 5610 | 14.435 | 13.929 | 17.2 | 18.00 |

Note:

- a) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.
- b) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.
 - 1) When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.
 - 2) When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.
- c) For each transmission mode configuration, power must be measured for the highest and lowest channels; and at the mid-band channel(s) when there are at least 3 channels. For configurations with multiple mid-band channels, due to an even number of channels, both channels should be measured.





7.1.5. Conducted Power Measurement Results(WIFI 5.8G)

| Condition | Mode | Frequency (MHz) | Antenna | Conducted Power (dBm) | Tune Up (dBm) |
|-----------|------|-----------------|---------|-----------------------|---------------|
| NVNT | a | 5745 | Ant1 | 14.206 | 15.00 |
| NVNT | a | 5785 | Ant1 | 15.811 | 16.00 |
| NVNT | a | 5825 | Ant1 | 14.039 | 15.00 |
| NVNT | n20 | 5745 | Ant1 | 14.529 | 15.00 |
| NVNT | n20 | 5785 | Ant1 | 14.069 | 15.00 |
| NVNT | n20 | 5825 | Ant1 | 13.908 | 14.00 |
| NVNT | n40 | 5755 | Ant1 | 14.908 | 15.00 |
| NVNT | n40 | 5795 | Ant1 | 14.323 | 15.00 |
| NVNT | ac20 | 5745 | Ant1 | 14.586 | 15.00 |
| NVNT | ac20 | 5785 | Ant1 | 13.964 | 14.00 |
| NVNT | ac20 | 5825 | Ant1 | 13.888 | 14.00 |
| NVNT | ac40 | 5755 | Ant1 | 14.835 | 15.00 |
| NVNT | ac40 | 5795 | Ant1 | 14.266 | 15.00 |
| NVNT | ac80 | 5775 | Ant1 | 14.792 | 15.00 |

| Condition | Mode | Frequency (MHz) | Antenna | Conducted Power (dBm) | Tune Up (dBm) |
|-----------|------|-----------------|---------|-----------------------|---------------|
| NVNT | a | 5745 | Ant2 | 13.067 | 14.00 |
| NVNT | a | 5785 | Ant2 | 14.305 | 15.00 |
| NVNT | a | 5825 | Ant2 | 13.305 | 14.00 |
| NVNT | n20 | 5745 | Ant2 | 12.617 | 13.00 |
| NVNT | n20 | 5785 | Ant2 | 16.258 | 17.00 |
| NVNT | n20 | 5825 | Ant2 | 13.31 | 14.00 |
| NVNT | n40 | 5755 | Ant2 | 13.808 | 14.00 |
| NVNT | n40 | 5795 | Ant2 | 15.804 | 16.00 |
| NVNT | ac20 | 5745 | Ant2 | 12.56 | 13.00 |
| NVNT | ac20 | 5785 | Ant2 | 16.183 | 16.50 |
| NVNT | ac20 | 5825 | Ant2 | 13.335 | 14.00 |
| NVNT | ac40 | 5755 | Ant2 | 13.756 | 14.00 |
| NVNT | ac40 | 5795 | Ant2 | 15.623 | 16.00 |
| NVNT | ac80 | 5775 | Ant2 | 15.233 | 16.00 |

MIMO

| Condition | Mode | Frequency (MHz) | Antenna | | Total Power (dBm) | Tune Up (dBm) |
|-----------|------|-----------------|---------|--------|-------------------|---------------|
| | | | Ant1 | Ant2 | | |
| NVNT | n20 | 5745 | 14.529 | 12.617 | 16.688 | 17.00 |
| NVNT | n20 | 5785 | 14.069 | 16.258 | 18.31 | 19.00 |
| NVNT | n20 | 5825 | 13.908 | 13.31 | 16.63 | 17.00 |
| NVNT | n40 | 5755 | 14.908 | 13.808 | 17.403 | 18.00 |
| NVNT | n40 | 5795 | 14.323 | 15.804 | 18.137 | 19.00 |
| NVNT | ac20 | 5745 | 14.586 | 12.56 | 16.7 | 17.00 |
| NVNT | ac20 | 5785 | 13.964 | 16.183 | 18.224 | 19.00 |
| NVNT | ac20 | 5825 | 13.888 | 13.335 | 16.631 | 17.00 |
| NVNT | ac40 | 5755 | 14.835 | 13.756 | 17.339 | 18.00 |
| NVNT | ac40 | 5795 | 14.266 | 15.623 | 18.008 | 19.00 |
| NVNT | ac80 | 5775 | 14.792 | 15.233 | 18.028 | 19.00 |

Note:



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- a) Power must be measured at each transmit antenna port according to the DSSS and OFDM transmission configurations in each standalone and aggregated frequency band.
- b) Power measurement is required for the transmission mode configuration with the highest maximum output power specified for production units.
- 1) When the same highest maximum output power specification applies to multiple transmission modes, the largest channel bandwidth configuration with the lowest order modulation and lowest data rate is measured.
- 2) When the same highest maximum output power is specified for multiple largest channel bandwidth configurations with the same lowest order modulation or lowest order modulation and lowest data rate, power measurement is required for all equivalent 802.11 configurations with the same maximum output power.
- c) For each transmission mode configuration, power must be measured for the highest and lowest channels; and at the mid-band channel(s) when there are at least 3 channels. For configurations with multiple mid-band channels, due to an even number of channels, both channels should be measured.



**7.1.6. Conducted Power Measurement Results(Bluetooth)**

| Condition | Mode | Frequency (MHz) | Antenna | Conducted Power (dBm) | Tune Up (dBm) |
|-----------|-------|-----------------|---------|-----------------------|---------------|
| NVNT | 1-DH5 | 2402 | Ant | 1.785 | 2.00 |
| NVNT | 1-DH5 | 2441 | Ant | 1.849 | 2.00 |
| NVNT | 1-DH5 | 2480 | Ant | 1.918 | 2.00 |
| NVNT | 2-DH5 | 2402 | Ant | 1.556 | 2.00 |
| NVNT | 2-DH5 | 2441 | Ant | 1.684 | 2.00 |
| NVNT | 2-DH5 | 2480 | Ant | 1.913 | 2.00 |
| NVNT | 3-DH5 | 2402 | Ant | 1.702 | 2.00 |
| NVNT | 3-DH5 | 2441 | Ant | 2 | 3.00 |
| NVNT | 3-DH5 | 2480 | Ant | 2.051 | 3.00 |

BLE

| TestMode | Frequency (MHz) | Antenna | Conducted Power (dBm) | Tune Up (dBm) |
|----------|-----------------|---------|-----------------------|---------------|
| BLE 1M | 2402 | Ant | 14.162 | 14.50 |
| | 2440 | Ant | 14.142 | 14.50 |
| | 2480 | Ant | 14.504 | 15.00 |
| BLE 2M | 2402 | Ant | 13.837 | 14.00 |
| | 2440 | Ant | 13.886 | 14.00 |
| | 2480 | Ant | 14.232 | 14.50 |



1.1. Stand-alone SAR test evaluation

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and Product specific 10g SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

| MHz | 5 | 10 | 15 | 20 | 25 | mm |
|------|-----|-----|-----|-----|-----|-----------------------------------|
| 150 | 39 | 77 | 116 | 155 | 194 | SAR Test Exclusion Threshold (mW) |
| 300 | 27 | 55 | 82 | 110 | 137 | |
| 450 | 22 | 45 | 67 | 89 | 112 | |
| 835 | 16 | 33 | 49 | 66 | 82 | |
| 900 | 16 | 32 | 47 | 63 | 79 | |
| 1500 | 12 | 24 | 37 | 49 | 61 | |
| 1900 | 11 | 22 | 33 | 44 | 54 | |
| 2450 | 10 | 19 | 29 | 38 | 48 | |
| 3600 | 8 | 16 | 24 | 32 | 40 | |
| 5200 | 7 | 13 | 20 | 26 | 33 | |
| 5400 | 6 | 13 | 19 | 26 | 32 | |
| 5800 | 6 | 12 | 19 | 25 | 31 | |
| MHz | 30 | 35 | 40 | 45 | 50 | |
| 150 | 232 | 271 | 310 | 349 | 387 | SAR Test Exclusion Threshold (mW) |
| 300 | 164 | 192 | 219 | 246 | 274 | |
| 450 | 134 | 157 | 179 | 201 | 224 | |
| 835 | 98 | 115 | 131 | 148 | 164 | |
| 900 | 95 | 111 | 126 | 142 | 158 | |
| 1500 | 73 | 86 | 98 | 110 | 122 | |
| 1900 | 65 | 76 | 87 | 98 | 109 | |
| 2450 | 57 | 67 | 77 | 86 | 96 | |
| 3600 | 47 | 55 | 63 | 71 | 79 | |
| 5200 | 39 | 46 | 53 | 59 | 66 | |
| 5400 | 39 | 45 | 52 | 58 | 65 | |
| 5800 | 37 | 44 | 50 | 56 | 62 | |

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.





The test exclusions are applicable only when the minimum test separation distance is > 50 mm and for transmission frequencies between 100 MHz and 6 GHz.

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and > 50 mm

| MHz | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | mm |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|----|
| 100 | 474 | 481 | 487 | 494 | 501 | 507 | 514 | 521 | 527 | 534 | 541 | 547 | 554 | 561 | 567 | mW |
| 150 | 387 | 397 | 407 | 417 | 427 | 437 | 447 | 457 | 467 | 477 | 487 | 497 | 507 | 517 | 527 | |
| 300 | 274 | 294 | 314 | 334 | 354 | 374 | 394 | 414 | 434 | 454 | 474 | 494 | 514 | 534 | 554 | |
| 450 | 224 | 254 | 284 | 314 | 344 | 374 | 404 | 434 | 464 | 494 | 524 | 554 | 584 | 614 | 644 | |
| 835 | 164 | 220 | 275 | 331 | 387 | 442 | 498 | 554 | 609 | 665 | 721 | 776 | 832 | 888 | 943 | |
| 900 | 158 | 218 | 278 | 338 | 398 | 458 | 518 | 578 | 638 | 698 | 758 | 818 | 878 | 938 | 998 | |
| 1500 | 122 | 222 | 322 | 422 | 522 | 622 | 722 | 822 | 922 | 1022 | 1122 | 1222 | 1322 | 1422 | 1522 | |
| 1900 | 109 | 209 | 309 | 409 | 509 | 609 | 709 | 809 | 909 | 1009 | 1109 | 1209 | 1309 | 1409 | 1509 | |
| 2450 | 96 | 196 | 296 | 396 | 496 | 596 | 696 | 796 | 896 | 996 | 1096 | 1196 | 1296 | 1396 | 1496 | |
| 3600 | 79 | 179 | 279 | 379 | 479 | 579 | 679 | 779 | 879 | 979 | 1079 | 1179 | 1279 | 1379 | 1479 | |
| 5200 | 66 | 166 | 266 | 366 | 466 | 566 | 666 | 766 | 866 | 966 | 1066 | 1166 | 1266 | 1366 | 1466 | |
| 5400 | 65 | 165 | 265 | 365 | 465 | 565 | 665 | 765 | 865 | 965 | 1065 | 1165 | 1265 | 1365 | 1465 | |
| 5800 | 62 | 162 | 262 | 362 | 462 | 562 | 662 | 762 | 862 | 962 | 1062 | 1162 | 1262 | 1362 | 1462 | |

According to the table above, Standalone SAR exclusion calculation for this device are as below:

| Freq. Band | Frequency (MHz) | Position | Test Separation (mm) | Max Power (dBm) | Max Power (mW) | Exclusion Threshold (mW) | Exclusion (Yes/No) |
|------------|-----------------|-------------|----------------------|-----------------|----------------|--------------------------|--------------------|
| BT | 2480 | Front side | 5 | 15.00 | 31.62 | 10 | No |
| | 2480 | Back side | 5 | 15.00 | 31.62 | 10 | No |
| | 2480 | Left side | 5 | 15.00 | 31.62 | 10 | No |
| | 2480 | Right side | 95 | 15.00 | 31.62 | 546 | Yes |
| | 2480 | Top side | 105 | 15.00 | 31.62 | 646 | Yes |
| | 2480 | Bottom side | 78 | 15.00 | 31.62 | 376 | Yes |

| Freq. Band | Frequency (MHz) | Position | Test Separation (mm) | Max Power (dBm) | Max Power (mW) | Exclusion Threshold (mW) | Exclusion (Yes/No) |
|------------|-----------------|-------------|----------------------|-----------------|----------------|--------------------------|--------------------|
| Wi-Fi 2.4G | 2462 | Front side | 5 | 17.00 | 50.12 | 10 | No |
| | 2462 | Back side | 5 | 17.00 | 50.12 | 10 | No |
| | 2462 | Left side | 70 | 17.00 | 50.12 | 296 | Yes |
| | 2462 | Right side | 5 | 17.00 | 50.12 | 10 | No |
| | 2462 | Top side | 140 | 17.00 | 50.12 | 996 | Yes |
| | 2462 | Bottom side | 45 | 17.00 | 50.12 | 86 | Yes |
| Wi-Fi 5.2G | 5190 | Front side | 5 | 15.00 | 31.62 | 7 | No |
| | 5190 | Back side | 5 | 15.00 | 31.62 | 7 | No |
| | 5190 | Left side | 70 | 15.00 | 31.62 | 266 | Yes |
| | 5190 | Right side | 5 | 15.00 | 31.62 | 7 | No |
| | 5190 | Top side | 140 | 15.00 | 31.62 | 966 | Yes |
| | 5190 | Bottom side | 45 | 15.00 | 31.62 | 59 | Yes |

