# FCC SAR Test Report

## FCC ID: 2BNOR-ID9

| | | |
|---|---|---|
| **Project No.** | : | 2607C175 |
| **Equipment** | : | Obook Laptop |
| **Brand Name** | : | ORICO |
| **Model Name** | : | ORICO-H1-15-680-12256-SV, the other models please refer to page 8. |
| **Date of Receipt** | : | Jul. 20, 2026 |
| **Date of Test** | : | Jul. 21, 2026 ~ Jul. 24, 2026 |
| **Issued Date** | : | |
| **Test Sample** | : | Engineering Sample No.: DG920260720320 |
| **Standard(s)** | : | Please refer to page 2. |
| **Applicant** | : | SHENZHEN ORICO TECHNOLOGIES CO.,LTD |
| **Address** | : | 1903-1904.14A,Zhonghaixin Innovation Industrial Park, no.12, Gan Lee Sixth Road, Gankeng Community, Jihua Street, Shenzhen, China |
| **Manufacturer** | : | SHENZHEN ORICO TECHNOLOGIES CO.,LTD |
| **Address** | : | 1903-1904.14A,Zhonghaixin Innovation Industrial Park, no.12, Gan Lee Sixth Road, Gankeng Community, Jihua Street, Shenzhen, China |
| **Factory** | : | Dongguan Huaming Teng Technology Co., Ltd. |
| **Address** | : | Room 702, Building 1, No. 68 Xingzhou Road, Shatian Town, Dongguan City, Guangdong Province |

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc. (Dongguan).

**Prepared by** : Justin Huang

Justin Huang

**Approved by** : Herbort Liu

Herbort Liu

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| | | |
|---|---|---|
| **Standard(s)** | : | **IEEE Std C95.1:2019** IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 kHz to 300 GHz<br><br>**IEEE Std 1528$^{TM}$-2013** IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques<br><br>**IEC/IEEE 62209-1528:2020** 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).<br><br>**KDB447498 D04** Interim General RF Exposure Guidance v01<br>**KDB865664 D01** SAR measurement 100 MHz to 6 GHz v01r04 |
| **Test Method** | : | **KDB616217 D04** SAR for laptop and tablets v01r02<br>**KDB248227 D01** 802.11 Wi-Fi SAR v02r02<br>**KDB865664 D02** SAR Reporting v01r02<br>**KDB690783 D01** SAR Listings on Grants v01r03 |

**Declaration**

**BTL** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

**BTL**'s reports apply only to the specific samples tested under conditions. It is manufacturer’s responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. BTL assumes no responsibility for the data provided by the customer, any statements, inferences or generalizations drawn by the customer or others from the reports issued by BTL.

The report must not be used by the client to claim product certification, approval, or endorsement by A2LA or any agency of the U.S. Government.

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**BTL**’s laboratory quality assurance procedures are in compliance with the ISO/IEC 17025: 2017 requirements, and accredited by the conformity assessment authorities listed in this test report.

**BTL** is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer’s responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

**Limitation**

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.
Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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# REVISION HISTORY

| Report No. | Version | Description | Issued Date | Note |
|---|---|---|---|---|
| BTL-FCC SAR-1-2607C175 | R00 | Original Report. | | Valid |

# 1. GENERAL INFORMATION

## 1.1 STATEMENT OF COMPLIANCE

| Mode | Highest Reported Body SAR-1g (W/kg) |
|---|---|
| **WLAN 2.4G** | 0.07 |
| **WLAN 5.2G** | 0.23 |
| **WLAN 5.8G** | 0.46 |
| **Bluetooth** | / |

Note:
1) The device is in compliance with Specific Absorption Rate (SAR) for general population uncontrolled exposure limits according to the FCC rule §2.1093, the ANSI/IEEE C95.1, the NCRP Report Number 86 for uncontrolled environment, and had been tested in accordance with the measurement methods and procedures specified in IEC/IEEE 62209-1528.