ANT1





| | | | | | | | | |
|--|---------------|------|-------------|-----|-------|-------|-----|-----|
| | Wi-Fi 5.3G | 5290 | Front side | 5 | 15.00 | 31.62 | 6 | No |
| | | 5290 | Back side | 5 | 15.00 | 31.62 | 6 | No |
| | | 5290 | Left side | 70 | 15.00 | 31.62 | 265 | Yes |
| | | 5290 | Right side | 5 | 15.00 | 31.62 | 6 | No |
| | | 5290 | Top side | 140 | 15.00 | 31.62 | 965 | Yes |
| | | 5290 | Bottom side | 45 | 15.00 | 31.62 | 58 | Yes |
| | Wi-Fi 5.5G | 5610 | Front side | 5 | 15.00 | 31.62 | 6 | No |
| | | 5610 | Back side | 5 | 15.00 | 31.62 | 6 | No |
| | | 5610 | Left side | 70 | 15.00 | 31.62 | 262 | Yes |
| | | 5610 | Right side | 5 | 15.00 | 31.62 | 6 | No |
| | | 5610 | Top side | 140 | 15.00 | 31.62 | 962 | Yes |
| | | 5610 | Bottom side | 45 | 15.00 | 31.62 | 56 | Yes |
| | Wi-Fi 5.8G | 5785 | Front side | 5 | 16.00 | 39.81 | 6 | No |
| | | 5785 | Back side | 5 | 16.00 | 39.81 | 6 | No |
| | | 5785 | Left side | 70 | 16.00 | 39.81 | 262 | Yes |
| | | 5785 | Right side | 5 | 16.00 | 39.81 | 6 | No |
| | | 5785 | Top side | 140 | 16.00 | 39.81 | 962 | Yes |
| | | 5785 | Bottom side | 45 | 16.00 | 39.81 | 56 | Yes |

| ANT2 | Freq. Band | Frequency (MHz) | Position | Test Separation (mm) | Max Power (dBm) | Max Power (mW) | Exclusion Threshold (mW) | Exclusion (Yes/No) |
|---------------|---------------|-----------------|-------------|----------------------|-----------------|----------------|--------------------------|--------------------|
| | Wi-Fi 2.4G | 2462 | Front side | 5 | 15.00 | 31.62 | 10 | No |
| | | 2462 | Back side | 5 | 15.00 | 31.62 | 10 | No |
| | | 2462 | Left side | 5 | 15.00 | 31.62 | 10 | No |
| | | 2462 | Right side | 70 | 15.00 | 31.62 | 296 | Yes |
| | | 2462 | Top side | 140 | 15.00 | 31.62 | 996 | Yes |
| | | 2462 | Bottom side | 45 | 15.00 | 31.62 | 86 | Yes |
| | Wi-Fi 5.2G | 5240 | Front side | 5 | 15.00 | 31.62 | 7 | No |
| | | 5240 | Back side | 5 | 15.00 | 31.62 | 7 | No |
| | | 5240 | Left side | 5 | 15.00 | 31.62 | 7 | No |
| | | 5240 | Right side | 70 | 15.00 | 31.62 | 266 | Yes |
| | | 5240 | Top side | 140 | 15.00 | 31.62 | 966 | Yes |
| | | 5240 | Bottom side | 45 | 15.00 | 31.62 | 59 | Yes |
| | Wi-Fi 5.3G | 5300 | Front side | 5 | 15.00 | 31.62 | 6 | No |
| | | 5300 | Back side | 5 | 15.00 | 31.62 | 6 | No |
| | | 5300 | Left side | 5 | 15.00 | 31.62 | 6 | No |
| | | 5300 | Right side | 70 | 15.00 | 31.62 | 265 | Yes |
| | | 5300 | Top side | 140 | 15.00 | 31.62 | 965 | Yes |
| 5300 | | Bottom side | 45 | 15.00 | 31.62 | 58 | Yes | |
| Wi-Fi 5.5G | 5700 | Front side | 5 | 15.00 | 31.62 | 6 | No | |
| | 5700 | Back side | 5 | 15.00 | 31.62 | 6 | No | |
| | 5700 | Left side | 5 | 15.00 | 31.62 | 6 | No | |
| | 5700 | Right side | 70 | 15.00 | 31.62 | 262 | Yes | |
| | 5700 | Top side | 140 | 15.00 | 31.62 | 962 | Yes | |
| | 5700 | Bottom side | 45 | 15.00 | 31.62 | 56 | Yes | |
| Wi-Fi 5.8G | 5785 | Front side | 5 | 17.00 | 50.12 | 6 | No | |
| | 5785 | Back side | 5 | 17.00 | 50.12 | 6 | No | |
| | 5785 | Left side | 5 | 17.00 | 50.12 | 6 | No | |



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| | | | | | | | |
|--|------|-------------|-----|-------|-------|-----|-----|
| | 5785 | Right side | 70 | 17.00 | 50.12 | 262 | Yes |
| | 5785 | Top side | 140 | 17.00 | 50.12 | 962 | Yes |
| | 5785 | Bottom side | 45 | 17.00 | 50.12 | 56 | Yes |

From what is shown in the table above, we can draw the conclusion that:

| EUT Sides for SAR Testing | | | | | | | |
|---------------------------|--------------------|-------|------|------|-------|-----|--------|
| Mode | Exposure Condition | Front | Back | Left | Right | Top | Bottom |
| BT | Body | Yes | Yes | Yes | No | No | No |

| ANT1 | EUT Sides for SAR Testing | | | | | | | |
|------|---------------------------|--------------------|-------|------|------|-------|-----|--------|
| | Mode | Exposure Condition | Front | Back | Left | Right | Top | Bottom |
| | WIFI 2.4G | Body | Yes | Yes | No | Yes | No | No |
| | WIFI 5.2G | Body | Yes | Yes | No | Yes | No | No |
| | WIFI 5.3G | Body | Yes | Yes | No | Yes | No | No |
| | WIFI 5.5G | Body | Yes | Yes | No | Yes | No | No |
| | WIFI 5.8G | Body | Yes | Yes | No | Yes | No | No |

| ANT2 | EUT Sides for SAR Testing | | | | | | | |
|------|---------------------------|--------------------|-------|------|------|-------|-----|--------|
| | Mode | Exposure Condition | Front | Back | Left | Right | Top | Bottom |
| | WIFI 2.4G | Body | Yes | Yes | Yes | No | No | No |
| | WIFI 5.2G | Body | Yes | Yes | Yes | No | No | No |
| | WIFI 5.3G | Body | Yes | Yes | Yes | No | No | No |
| | WIFI 5.5G | Body | Yes | Yes | Yes | No | No | No |
| | WIFI 5.8G | Body | Yes | Yes | Yes | No | No | No |

EUT Sides for SAR Testing.





1.2. SAR Measurement Results

The calculated SAR is obtained by the following formula:

$$\text{Reported SAR} = \text{Measured SAR} * 10^{(P_{\text{target}} - P_{\text{measured}})/10}$$

$$\text{Scaling factor} = 10^{(P_{\text{target}} - P_{\text{measured}})/10}$$

$$\text{Reported SAR} = \text{Measured SAR} * \text{Scaling factor}$$

Where

P_{target} is the power of manufacturing upper limit;

P_{measured} is the measured power;

Measured SAR is measured SAR at measured power which including power drift)

Reported SAR which including Power Drift and Scaling factor

1.2.1. SAR Results [WIFI 2.4G]

| SAR Values [WIFI 2.4G] ANT1 | | | | | | | | |
|---|-----------------|------------------|-----------------------------|--------------------------------------|--------------------|-------------------|----------------------------------|--------------|
| Ch/ Freq. (MHz) | Channel Type | Test Position | Conducted Power (dBm) | Maximum Allowed Power (dBm) | PowerDrift (dB) | Scaling Factor | SAR _{1-g} results(W/kg) | |
| | | | | | | | Measured | Reported |
| measured / reported SAR numbers - Body (distance 0mm) | | | | | | | | |
| 11/2462 | 802.11b | Frontside | 15.452 | 16.00 | 0.08 | 1.134 | 0.288 | 0.327 |
| 11/2462 | 802.11b | Rear side | 15.452 | 16.00 | -0.14 | 1.134 | 0.234 | 0.265 |
| 11/2462 | 802.11b | Right side | 15.452 | 16.00 | 0.13 | 1.134 | 0.136 | 0.154 |
| 11/2462 | 802.11g | Frontside | 16.033 | 17.00 | -0.13 | 1.249 | 0.319 | 0.399 |
| 11/2462 | 802.11g | Rear side | 16.033 | 17.00 | -0.11 | 1.249 | 0.278 | 0.347 |
| 11/2462 | 802.11g | Right side | 16.033 | 17.00 | -0.15 | 1.249 | 0.165 | 0.206 |

| SAR Values [WIFI 2.4G] ANT2 | | | | | | | | |
|---|-----------------|------------------|-----------------------------|--------------------------------------|--------------------|-------------------|----------------------------------|--------------|
| Ch/ Freq. (MHz) | Channel Type | Test Position | Conducted Power (dBm) | Maximum Allowed Power (dBm) | PowerDrift (dB) | Scaling Factor | SAR _{1-g} results(W/kg) | |
| | | | | | | | Measured | Reported |
| measured / reported SAR numbers - Body (distance 0mm) | | | | | | | | |
| 11/2462 | 802.11b | Frontside | 14.015 | 14.50 | 0.04 | 1.118 | 0.241 | 0.269 |
| 11/2462 | 802.11b | Rear side | 14.015 | 14.50 | -0.14 | 1.118 | 0.186 | 0.208 |
| 11/2462 | 802.11b | Left side | 14.015 | 14.50 | -0.12 | 1.118 | 0.122 | 0.136 |
| 11/2462 | 802.11g | Frontside | 14.339 | 15.00 | -0.11 | 1.164 | 0.285 | 0.332 |
| 11/2462 | 802.11g | Rear side | 14.339 | 15.00 | -0.02 | 1.164 | 0.228 | 0.265 |
| 11/2462 | 802.11g | Left side | 14.339 | 15.00 | -0.17 | 1.164 | 0.142 | 0.165 |

Note:

- 1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.
- 2) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n.
- 3) When the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.



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Scan code to check authenticity

**7.1.7. SAR Results [WIFI 5.2G]**

| SAR Values [WIFI 5.2G] ANT1 | | | | | | | | |
|---|-----------------|------------------|-----------------------------|--------------------------------------|--------------------|-------------------|----------------------------------|--------------|
| Ch/ Freq. (MHz) | Channel Type | Test Position | Conducted Power (dBm) | Maximum Allowed Power (dBm) | PowerDrift (dB) | Scaling Factor | SAR _{1-g} results(W/kg) | |
| | | | | | | | Measured | Reported |
| measured / reported SAR numbers - Body (distance 0mm) | | | | | | | | |
| 38/5190 | 802.11n 40M | Front side | 14.327 | 15.00 | 0.16 | 1.168 | 0.185 | 0.216 |
| 38/5190 | 802.11n 40M | Rear side | 14.327 | 15.00 | 0.02 | 1.168 | 0.138 | 0.161 |
| 38/5190 | 802.11n 40M | Right side | 14.327 | 15.00 | -0.14 | 1.168 | 0.071 | 0.083 |

| SAR Values [WIFI 5.2G] ANT2 | | | | | | | | |
|---|-----------------|------------------|-----------------------------|--------------------------------------|--------------------|-------------------|----------------------------------|--------------|
| Ch/ Freq. (MHz) | Channel Type | Test Position | Conducted Power (dBm) | Maximum Allowed Power (dBm) | PowerDrift (dB) | Scaling Factor | SAR _{1-g} results(W/kg) | |
| | | | | | | | Measured | Reported |
| measured / reported SAR numbers - Body (distance 0mm) | | | | | | | | |
| 48/5240 | 802.11n | Front side | 14.164 | 15.00 | -0.02 | 1.212 | 0.166 | 0.201 |
| 48/5240 | 802.11n | Rear side | 14.164 | 15.00 | -0.20 | 1.212 | 0.112 | 0.136 |
| 48/5240 | 802.11n | Left side | 14.164 | 15.00 | -0.14 | 1.212 | 0.048 | 0.058 |

Note:

- 1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.
- 2) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n.
- 3) When the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.



7.1.8. SAR Results [WIFI 5.3G]

| SAR Values [WIFI 5.3G] ANT1 | | | | | | | | |
|---|-----------------|------------------|-----------------------------|--------------------------------------|--------------------|-------------------|----------------------------------|--------------|
| Ch/ Freq. (MHz) | Channel Type | Test Position | Conducted Power (dBm) | Maximum Allowed Power (dBm) | PowerDrift (dB) | Scaling Factor | SAR _{1-g} results(W/kg) | |
| | | | | | | | Measured | Reported |
| measured / reported SAR numbers - Body (distance 0mm) | | | | | | | | |
| 58/5290 | 802.11ac 80M | Front side | 14.47 | 15.00 | -0.11 | 1.130 | 0.211 | 0.238 |
| 58/5290 | 802.11ac 80M | Rear side | 14.47 | 15.00 | -0.18 | 1.130 | 0.165 | 0.186 |
| 58/5290 | 802.11ac 80M | Right side | 14.47 | 15.00 | 0.02 | 1.130 | 0.075 | 0.085 |

| SAR Values [WIFI 5.3G] ANT2 | | | | | | | | |
|---|-----------------|------------------|-----------------------------|--------------------------------------|--------------------|-------------------|----------------------------------|--------------|
| Ch/ Freq. (MHz) | Channel Type | Test Position | Conducted Power (dBm) | Maximum Allowed Power (dBm) | PowerDrift (dB) | Scaling Factor | SAR _{1-g} results(W/kg) | |
| | | | | | | | Measured | Reported |
| measured / reported SAR numbers - Body (distance 0mm) | | | | | | | | |
| 60/5300 | 802.11a | Front side | 14.291 | 15.00 | 0.20 | 1.177 | 0.196 | 0.231 |
| 60/5300 | 802.11a | Rear side | 14.291 | 15.00 | -0.15 | 1.177 | 0.139 | 0.164 |
| 60/5300 | 802.11a | Left side | 14.291 | 15.00 | 0.14 | 1.177 | 0.060 | 0.071 |

Note:

- 1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.
- 2) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n.
- 3) When the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.



**7.1.9. SAR Results [WIFI 5.5G]**

| SAR Values [WIFI 5.5G] ANT1 | | | | | | | | |
|---|-----------------|------------------|-----------------------------|--------------------------------------|--------------------|-------------------|----------------------------------|--------------|
| Ch/ Freq. (MHz) | Channel Type | Test Position | Conducted Power (dBm) | Maximum Allowed Power (dBm) | PowerDrift (dB) | Scaling Factor | SAR _{1-g} results(W/kg) | |
| | | | | | | | Measured | Reported |
| measured / reported SAR numbers - Body (distance 0mm) | | | | | | | | |
| 122/5610 | 802.11ac 80M | Front side | 14.435 | 15.00 | 0.06 | 1.139 | 0.148 | 0.169 |
| 122/5610 | 802.11ac 80M | Rear side | 14.435 | 15.00 | -0.14 | 1.139 | 0.096 | 0.109 |
| 122/5610 | 802.11ac 80M | Right side | 14.435 | 15.00 | 0.07 | 1.139 | 0.044 | 0.050 |

| SAR Values [WIFI 5.5G] ANT2 | | | | | | | | |
|---|-----------------|------------------|-----------------------------|--------------------------------------|--------------------|-------------------|----------------------------------|--------------|
| Ch/ Freq. (MHz) | Channel Type | Test Position | Conducted Power (dBm) | Maximum Allowed Power (dBm) | PowerDrift (dB) | Scaling Factor | SAR _{1-g} results(W/kg) | |
| | | | | | | | Measured | Reported |
| measured / reported SAR numbers - Body (distance 0mm) | | | | | | | | |
| 140/5700 | 802.11a | Front side | 14.773 | 15.00 | 0.15 | 1.054 | 0.106 | 0.112 |
| 140/5700 | 802.11a | Rear side | 14.773 | 15.00 | -0.11 | 1.054 | 0.065 | 0.068 |
| 140/5700 | 802.11a | Left side | 14.773 | 15.00 | 0.17 | 1.054 | 0.036 | 0.038 |

Note:

- 1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.
- 2) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n.
- 3) When the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.



**7.1.10. SAR Results [WIFI 5.8G]**

| SAR Values [WIFI 5.8G] ANT1 | | | | | | | | |
|---|-----------------|------------------|-----------------------------|--------------------------------------|--------------------|-------------------|----------------------------------|--------------|
| Ch/ Freq. (MHz) | Channel Type | Test Position | Conducted Power (dBm) | Maximum Allowed Power (dBm) | PowerDrift (dB) | Scaling Factor | SAR _{1-g} results(W/kg) | |
| | | | | | | | Measured | Reported |
| measured / reported SAR numbers - Body (distance 0mm) | | | | | | | | |
| 157/5785 | 802.11a | Front side | 15.811 | 16.00 | 0.06 | 1.044 | 0.161 | 0.168 |
| 157/5785 | 802.11a | Rear side | 15.811 | 16.00 | -0.14 | 1.044 | 0.085 | 0.089 |
| 157/5785 | 802.11a | Right side | 15.811 | 16.00 | 0.07 | 1.044 | 0.038 | 0.040 |

| SAR Values [WIFI 5.8G] ANT2 | | | | | | | | |
|---|-----------------|------------------|-----------------------------|--------------------------------------|--------------------|-------------------|----------------------------------|--------------|
| Ch/ Freq. (MHz) | Channel Type | Test Position | Conducted Power (dBm) | Maximum Allowed Power (dBm) | PowerDrift (dB) | Scaling Factor | SAR _{1-g} results(W/kg) | |
| | | | | | | | Measured | Reported |
| measured / reported SAR numbers - Body (distance 0mm) | | | | | | | | |
| 157/5785 | 802.11n | Front side | 16.258 | 17.00 | -0.19 | 1.186 | 0.122 | 0.145 |
| 157/5785 | 802.11n | Rear side | 16.258 | 17.00 | 0.03 | 1.186 | 0.054 | 0.064 |
| 157/5785 | 802.11n | Left side | 16.258 | 17.00 | -0.17 | 1.186 | 0.027 | 0.032 |

Note:

- 1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.
- 2) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n.
- 3) When the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.





7.1.11. SAR Results [Bluetooth]

| SAR Values [Bluetooth] | | | | | | | | |
|---|-----------------|------------------|-----------------------------|--------------------------------------|------------------------|-------------------|----------------------------------|--------------|
| Ch/ Freq. (MHz) | Channel Type | Test Position | Conducted Power (dBm) | Maximum Allowed Power (dBm) | Power Drift (dB) | Scaling Factor | SAR _{1-g} results(W/kg) | |
| | | | | | | | Measured | Reported |
| measured / reported SAR numbers - Body (Test data distance 0mm) | | | | | | | | |
| 39/2480 | BLE_1M | Front side | 14.504 | 15.00 | 0.05 | 1.121 | 0.187 | 0.210 |
| 39/2480 | BLE_1M | Rear side | 14.504 | 15.00 | -0.12 | 1.121 | 0.176 | 0.197 |
| 39/2480 | BLE_1M | Left side | 14.504 | 15.00 | -0.09 | 1.121 | 0.285 | 0.319 |

Note:

- 1) The maximum Scaled SAR value is marked in bold. Graph results refer to Appendix B.



7.2. Multiple Transmitter Evaluation

7.2.1. Simultaneous SAR SAR test evaluation

| NO. | Simultaneous Tx Combination | Body |
|-----|---|------|
| 1 | WIFI 2.4G ANT1 + WIFI 2.4G ANT2 +Bluetooth | Yes |
| 2 | WIFI 5..2G ANT1 + WIFI 5.2G ANT2 +Bluetooth | Yes |
| 3 | WIFI 5..3G ANT1 + WIFI 5.3G ANT2 +Bluetooth | Yes |
| 4 | WIFI 5..5G ANT1 + WIFI 5.5G ANT2 +Bluetooth | Yes |
| 5 | WIFI 5..8G ANT1 + WIFI 5.8G ANT2 +Bluetooth | Yes |

Note:

- 1) The device does not support DTM function.

7.2.2. Simultaneous Transmission SAR Summation Scenario

| Test position | | Antenna SARmax (W/kg) | | | | | | | | | | |
|---------------|-------------|-----------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-----------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | | WIFI 2.4G Ant1 | WIFI 2.4G Ant2 | WIFI 5..2G Ant1 | WIFI 5..2G Ant2 | WIFI 5..3G Ant1 | WIFI 5..3G Ant2 | WIFI 5..5G Ant1 | WIFI 5..5G Ant2 | WIFI 5..8G Ant1 | WIFI 5..8G Ant2 | BT Ant |
| Body | Front side | 0.399 | 0.332 | 0.216 | 0.201 | 0.238 | 0.231 | 0.169 | 0.112 | 0.168 | 0.145 | 0.210 |
| | Rear side | 0.347 | 0.265 | 0.161 | 0.136 | 0.186 | 0.164 | 0.109 | 0.068 | 0.089 | 0.064 | 0.197 |
| | Left side | / | 0.165 | / | 0.058 | / | 0.071 | / | 0.038 | / | 0.032 | 0.319 |
| | Right side | 0.206 | / | 0.083 | / | 0.085 | / | 0.050 | / | 0.040 | / | / |
| | Top side | / | / | / | / | / | / | / | / | / | / | / |
| | Bottom side | / | / | / | / | / | / | / | / | / | / | / |

| Test position | | Summed 1g SARmax (W/kg) | | | | |
|---------------|-------------|-------------------------|--------|--------|--------|---------|
| | | 1+2+11 | 3+4+11 | 5+6+11 | 7+8+11 | 9+10+11 |
| Body | Front side | 0.941 | 0.627 | 0.679 | 0.491 | 0.523 |
| | Rear side | 0.809 | 0.494 | 0.547 | 0.374 | 0.350 |
| | Left side | 0.484 | 0.377 | 0.390 | 0.357 | 0.351 |
| | Right side | 0.206 | 0.083 | 0.085 | 0.050 | 0.040 |
| | Top side | / | / | / | / | / |
| | Bottom side | / | / | / | / | / |





APPENDIX A: DETAILED SYSTEM CHECK RESULTS

| |
|--|
| 1. System Performance Check |
| System Performance Check 2450 MHz Head |
| System Performance Check 5250 MHz Head |
| System Performance Check 5600 MHz Head |
| System Performance Check 5750 MHz Head |



Test Laboratory: LCS-SAR Lab

System Check_2450Mhz**DUT: D2450V2; Type: D2450V2; Serial: 808**

Communication System: UID 0, CW (0); Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2450$ MHz; $\sigma = 1.855$ S/m; $\epsilon_r = 37.999$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(7.42, 7.42, 7.42); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (4x8x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 17.6 W/kg

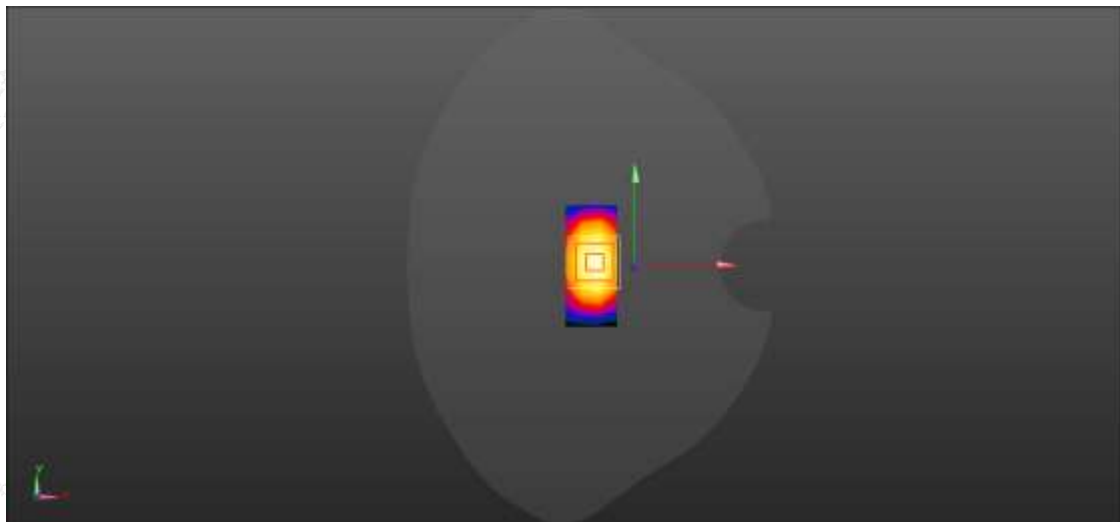
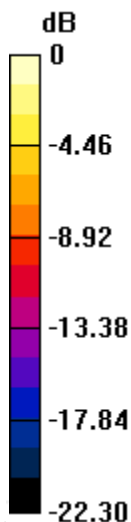
Configuration/Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.94 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 27.1 W/kg

SAR(1 g) = 13 W/kg; SAR(10 g) = 5.97 W/kg

Maximum value of SAR (measured) = 20.1 W/kg



0 dB = 20.1 W/kg = 13.03 dBW/kg



Test Laboratory: LCS-SAR Lab

System Check_5250Mhz**DUT: D5GHzV2; Type: D5GHzV2; Serial: 1046**

Communication System: UID 0, CW (0); Frequency: 5250 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5250$ MHz; $\sigma = 4.803$ S/m; $\epsilon_r = 35.778$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(5.38, 5.38, 5.38); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (5x5x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 18.1 W/kg

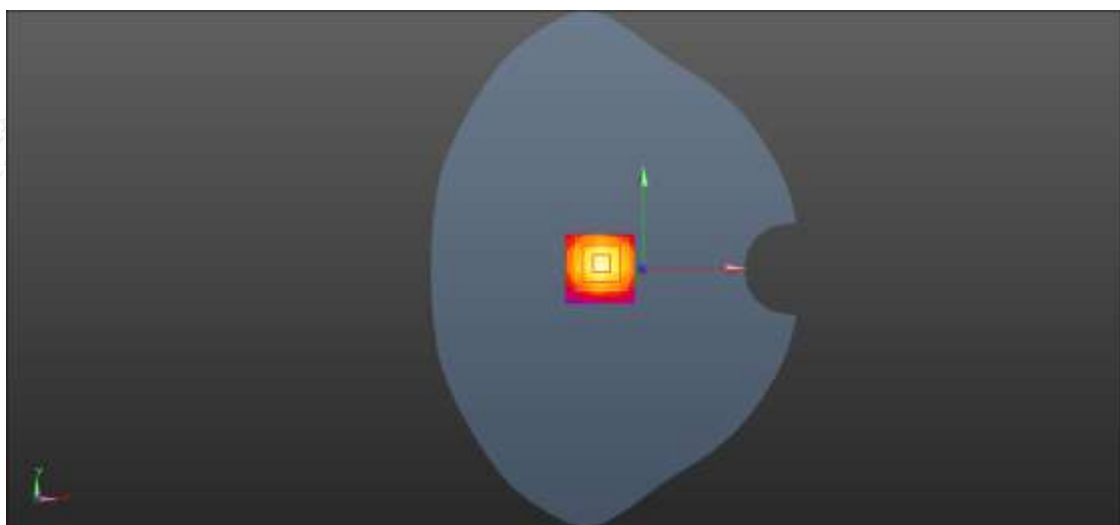
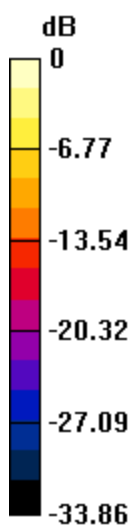
Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 67.77 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 30.5 W/kg

SAR(1 g) = 7.89 W/kg; SAR(10 g) = 2.31 W/kg

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



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



Test Laboratory: LCS-SAR Lab

System Check_5600Mhz**DUT: D5GHzV2; Type: D5GHzV2; Serial: 1046**

Communication System: UID 0, CW (0); Frequency: 5600 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5600$ MHz; $\sigma = 5.123$ S/m; $\epsilon_r = 35.311$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(4.75, 4.75, 4.75); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (5x5x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 20.3 W/kg

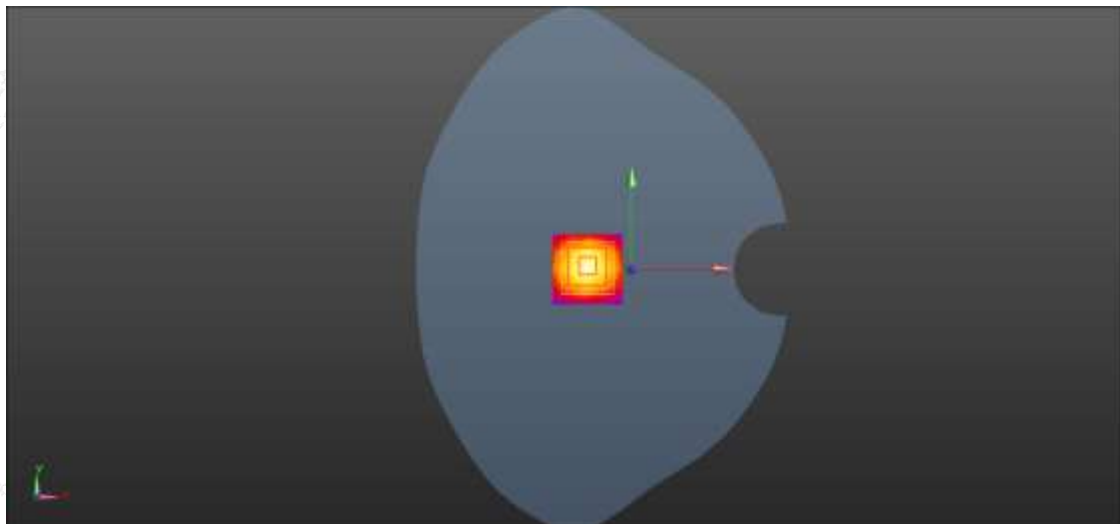
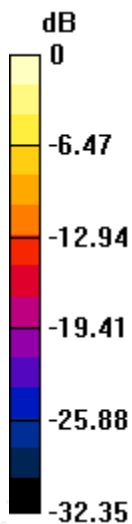
Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 71.18 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 35.6 W/kg