## 1.2 LABORATORY ENVIRONMENT

| | |
|---|---|
| Temperature | Min. = 18ºC, Max. = 25ºC |
| Relative humidity | Min. = 30%, Max. = 70% |
| Ground system resistance | < 0.5Ω |
| Ambient noise is checked and found very low and in compliance with requirement of standards.<br>Reflection of surrounding objects is minimized and in compliance with requirement of standards. | |

### 1.3 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td colspan="6">Obook Laptop</td></tr>
<tr><td>Brand Name</td><td colspan="6">ORICO</td></tr>
<tr><td>Test Model</td><td colspan="6">ORICO-H1-15-680-12256-SV</td></tr>
<tr><td>Model Name</td><td colspan="6">ORICO-H1-15-680-12256-SV, ORICO-H1-15-680-12512-SV, ORICO-H1-15-680-121000-SV, ORICO-H1-15-680-24512-SV, ORICO-H1-15-680-241000-SV, ORICO-H1-15-680-12256-PK, ORICO-H1-15-680-12512-PK, ORICO-H1-15-680-121000-PK, ORICO-H1-15-680-24512-PK, ORICO-H1-15-680-241000-PK, ORICO-H1-15-680-12256-BL, ORICO-H1-15-680-12512-BL, ORICO-H1-15-680-121000-BL, ORICO-H1-15-680-24512-BL, ORICO-H1-15-680-241000-BL, ORICO-H1-15-680-12256-US-SV, ORICO-H1-15-680-12512-US-SV, ORICO-H1-15-680-121000-US-SV, ORICO-H1-15-680-24512-US-SV, ORICO-H1-15-680-241000-US-SV, ORICO-H1-15-680-12256-US-PK, ORICO-H1-15-680-12512-US-PK, ORICO-H1-15-680-121000-US-PK, ORICO-H1-15-680-24512-US-PK, ORICO-H1-15-680-241000-US-PK, ORICO-H1-15-680-12256-US-BL, ORICO-H1-15-680-12512-US-BL, ORICO-H1-15-680-121000-US-BL, ORICO-H1-15-680-24512-US-BL, ORICO-H1-15-680-241000-US-BL</td></tr>
<tr><td>Model Difference(s)</td><td colspan="6">Which represents different sales area divisions, and does not affect the and EMC performance of the product.</td></tr>
<tr><td>Hardware Version</td><td colspan="6">V2.0</td></tr>
<tr><td>Software Version</td><td colspan="6">V3.0</td></tr>
<tr><td>Modulation</td><td colspan="6">WiFi(DSSS/OFDM/OFDMA), BT(GFSK/π/4-DQPSK/8-DPSK)</td></tr>
<tr><td rowspan="5">Operation Frequency Range(s)</td><td colspan="2">Band</td><td colspan="2">TX (MHz)</td><td colspan="2">RX (MHz)</td></tr>
<tr><td colspan="2">Bluetooth</td><td colspan="4">2400~2483.5</td></tr>
<tr><td colspan="2">WiFi 2.4G</td><td colspan="4">2400~2483.5</td></tr>
<tr><td colspan="2">WiFi 5.2G</td><td colspan="4">5150~5250</td></tr>
<tr><td colspan="2">WiFi 5.8G</td><td colspan="4">5725~5850</td></tr>
<tr><td rowspan="8">Test Channels<br>(low-mid-high)</td><td colspan="6">0-39-78 (BT)</td></tr>
<tr><td colspan="6">0-19-39 (BLE)</td></tr>
<tr><td colspan="6">1-6-11 (WiFi 2.4G 802.11b/g/n HT20/ax HE20)</td></tr>
<tr><td colspan="6">3-6-9 (WiFi 2.4G 802.11n HT40/ax HE40)</td></tr>
<tr><td colspan="2">Band</td><td colspan="2">WiFi 5.2G</td><td colspan="2">WiFi 5.8G</td></tr>
<tr><td colspan="2">802.11a<br>802.11n HT20<br>802.11ac VHT20<br>802.11ax HE20</td><td colspan="2">36-40-48</td><td colspan="2">149-157-165</td></tr>
<tr><td colspan="2">802.11n HT40<br>802.11ac VHT40<br>802.11ax HE40</td><td colspan="2">38-46</td><td colspan="2">151-159</td></tr>
<tr><td colspan="2">802.11ac VHT80<br>802.11ax HE80</td><td colspan="2">42</td><td colspan="2">155</td></tr>
<tr><td rowspan="5">Antenna Information</td><td>Ant.</td><td>Manufacturer</td><td>Model Name</td><td>Type</td><td>Band</td><td>Gain (dBi)</td></tr>
<tr><td rowspan="2">Main</td><td rowspan="2">N/A</td><td rowspan="2">N/A</td><td rowspan="2">PCB</td><td>2.4GHz</td><td>2.45</td></tr>
<tr><td>5GHz</td><td>4.95</td></tr>
<tr><td rowspan="2">Aux</td><td rowspan="2">N/A</td><td rowspan="2">N/A</td><td rowspan="2">PCB</td><td>2.4GHz / BT</td><td>2.86</td></tr>
<tr><td>5GHz</td><td>4.57</td></tr>
</table>

| Other Information | | |
|---|---|---|
| Battery Information | Model Name | W042-ID9 |
| | Power Rating | Rated Voltage: 11.55Vdc<br>Rated Capacity: 4700mAh<br>Nominal Energy: 54.29Wh<br>Limited Changed Voltage: 13.2Vdc |
| | Manufacturer | Chongqing VDL Electronics Co.,Ltd. |

Note: The antenna gain is provided by the manufacturer.