SAR(1 g) = 8.3 W/kg; SAR(10 g) = 2.3 W/kg

Maximum value of SAR (measured) = 21.4 W/kg



0 dB = 21.4 W/kg = 13.30 dBW/kg



Date: 2024/5/29

Test Laboratory: LCS-SAR Lab

System Check_5750Mhz**DUT: D5GHzV2; Type: D5GHzV2; Serial: 1046**

Communication System: UID 0, CW (0); Frequency: 5750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5750$ MHz; $\sigma = 5.252$ S/m; $\epsilon_r = 35.344$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(4.88, 4.88, 4.88); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (5x5x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 18.6 W/kg

Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

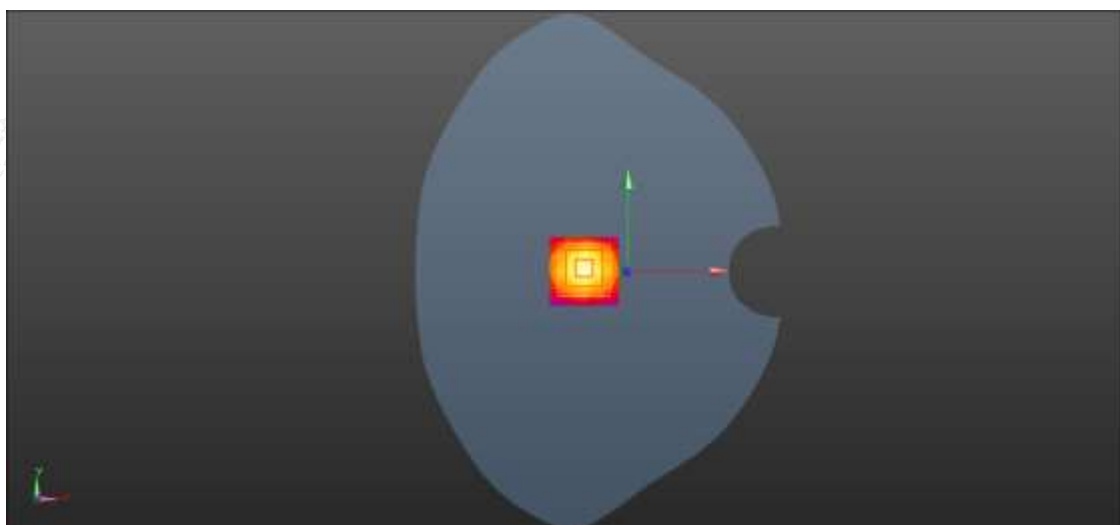
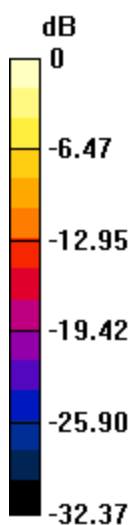
dy=4mm, dz=2mm

Reference Value = 71.23 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 31.1 W/kg

SAR(1 g) = 8.05 W/kg; SAR(10 g) = 2.21 W/kg

Maximum value of SAR (measured) = 20.3 W/kg



0 dB = 20.3 W/kg = 13.07 dBW/kg



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China

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Scan code to check authenticity



APPENDIX B: DETAILED TEST RESULTS

| |
|--------------------|
| 1. WLAN |
| WLAN 2.4G for Body |
| WLAN 5.2G for Body |
| WLAN 5.3G for Body |
| WLAN 5.5G for Body |
| WLAN 5.8G for Body |
| 2. Bluetooth |
| BT for Body |



Test Laboratory: LCS-SAR Lab

WIFI 2.4G 802.11g 11CH Front side 0mm ANT1**DUT: Hollyland VenusLiv V2 All-in-one Streaming Camera ; Type: VenusLiv V2; Serial: A240520122-1**

Communication System: UID 0, WIFI 2.4GHz (0); Frequency: 2462 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2462$ MHz; $\sigma = 1.765$ S/m; $\epsilon_r = 39.471$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(7.42, 7.42, 7.42); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (10x15x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.542 W/kg

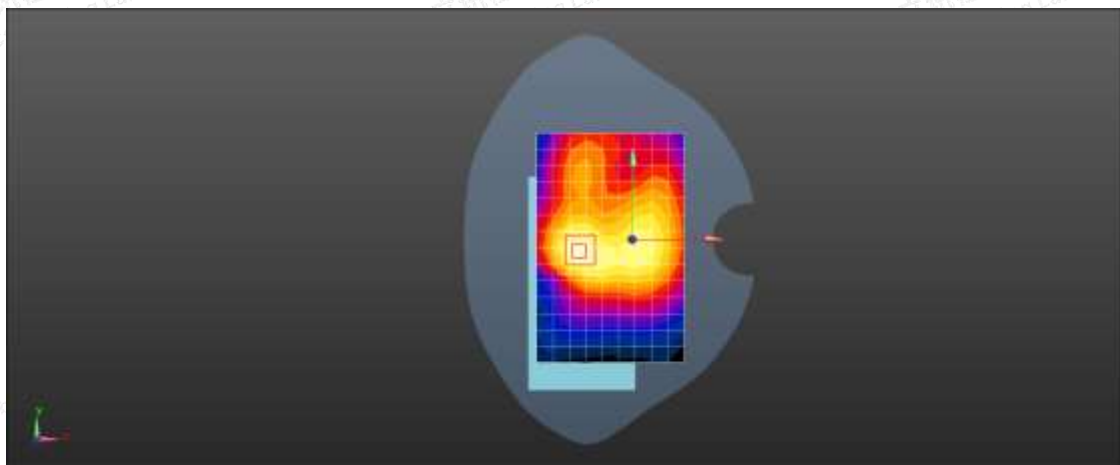
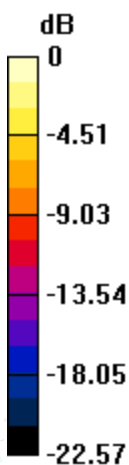
Configuration/Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.258 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 1.12 W/kg

SAR(1 g) = 0.319 W/kg; SAR(10 g) = 0.136 W/kg

Maximum value of SAR (measured) = 0.524 W/kg



0 dB = 0.524 W/kg = -2.81 dBW/kg



Test Laboratory: LCS-SAR Lab

WIFI 2.4G 802.11g 11CH Front side 0mm ANT2**DUT: Hollyland VenusLiv V2 All-in-one Streaming Camera ; Type: VenusLiv V2; Serial: A240520122-1**

Communication System: UID 0, WIFI 2.4GHz (0); Frequency: 2462 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2462$ MHz; $\sigma = 1.765$ S/m; $\epsilon_r = 39.471$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(7.42, 7.42, 7.42); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (10x15x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.501 W/kg

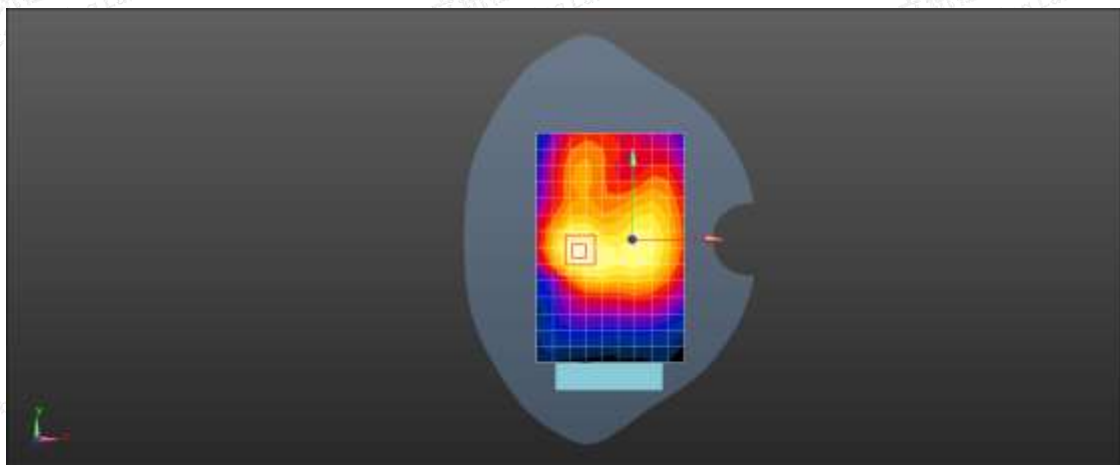
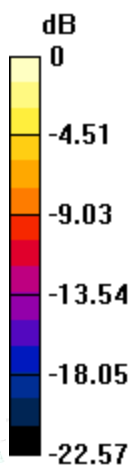
Configuration/Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.117 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 1.41 W/kg

SAR(1 g) = 0.285 W/kg; SAR(10 g) = 0.118 W/kg

Maximum value of SAR (measured) = 0.495 W/kg



0 dB = 0.495 W/kg = -3.05 dBW/kg



Test Laboratory: LCS-SAR Lab

WIFI 5.2G 802.11n40 38CH Front side 0mm ANT1**DUT: Hollyland VenusLiv V2 All-in-one Streaming Camera; Type: VenusLiv V2; Serial: A240520122-1**

Communication System: UID 0, WIFI 5GHz (0); Frequency: 5190 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5190$ MHz; $\sigma = 4.542$ S/m; $\epsilon_r = 36.841$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(5.38, 5.38, 5.38); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.265 W/kg

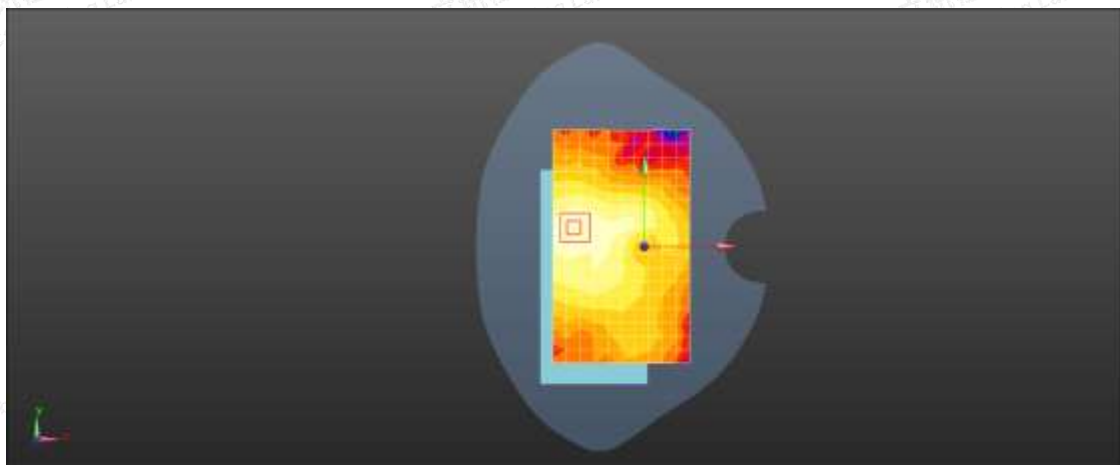
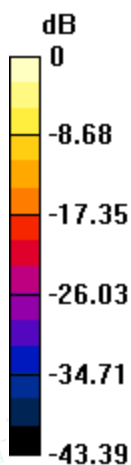
Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 3.745 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.425 W/kg

SAR(1 g) = 0.185 W/kg; SAR(10 g) = 0.084 W/kg

Maximum value of SAR (measured) = 0.222 W/kg



0 dB = 0.222 W/kg = -6.54 dBW/kg



Test Laboratory: LCS-SAR Lab

WIFI 5.2G 802.11n 48CH Front side 0mm ANT2**DUT: Hollyland VenusLiv V2 All-in-one Streaming Camera; Type: VenusLiv V2; Serial: A240520122-1**

Communication System: UID 0, WIFI 5GHz (0); Frequency: 5240 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5240$ MHz; $\sigma = 4.542$ S/m; $\epsilon_r = 36.411$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(5.38, 5.38, 5.38); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.242 W/kg

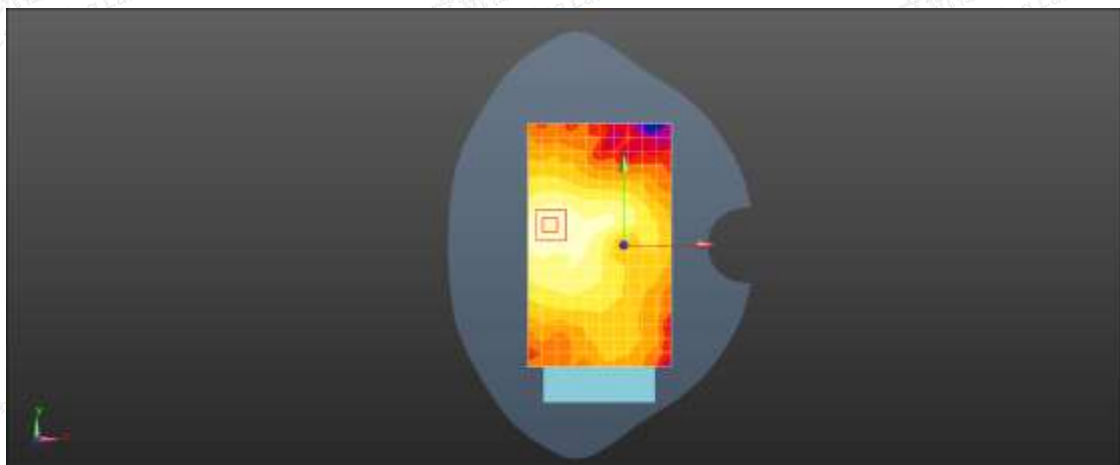
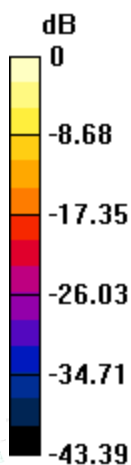
Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 3.528 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.463 W/kg

SAR(1 g) = 0.166 W/kg; SAR(10 g) = 0.076 W/kg

Maximum value of SAR (measured) = 0.236 W/kg



0 dB = 0.236 W/kg = -6.27 dBW/kg



Test Laboratory: LCS-SAR Lab

WIFI 5.3G 802.11ac80 58CH Front side 0mm ANT1**DUT: Hollyland VenusLiv V2 All-in-one Streaming Camera ; Type: VenusLiv V2; Serial: A240520122-1**

Communication System: UID 0, WIFI 5GHz (0); Frequency: 5290 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5290$ MHz; $\sigma = 4.787$ S/m; $\epsilon_r = 36.857$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(5.38, 5.38, 5.38); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.214 W/kg

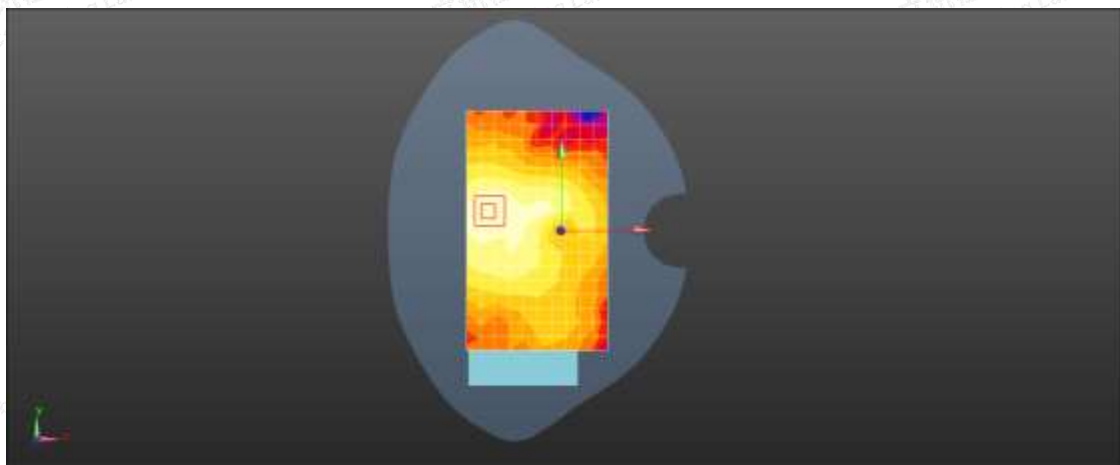
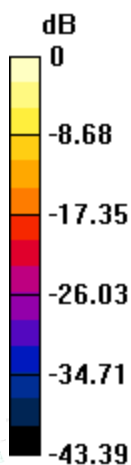
Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 3.475 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 0.423 W/kg

SAR(1 g) = 0.211 W/kg; SAR(10 g) = 0.087 W/kg

Maximum value of SAR (measured) = 0.208 W/kg



0 dB = 0.208 W/kg = -6.82 dBW/kg



Test Laboratory: LCS-SAR Lab

WIFI 5.3G 802.11a 60CH Front side 0mm ANT2**DUT: Hollyland VenusLiv V2 All-in-one Streaming Camera ; Type: VenusLiv V2; Serial: A240520122-1**

Communication System: UID 0, WIFI 5GHz (0); Frequency: 5300 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5300$ MHz; $\sigma = 4.577$ S/m; $\epsilon_r = 35.425$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(5.38, 5.38, 5.38); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.265 W/kg

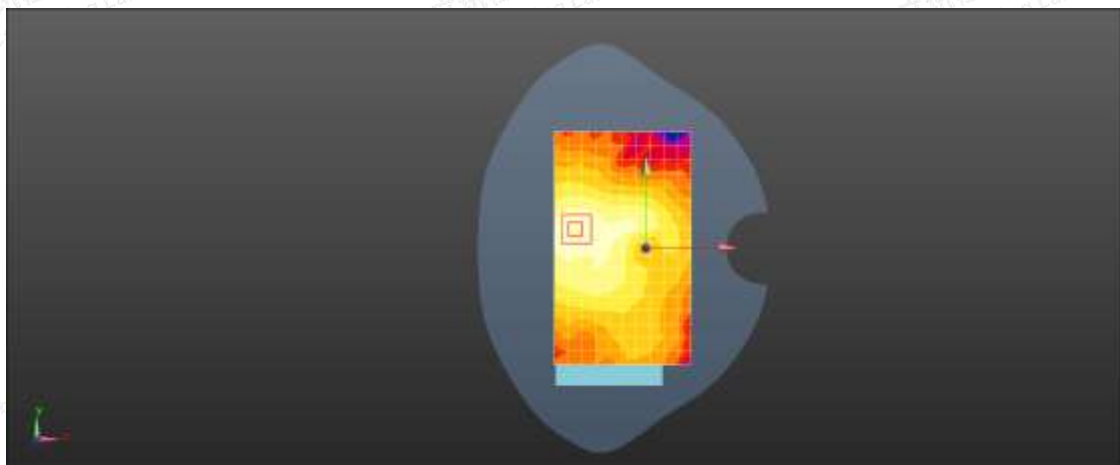
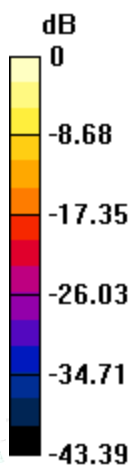
Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 3.325 V/m; Power Drift = 0.20 dB

Peak SAR (extrapolated) = 0.442 W/kg

SAR(1 g) = 0.196 W/kg; SAR(10 g) = 0.063 W/kg

Maximum value of SAR (measured) = 0.247 W/kg



0 dB = 0.247 W/kg = -6.07 dBW/kg



Test Laboratory: LCS-SAR Lab

WIFI 5.5G 802.11ac80 122CH Front side 0mm ANT1**DUT: Hollyland VenusLiv V2 All-in-one Streaming Camera ; Type: VenusLiv V2; Serial: A240520122-1**

Communication System: UID 0, WIFI 5GHz (0); Frequency: 5610 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5610$ MHz; $\sigma = 5.242$ S/m; $\epsilon_r = 35.758$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(4.75, 4.75, 4.75); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.214 W/kg

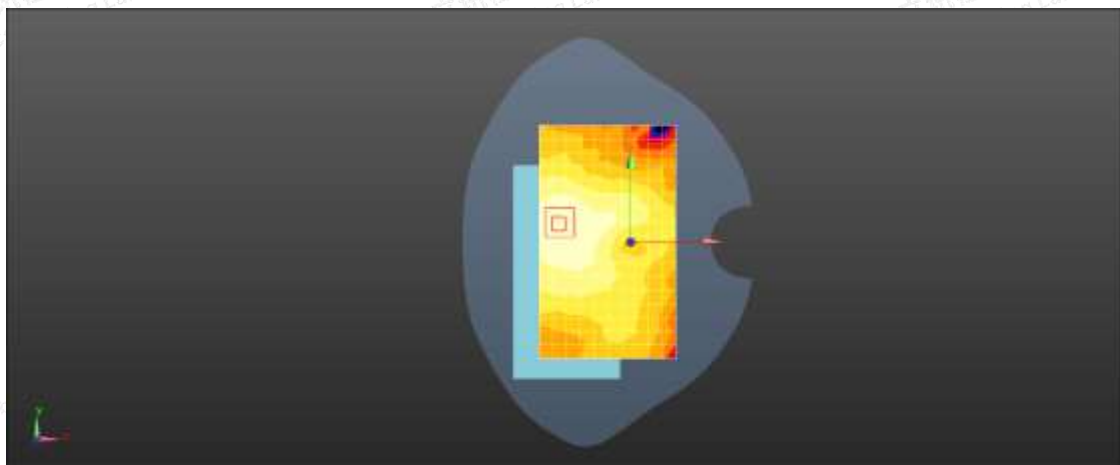
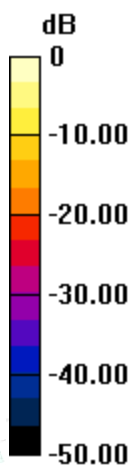
Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 3.331 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.363 W/kg

SAR(1 g) = 0.148 W/kg; SAR(10 g) = 0.068 W/kg

Maximum value of SAR (measured) = 0.221 W/kg



0 dB = 0.221 W/kg = -6.56 dBW/kg



Test Laboratory: LCS-SAR Lab

WIFI 5.5G 802.11a 140CH Front side 0mm ANT2**DUT: Hollyland VenusLiv V2 All-in-one Streaming Camera ; Type: VenusLiv V2; Serial: A240520122-1**

Communication System: UID 0, WIFI 5GHz (0); Frequency: 5700 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5700$ MHz; $\sigma = 5.142$ S/m; $\epsilon_r = 35.754$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(4.75, 4.75, 4.75); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.215 W/kg

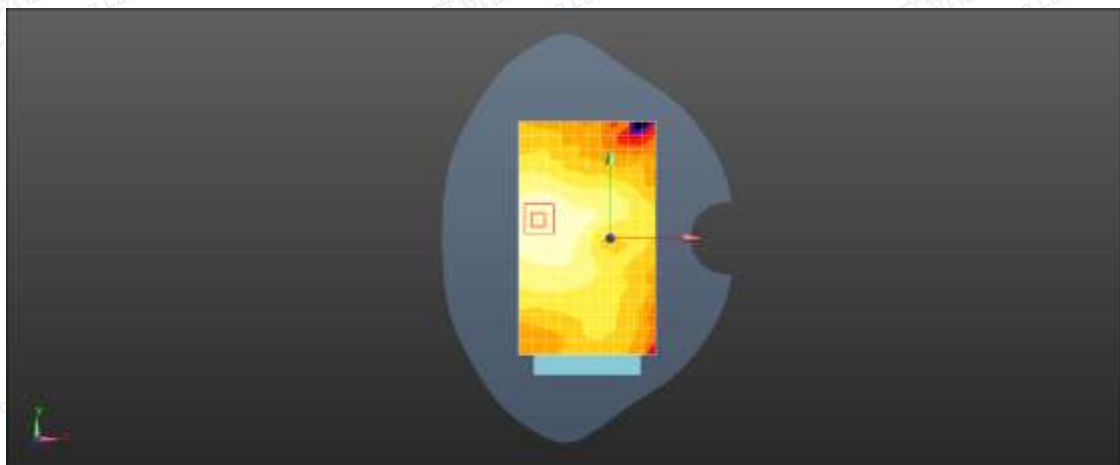
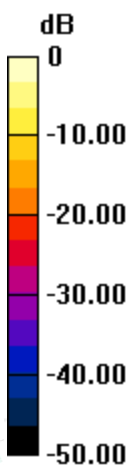
Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 3.441 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.342 W/kg

SAR(1 g) = 0.106 W/kg; SAR(10 g) = 0.036 W/kg

Maximum value of SAR (measured) = 0.260 W/kg



0 dB = 0.260 W/kg = -5.85 dBW/kg



Test Laboratory: LCS-SAR Lab

WIFI 5.8GHz 802.11a 157CH Front side 0mm ANT1**DUT: Hollyland VenusLiv V2 All-in-one Streaming Camera ; Type: VenusLiv V2; Serial: A240520122-1**

Communication System: UID 0, WIFI 5GHz (0); Frequency: 5785 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5785 \text{ MHz}$; $\sigma = 5.347 \text{ S/m}$; $\epsilon_r = 35.477$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(4.88, 4.88, 4.88); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (11x18x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.245 W/kg

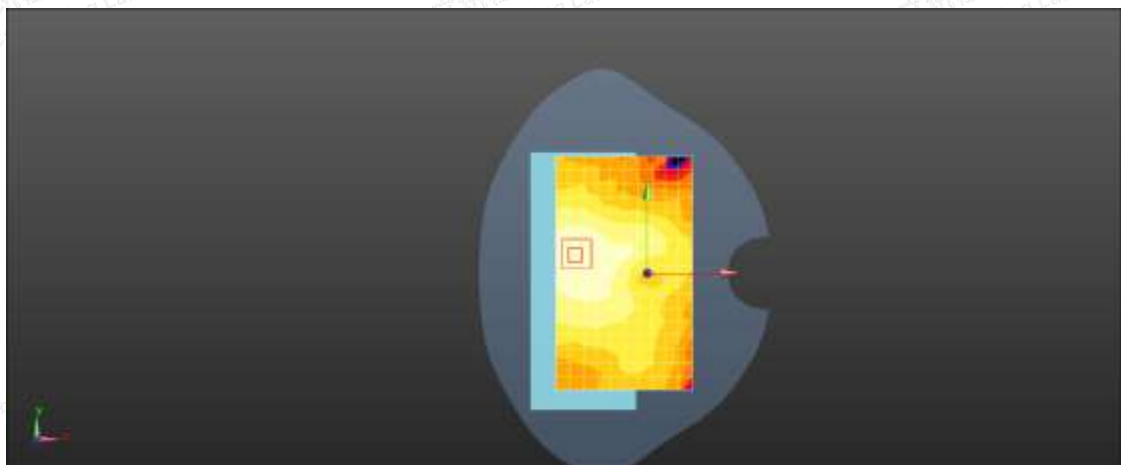
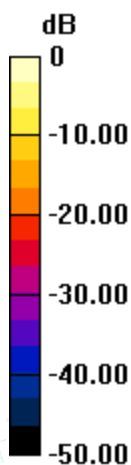
Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 3.276 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.426 W/kg

SAR(1 g) = 0.161 W/kg; SAR(10 g) = 0.074 W/kg

Maximum value of SAR (measured) = 0.174 W/kg



0 dB = 0.174 W/kg = -7.59 dBW/kg



Test Laboratory: LCS-SAR Lab

WIFI 5.8GHz 802.11n 157CH Front side 0mm ANT2**DUT: Hollyland VenusLiv V2 All-in-one Streaming Camera ; Type: VenusLiv V2; Serial: A240520122-1**

Communication System: UID 0, WIFI 5GHz (0); Frequency: 5785 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 5785 \text{ MHz}$; $\sigma = 5.347 \text{ S/m}$; $\epsilon_r = 35.477$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(4.88, 4.88, 4.88); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (11x18x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 0.278 W/kg

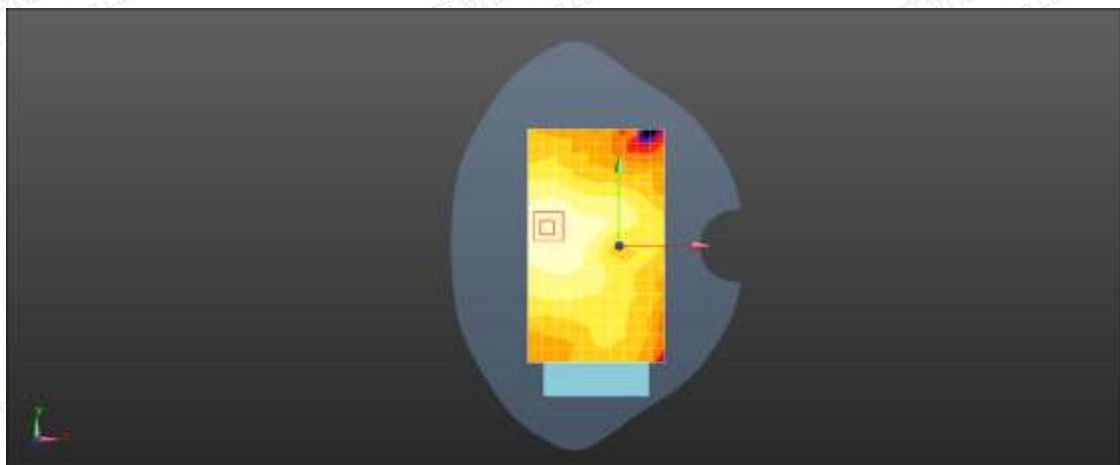
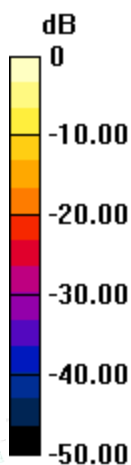
Configuration/Unnamed procedure/Zoom Scan (7x7x12)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2\text{mm}$

Reference Value = 3.114 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 0.432 W/kg

SAR(1 g) = 0.122 W/kg; SAR(10 g) = 0.058 W/kg

Maximum value of SAR (measured) = 0.285 W/kg



0 dB = 0.285 W/kg = -5.45 dBW/kg



Test Laboratory: LCS-SAR Lab

Bluetooth BLE_1M 39CH Left side 0mm**DUT: Hollyland VenusLiv V2 All-in-one Streaming Camera ; Type: VenusLiv V2; Serial: A240520122-1**

Communication System: UID 0, Bluetooth (0); Frequency: 2480 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2480$ MHz; $\sigma = 1.785$ S/m; $\epsilon_r = 38.745$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3805; ConvF(7.42, 7.42, 7.42); Calibrated: 2023/11/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn373; Calibrated: 2024/1/3
- Phantom: SAM v5.0; Type: SAM; Serial: 1850
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Unnamed procedure/Area Scan (10x15x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.565 W/kg

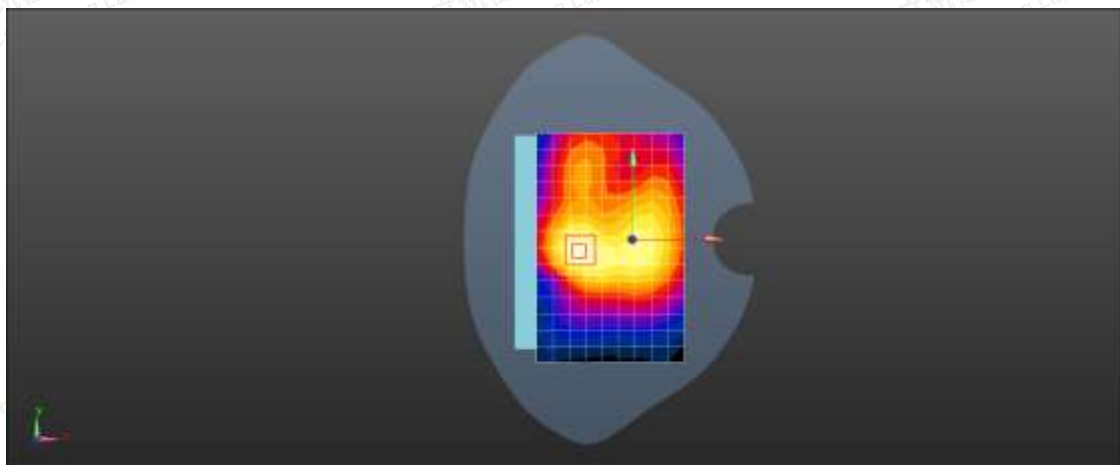
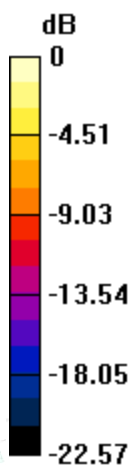
Configuration/Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.487 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 1.67 W/kg

SAR(1 g) = 0.285 W/kg; SAR(10 g) = 0.130 W/kg

Maximum value of SAR (measured) = 0.523 W/kg



0 dB = 0.523 W/kg = -2.81 dBW/kg





APPENDIX C: CALIBRATION CERTIFICATE

| |
|-----------------------------|
| 1. Dipole |
| D2450V2-SN 808(2023-10-23) |
| D5GHzV2-SN 1046(2023-10-23) |
| 2. DAE |
| DAE3-SN 373(2024-01-03) |
| 3. Probe |
| EX3DV4-SN 3805(2023-11-23) |





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中国认可
国际互认
校准
CALIBRATION
CNAS L0570



Client SHENZHEN LCS

Certificate No: 23J02Z80105

CALIBRATION CERTIFICATE

Object D2450V2 - SN: 808
Calibration Procedure(s) FF-Z11-003-01
Calibration Procedures for dipole validation kits
Calibration date: October 23, 2023

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 NRP2 | 106276 | 15-May-23 (CTTL, No.J23X04183) | May-24 |
| Power sensor NRP6A | 101369 | 15-May-23 (CTTL, No.J23X04183) | May-24 |
| Reference Probe EX3DV4 | SN 3617 | 31-Mar-23(CTTL-SPEAG,No.Z23-60161) | Mar-24 |
| DAE4 | SN 1556 | 11-Jan-23(CTTL-SPEAG,No.Z23-60034) | Jan-24 |
| Secondary Standards | ID # | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
| Signal Generator E4438C | MY49071430 | 05-Jan-23 (CTTL, No. J23X00107) | Jan-24 |
| NetworkAnalyzer E5071C | MY46110673 | 10-Jan-23 (CTTL, No. J23X00104) | Jan-24 |

| | Name | Function | Signature |
|----------------|-------------|--------------------|-----------|
| Calibrated by: | Zhao Jing | SAR Test Engineer | |
| Reviewed by: | Lin Hao | SAR Test Engineer | |
| Approved by: | Qi Dianyuan | SAR Project Leader | |

Issued: October 31, 2023

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

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) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

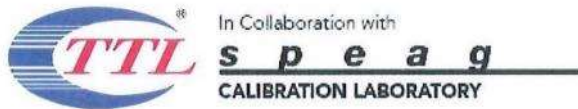
- c) DASY4/5 System Handbook

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 | 52.10.4 |
| 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 | |

Head TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|--|-----------------|--------------|------------------|
| Nominal Head TSL parameters | 22.0 °C | 39.2 | 1.80 mho/m |
| Measured Head TSL parameters | (22.0 ± 0.2) °C | 39.6 ± 6 % | 1.81 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 | 13.4 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 53.5 W/kg ± 18.8 % (k=2) |
| SAR averaged over 10 cm³ (10 g) of Head TSL | Condition | |
| SAR measured | 250 mW input power | 6.21 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 24.8 W/kg ± 18.7 % (k=2) |





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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

| | |
|--------------------------------------|---------------|
| Impedance, transformed to feed point | 51.4Ω+ 4.73jΩ |
| Return Loss | - 26.3dB |

General Antenna Parameters and Design

| | |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.061 ns |
|----------------------------------|----------|

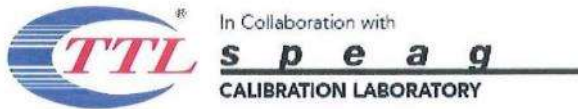
After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point can be measured.

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 feed-point may be damaged.

Additional EUT Data

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





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DASY5 Validation Report for Head TSL

Date: 2023-10-23

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 808

Communication System: UID 0, CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.813$ S/m; $\epsilon_r = 39.57$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.68, 7.68, 7.68) @ 2450 MHz; Calibrated: 2023-03-31
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2023-01-11
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

Reference Value = 97.77 V/m; Power Drift = -0.01 dB

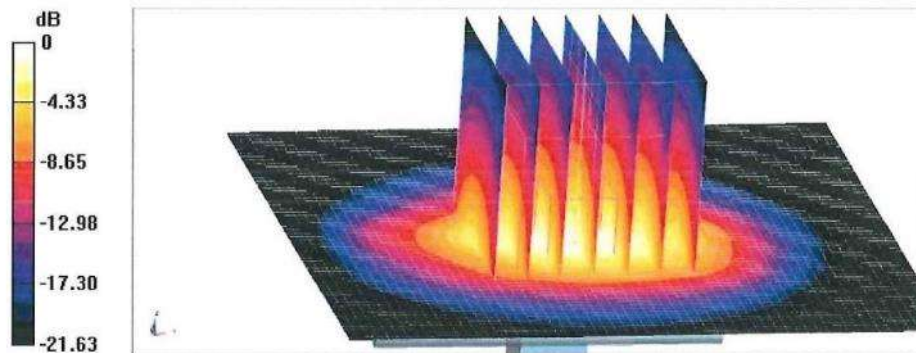
Peak SAR (extrapolated) = 27.8 W/kg

SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.21 W/kg

Smallest distance from peaks to all points 3 dB below = 8.9 mm

Ratio of SAR at M2 to SAR at M1 = 48.9%

Maximum value of SAR (measured) = 22.5 W/kg



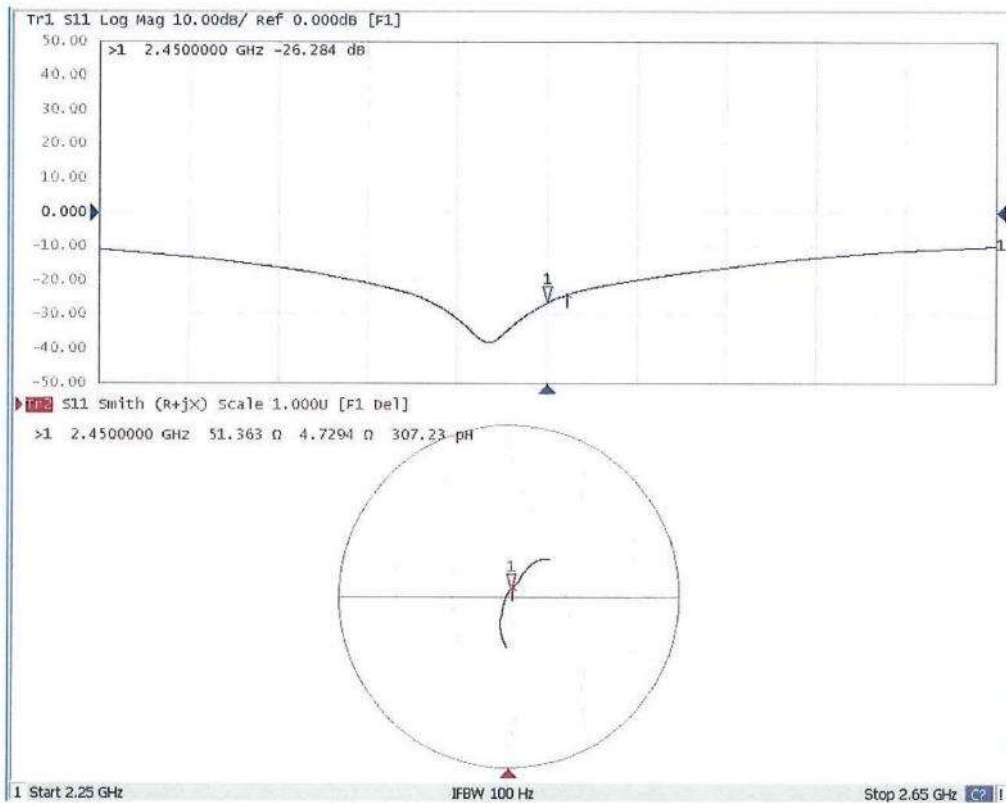
0 dB = 22.5 W/kg = 13.52 dBW/kg





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Impedance Measurement Plot for Head TSL





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Client **SHENZHEN LCS**

Certificate No: **23J02Z80106**

CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN: 1046**
Calibration Procedure(s) **FF-Z11-003-01**
Calibration Procedures for dipole validation kits
Calibration date: **October 23, 2023**

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 NRP2 | 106276 | 15-May-23 (CTTL, No.J23X04183) | May-24 |
| Power sensor NRP6A | 101369 | 15-May-23 (CTTL, No.J23X04183) | May-24 |
| Reference Probe EX3DV4 | SN 3617 | 31-Mar-23(CTTL-SPEAG,No.Z23-60161) | Mar-24 |
| DAE4 | SN 1556 | 11-Jan-23(CTTL-SPEAG,No.Z23-60034) | Jan-24 |
| Secondary Standards | ID # | Cal Date (Calibrated by, Certificate No.) | Scheduled Calibration |
| Signal Generator E4438C | MY49071430 | 05-Jan-23 (CTTL, No. J23X00107) | Jan-24 |
| NetworkAnalyzer E5071C | MY46110673 | 10-Jan-23 (CTTL, No. J23X00104) | Jan-24 |

| | Name | Function | Signature |
|----------------|-------------|--------------------|-----------|
| Calibrated by: | Zhao Jing | SAR Test Engineer | |
| Reviewed by: | Lin Hao | SAR Test Engineer | |
| Approved by: | Qi Dianyuan | SAR Project Leader | |

Issued: October 31, 2023

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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) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- c) 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.

Table with 3 columns: Parameter, Value, and Note. Rows include DASY Version (DASY52, 52.10.4), 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)), and Frequency (5250 MHz ± 1 MHz, 5600 MHz ± 1 MHz, 5750 MHz ± 1 MHz).

Head TSL parameters at 5250MHz

The following parameters and calculations were applied.

Table with 4 columns: Parameter, Temperature, Permittivity, and Conductivity. Rows include 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 %, 4.75 mho/m ± 6 %), and Head TSL temperature change during test (<1.0 °C, ---, ---).

SAR result with Head TSL at 5250MHz

Table with 3 columns: SAR description, Condition, and Value. Rows include SAR averaged over 1 cm³ (1 g) of Head TSL (100 mW input power, 7.82 W/kg), SAR for nominal Head TSL parameters (normalized to 1W, 78.1 W/kg ± 24.4 % (k=2)), SAR averaged over 10 cm³ (10 g) of Head TSL (100 mW input power, 2.22 W/kg), and SAR for nominal Head TSL parameters (normalized to 1W, 22.2 W/kg ± 24.2 % (k=2)).





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Head TSL parameters at 5600MHz

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 | 35.1 ± 6 % | 5.14 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C | ---- | ---- |

SAR result with Head TSL at 5600MHz

| | | |
|---|--------------------|--------------------------|
| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | |
| SAR measured | 100 mW input power | 8.20 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 81.9 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm ³ (10 g) of Head TSL | Condition | |
| SAR measured | 100 mW input power | 2.31 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 23.1 W/kg ± 24.2 % (k=2) |

Head TSL parameters at 5750MHz

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 | 34.9 ± 6 % | 5.30 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C | ---- | ---- |

SAR result with Head TSL at 5750MHz

| | | |
|---|--------------------|--------------------------|
| SAR averaged over 1 cm ³ (1 g) of Head TSL | Condition | |
| SAR measured | 100 mW input power | 7.76 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 77.4 W/kg ± 24.4 % (k=2) |
| SAR averaged over 10 cm ³ (10 g) of Head TSL | Condition | |
| SAR measured | 100 mW input power | 2.17 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | 21.6 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 5250MHz

Table with 2 columns: Parameter (Impedance, Return Loss) and Value (49.9Ω- 3.71jΩ, -28.6dB)

Antenna Parameters with Head TSL at 5600MHz

Table with 2 columns: Parameter (Impedance, Return Loss) and Value (55.3Ω+ 0.26jΩ, -25.9dB)

Antenna Parameters with Head TSL at 5750MHz

Table with 2 columns: Parameter (Impedance, Return Loss) and Value (54.6Ω+ 1.18jΩ, -26.8dB)

General Antenna Parameters and Design

Table with 2 columns: Parameter (Electrical Delay) and Value (1.105 ns)

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

Additional EUT Data

Table with 2 columns: Parameter (Manufactured by) and Value (SPEAG)





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DASY5 Validation Report for Head TSL

Date: 2023-10-23

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1046

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

Medium parameters used: $f = 5250$ MHz; $\sigma = 4.752$ S/m; $\epsilon_r = 35.73$; $\rho = 1000$ kg/m³Medium parameters used: $f = 5600$ MHz; $\sigma = 5.135$ S/m; $\epsilon_r = 35.13$; $\rho = 1000$ kg/m³Medium parameters used: $f = 5750$ MHz; $\sigma = 5.301$ S/m; $\epsilon_r = 34.91$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(5.5, 5.5, 5.5) @ 5250 MHz; ConvF(5.01, 5.01, 5.01) @ 5600 MHz; ConvF(5.15, 5.15, 5.15) @ 5750 MHz; Calibrated: 2023-03-31
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2023-01-11
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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 = 66.26 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 31.8 W/kg

SAR(1 g) = 7.82 W/kg; SAR(10 g) = 2.22 W/kg

Smallest distance from peaks to all points 3 dB below = 7.4 mm

Ratio of SAR at M2 to SAR at M1 = 65.1%

Maximum value of SAR (measured) = 18.4 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 = 68.69 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 36.7 W/kg

SAR(1 g) = 8.2 W/kg; SAR(10 g) = 2.31 W/kg

Smallest distance from peaks to all points 3 dB below = 7.4 mm

Ratio of SAR at M2 to SAR at M1 = 62%

Maximum value of SAR (measured) = 20.1 W/kg



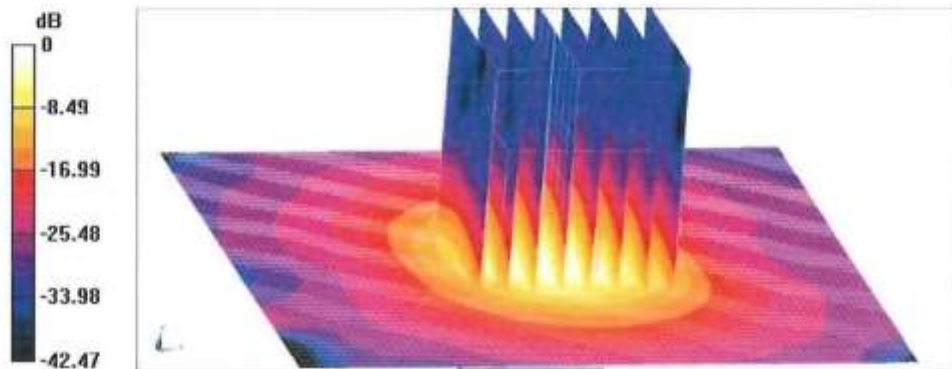


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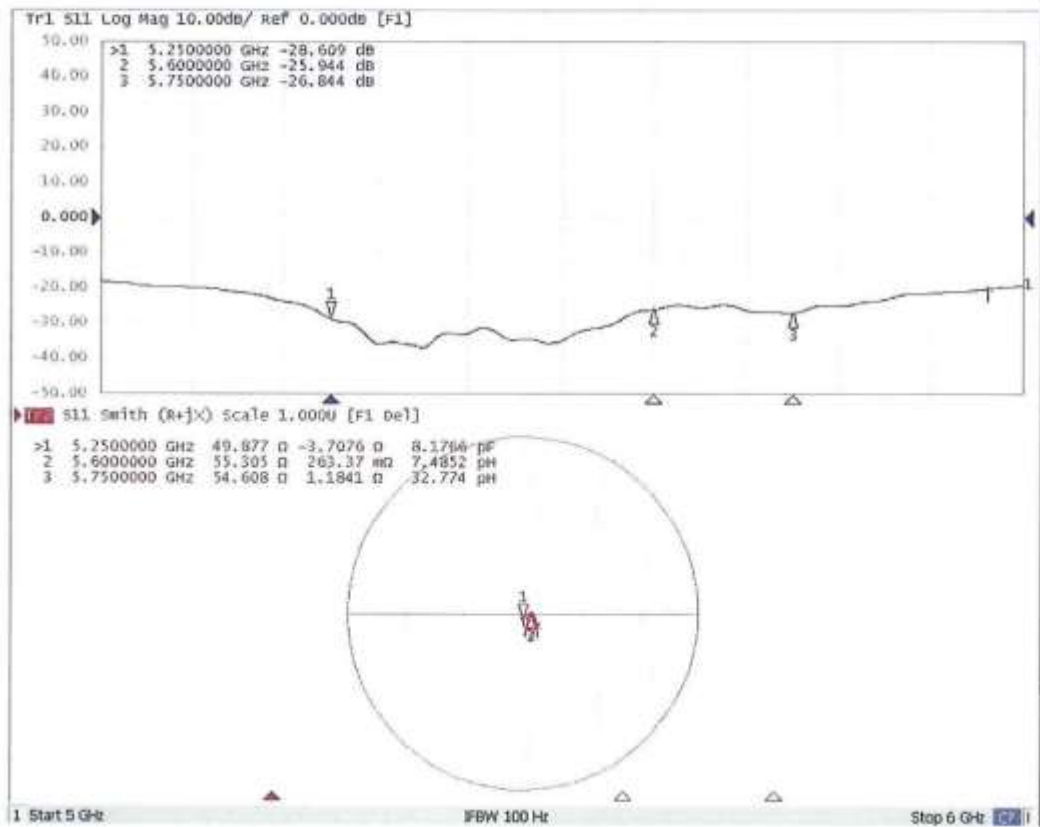
Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan,
dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 69.29 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 36.1 W/kg
SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.17 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 60.8%
Maximum value of SAR (measured) = 19.3 W/kg





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Impedance Measurement Plot for Head TSL





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Client : SHENZHEN LCS

Certificate No: 23J02Z80217

CALIBRATION CERTIFICATE

Object: DAE3 - SN: 373

Calibration Procedure(s): FF-Z11-002-01
Calibration Procedure for the Data Acquisition Electronics (DAEx)

Calibration date: January 03, 2024

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 | 12-Jun-23 (CTTL, No.J23X05436) | Jun-24 |

| | Name | Function | Signature |
|----------------|-------------|--------------------|-----------|
| Calibrated by: | Yu Zongying | SAR Test Engineer | |
| Reviewed by: | Lin Jun | SAR Test Engineer | |
| Approved by: | Qi Dianyuan | SAR Project Leader | |

Issued: January 04, 2024

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Glossary:

DAE data acquisition electronics
Connector angle information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters:

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle:* The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The report provide only calibration results for DAE, it does not contain other performance test results.





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DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1µV, full range = -100...+300 mV
Low Range: 1LSB = 61nV, full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| Calibration Factors | X | Y | Z |
|---------------------|-----------------------|-----------------------|-----------------------|
| High Range | 402.650 ± 0.15% (k=2) | 403.231 ± 0.15% (k=2) | 402.697 ± 0.15% (k=2) |
| Low Range | 3.92127 ± 0.7% (k=2) | 3.97784 ± 0.7% (k=2) | 3.93537 ± 0.7% (k=2) |

Connector Angle

| | |
|---|------------|
| Connector Angle to be used in DASY system | 293° ± 1 ° |
|---|------------|





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Client SHENZHEN LCS

Certificate No: 23J02Z80102

CALIBRATION CERTIFICATE

Object EX3DV4 - SN : 3805
Calibration Procedure(s) FF-Z11-004-02
Calibration Procedures for Dosimetric E-field Probes
Calibration date: November 23, 2023

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 NRP2 | 101919 | 12-Jun-23(CTTL, No.J23X05435) | Jun-24 |
| Power sensor NRP-Z91 | 101547 | 12-Jun-23(CTTL, No.J23X05435) | Jun-24 |
| Power sensor NRP-Z91 | 101548 | 12-Jun-23(CTTL, No.J23X05435) | Jun-24 |
| Reference 10dBAttenuator | 18N50W-10dB | 19-Jan-23(CTTL, No.J23X00212) | Jan-25 |
| Reference 20dBAttenuator | 18N50W-20dB | 19-Jan-23(CTTL, No.J23X00211) | Jan-25 |
| Reference Probe EX3DV4 | SN 3846 | 31-May-23(SPEAG, No.EX-3846_May23) | May-24 |
| DAE4 | SN 1555 | 24-Aug-23(SPEAG, No.DAE4-1555_Aug23) | Aug-24 |
| Secondary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
| SignalGenerator MG3700A | 6201052605 | 12-Jun-23(CTTL, No.J23X05434) | Jun-24 |
| Network Analyzer E5071C | MY46110673 | 10-Jan-23(CTTL, No.J23X00104) | Jan-24 |
| Reference 10dBAttenuator | BT0520 | 11-May-23(CTTL, No.J23X04061) | May-25 |
| Reference 20dBAttenuator | BT0267 | 11-May-23(CTTL, No.J23X04062) | May-25 |
| OCP DAK-3.5 | SN 1040 | 18-Jan-23(SPEAG, No.OCP-DAK3.5-1040_Jan23) | Jan-24 |

| | Name | Function | Signature |
|----------------|-------------|--------------------|-----------|
| Calibrated by: | Yu Zongying | SAR Test Engineer | |
| Reviewed by: | Lin Hao | SAR Test Engineer | |
| Approved by: | Qi Dianyuan | SAR Project Leader | |

Issued: November 28, 2023

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





In Collaboration with
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CALIBRATION LABORATORY



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Glossary:

| | |
|-----------------------|---|
| TSL | tissue simulating liquid |
| NORM _{x,y,z} | sensitivity in free space |
| ConvF | sensitivity in TSL / NORM _{x,y,z} |
| DCP | diode compression point |
| 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 an axis that is in the plane normal to probe axis (at measurement center), i $\theta=0$ is normal to probe axis |
| Connector Angle | information used in DASY system to align probe sensor X to the robot coordinate system |

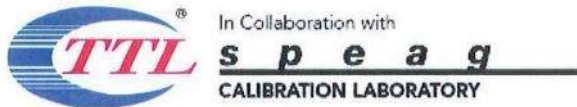
Calibration is Performed According to the Following Standards:

- 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"

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}*: Assessed for E-field polarization $\theta=0$ ($f \leq 900\text{MHz}$ in TEM-cell; $f > 1800\text{MHz}$: waveguide). *NORM_{x,y,z}* are only intermediate values, i.e., the uncertainties of *NORM_{x,y,z}* does not effect the E^2 -field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions 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 characteristics.
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}; A,B,C* 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 $f \leq 800\text{MHz}$) and inside waveguide using analytical field distributions based on power measurements for $f > 800\text{MHz}$. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORM_{x,y,z} * ConvF* whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from $\pm 50\text{MHz}$ to $\pm 100\text{MHz}$.
- 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 *NORM_x* (no uncertainty required).





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DASY/EASY – Parameters of Probe: EX3DV4 – SN:3805

Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|--------------------------------------|----------|----------|----------|-----------|
| Norm($\mu V/(V/m)^2$) ^A | 0.49 | 0.63 | 0.45 | ±10.0% |
| DCP(mV) ^B | 101.4 | 97.7 | 101.4 | |

Modulation Calibration Parameters

| UID | Communication System Name | | A dB | B dB $\sqrt{\mu V}$ | C | D dB | VR mV | Unc ^E (k=2) |
|-----|---------------------------|---|------|---------------------|-----|------|-------|------------------------|
| 0 | CW | X | 0.0 | 0.0 | 1.0 | 0.00 | 169.0 | ±2.5% |
| | | Y | 0.0 | 0.0 | 1.0 | | 189.9 | |
| | | Z | 0.0 | 0.0 | 1.0 | | 155.5 | |

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%.

^A The uncertainties of Norm X, Y, Z do not affect the E²-field uncertainty inside TSL (see Page 4).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.





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DASY/EASY – Parameters of Probe: EX3DV4 – SN:3805

Calibration Parameter Determined in Head Tissue Simulating Media

| f [MHz] ^C | Relative Permittivity ^F | Conductivity (S/m) ^F | ConvF X | ConvF Y | ConvF Z | Alpha ^G | Depth ^G (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750 | 41.9 | 0.89 | 9.66 | 9.66 | 9.66 | 0.14 | 1.30 | ±12.7% |
| 835 | 41.5 | 0.90 | 9.26 | 9.26 | 9.26 | 0.13 | 1.43 | ±12.7% |
| 1750 | 40.1 | 1.37 | 8.16 | 8.16 | 8.16 | 0.23 | 1.09 | ±12.7% |
| 1900 | 40.0 | 1.40 | 7.85 | 7.85 | 7.85 | 0.24 | 1.04 | ±12.7% |
| 2000 | 40.0 | 1.40 | 7.83 | 7.83 | 7.83 | 0.22 | 1.13 | ±12.7% |
| 2300 | 39.5 | 1.67 | 7.66 | 7.66 | 7.66 | 0.40 | 0.87 | ±12.7% |
| 2450 | 39.2 | 1.80 | 7.42 | 7.42 | 7.42 | 0.36 | 0.94 | ±12.7% |
| 2600 | 39.0 | 1.96 | 7.17 | 7.17 | 7.17 | 0.39 | 0.97 | ±12.7% |
| 3300 | 38.2 | 2.71 | 7.01 | 7.01 | 7.01 | 0.47 | 0.90 | ±13.9% |
| 3500 | 37.9 | 2.91 | 6.87 | 6.87 | 6.87 | 0.45 | 1.02 | ±13.9% |
| 3700 | 37.7 | 3.12 | 6.65 | 6.65 | 6.65 | 0.35 | 1.25 | ±13.9% |
| 3900 | 37.5 | 3.32 | 6.60 | 6.60 | 6.60 | 0.40 | 1.25 | ±13.9% |
| 4100 | 37.2 | 3.53 | 6.54 | 6.54 | 6.54 | 0.40 | 1.15 | ±13.9% |
| 4200 | 37.1 | 3.63 | 6.45 | 6.45 | 6.45 | 0.35 | 1.35 | ±13.9% |
| 4400 | 36.9 | 3.84 | 6.36 | 6.36 | 6.36 | 0.40 | 1.25 | ±13.9% |
| 4600 | 36.7 | 4.04 | 6.26 | 6.26 | 6.26 | 0.40 | 1.30 | ±13.9% |
| 4800 | 36.4 | 4.25 | 6.20 | 6.20 | 6.20 | 0.40 | 1.38 | ±13.9% |
| 4950 | 36.3 | 4.40 | 5.95 | 5.95 | 5.95 | 0.40 | 1.40 | ±13.9% |
| 5250 | 35.9 | 4.71 | 5.38 | 5.38 | 5.38 | 0.40 | 1.50 | ±13.9% |
| 5600 | 35.5 | 5.07 | 4.75 | 4.75 | 4.75 | 0.50 | 1.30 | ±13.9% |
| 5750 | 35.4 | 5.22 | 4.88 | 4.88 | 4.88 | 0.45 | 1.40 | ±13.9% |

^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.

^F At frequency up to 6 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

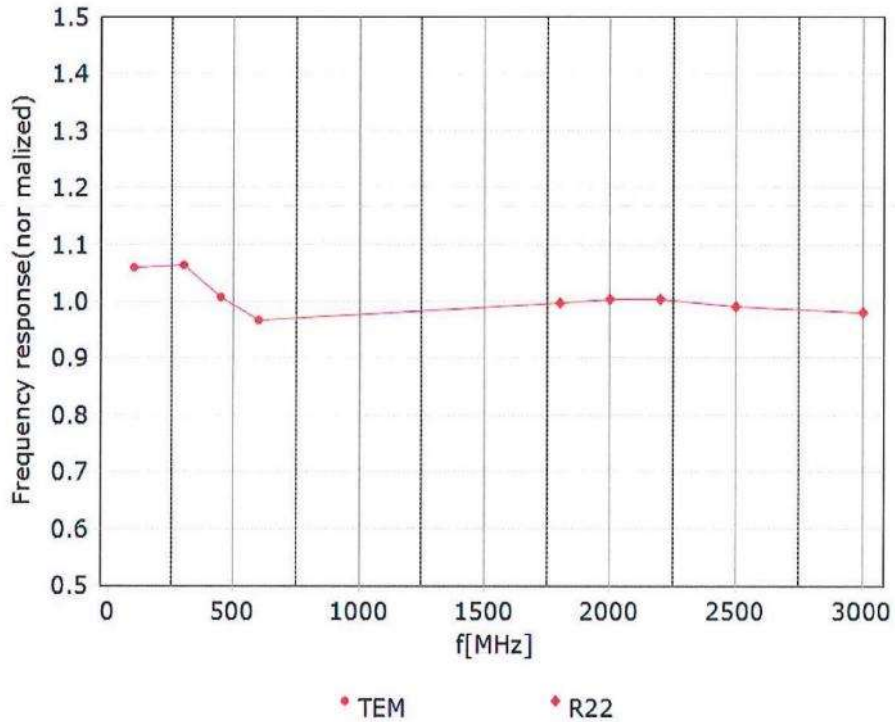
^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.





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



Uncertainty of Frequency Response of E-field: $\pm 7.4\%$ ($k=2$)



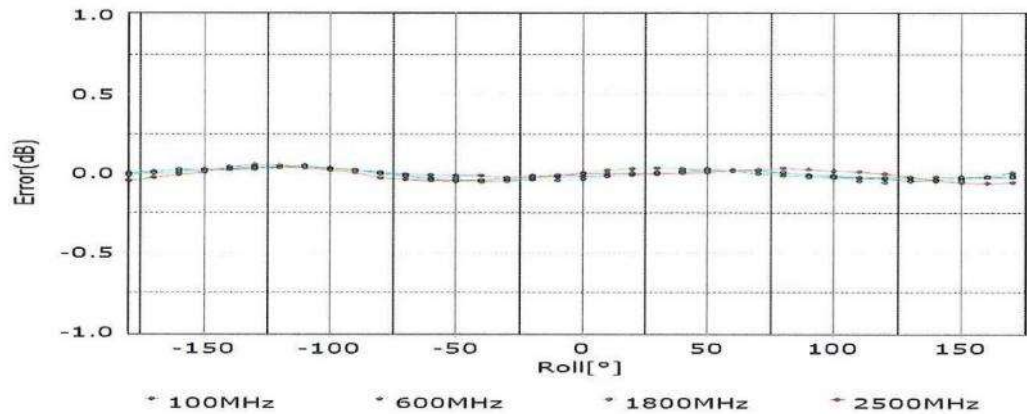
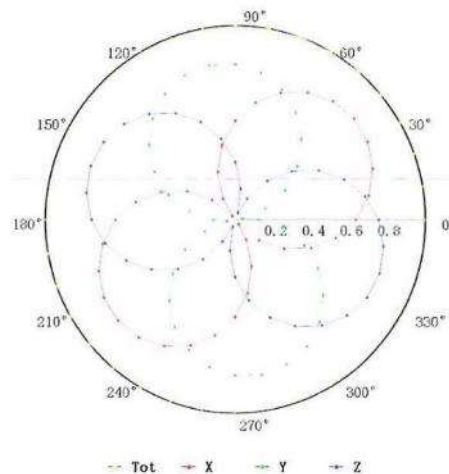
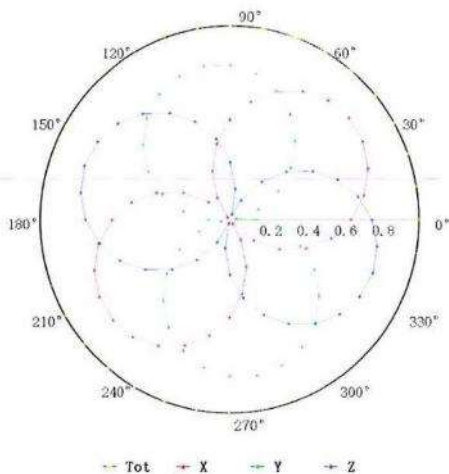


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Receiving Pattern (Φ), $\theta=0^\circ$

f=600 MHz, TEM

f=1800 MHz, R22



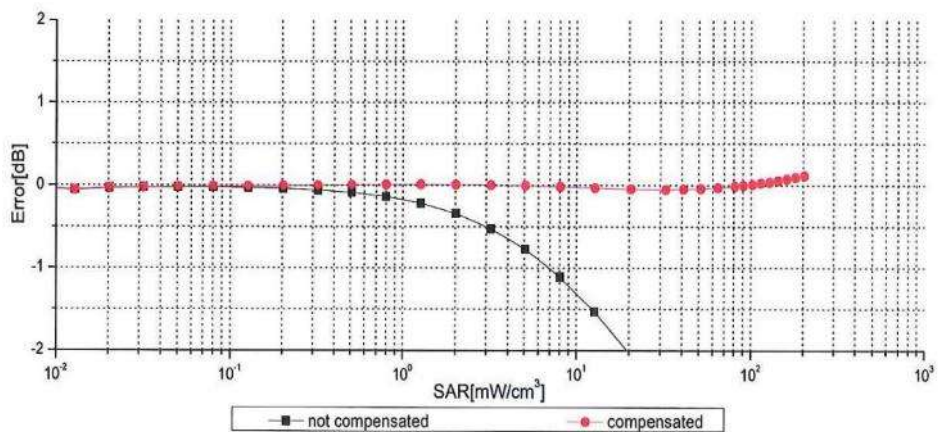
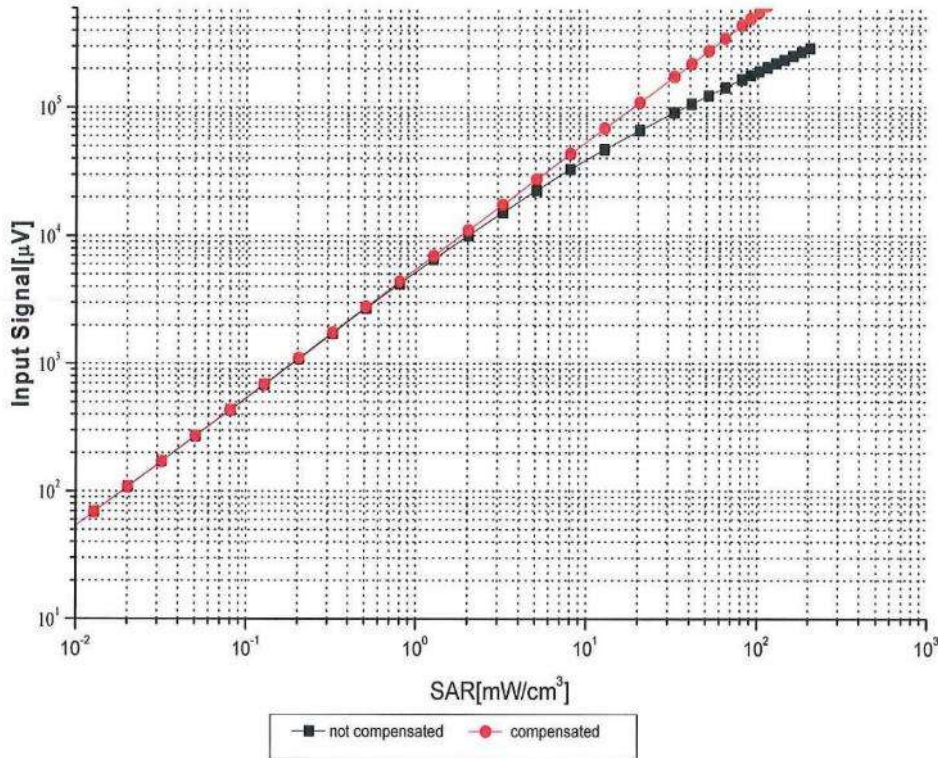
Uncertainty of Axial Isotropy Assessment: $\pm 1.2\%$ ($k=2$)





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Dynamic Range f(SAR_{head}) (TEM cell, f = 900 MHz)



Uncertainty of Linearity Assessment: ±0.9% (k=2)



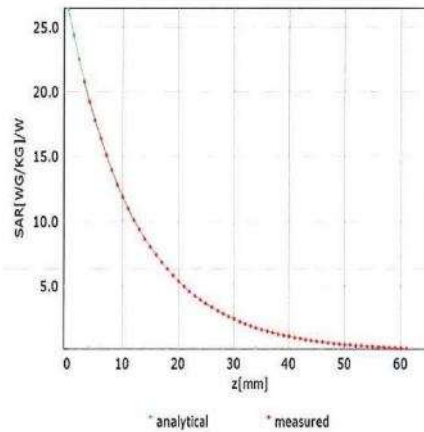
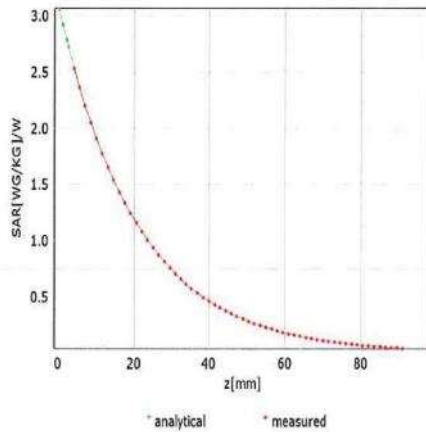


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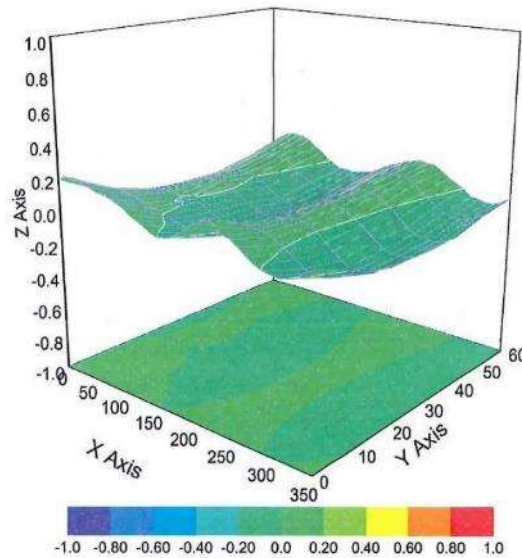
Conversion Factor Assessment

f=750 MHz,WGLS R9(H_convF)

f=1750 MHz,WGLS R22(H_convF)



Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: $\pm 3.2\%$ ($k=2$)





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DASY/EASY – Parameters of Probe: EX3DV4 – SN:3805

Other Probe Parameters

| | |
|---|------------|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | 127.3 |
| 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 |





APPENDIX D: PHOTOGRAPHS

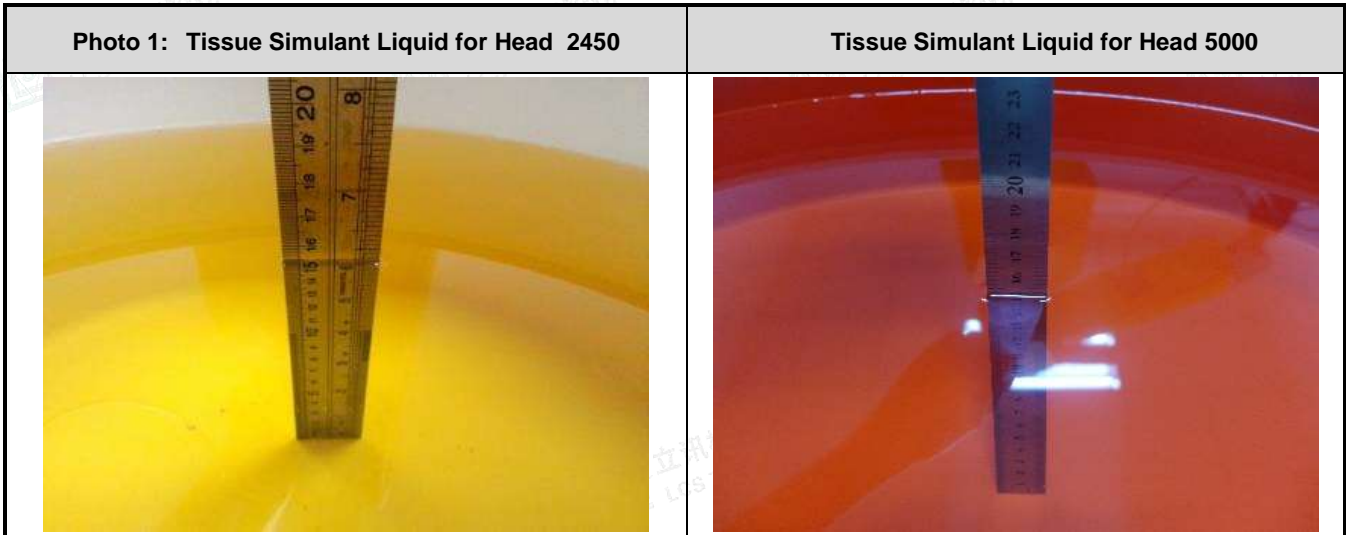
| |
|--|
| 1. SAR measurement System |
| 2. Photographs of Tissue Simulate Liquid |
| 3. Photographs of EUT test position |
| 4. EUT Constructional Details |



1. SAR measurement System



2. Photographs of Tissue Simulate Liquid



3. Photographs of EUT test position



4. EUT Constructional Details



.....The End of Test Report.....