### 1.4 MAIN TEST INSTRUMENTS

| Item | Equipment | Manufacturer | Model | Serial No. | Cal. Date | Cal. Interval |
|---|---|---|---|---|---|---|
| 1 | DASY5 System | Speag | DASY 5 | N/A | N/A | N/A |
| 2 | Data Acquisition Electronics | Speag | DAE4 | 1390 | Nov. 19, 2025 | 1 Year |
| 3 | E-field Probe | Speag | EX3DV4 | 7693 | Nov. 26, 2025 | 1 Year |
| 4 | System Validation Dipole | Speag | D2450V2 | 919 | Apr. 22, 2024 | 3 Years |
| 5 | System Validation Dipole | Speag | D5GHzV2 | 1160 | Apr. 25, 2024 | 3 Years |
| 6 | ELI Phantom | Speag | ELI Phantom V5.0 | 1222 | N/A | N/A |
| 7 | Power Amplifier | Mini-Circuits | ZHL-42W+ | QA1333003 | Apr. 26, 2026 | 1 Year |
| 8 | Power Amplifier | Mini-Circuits | ZVE-8G+ | 520701341 | Dec. 20, 2025 | 1 Year |
| 9 | DC Source metter | Iteck | IT6154 | 0061041267682 01001 | Apr. 26, 2026 | 1 Year |
| 10 | Vector Network Analyzer | Agilent | E5071C | MY46102965 | Dec. 20, 2025 | 1 Year |
| 11 | Signal Generator | Agilent | N5172B | MY53050758 | Dec. 20, 2025 | 1 Year |
| 12 | Smart Power Sensor | R&S | NRP18S | 103226 | Jan. 05, 2026 | 1 Year |
| 13 | 3.5mm Economy Calibration Kit | Agilent | 85052D | MY43252246 | Nov. 20, 2025 | 1 Year |
| 14 | Dielectric Assessment Kit | Speag | DAK-3.5 | 1226 | Feb. 19, 2026 | 1 Year |
| 15 | Directional Coupler | Talent Microwave | TC-05180-20S | 210628013 | Dec. 20, 2025 | 1 Year |
| 16 | Coupler | Woken | ATD10-400M-6G-A2 | 2021008 | Apr. 26, 2026 | 1 Year |
| 17 | Liquid Thermometer | Nscing Es | YZ6021S | / | Nov. 13, 2025 | 1 Year |

Note:
1. "N/A" denotes no model name, serial No. or calibration specified.
2.
1) Per KDB865664 D01 requirements for dipole calibration, the test laboratory has adopted three-year extended calibration interval. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.
  a) There is no physical damage on the dipole;
  b) System check with specific dipole is within 10% of calibrated value;
  c) The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement;
  d) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the previous measurement.
2) Network analyzer probe calibration against air, distilled water and a short block performed before measuring liquid parameters.

# 2. RF EMISSIONS MEASUREMENT

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is SAR room at the location of No.3, Jinshagang 1st Road, Dalang, Dongguan, Guangdong People’s Republic of China.
BTL's Registration Number for FCC: 747969
BTL's Designation Number for FCC: CN1377

## 2.2 MEASUREMENT UNCERTAINTY

**Uncertainty Budget for Frequency range of 300 MHz to 3 GHz**

| Symbol | Input quantity *Xi* (source of uncertainty) | Unc. Value | Prob. Dist. | Div. | ci (1g) | ci (10g) | Std.Unc. (1g) (±%) | Std.Unc. (10g) (±%) |
|---|---|---|---|---|---|---|---|---|
| **Measurement system errors** | | | | | | | | |
| ***CF*** | Probe calibration(±%) | 11.0 | N | 2 | 1 | 1 | 5.5 | 5.5 |
| $CF_{drift}$ | Probe calibration drift(±%) | 1.7 | R | $\sqrt{3}$ | 1 | 1 | 1.0 | 1.0 |
| ***LIN*** | Probe linearity and detection limit(±%) | 4.7 | R | $\sqrt{3}$ | 1 | 1 | 2.7 | 2.7 |
| ***BBS*** | Broadband signal(±%) | 3.0 | R | $\sqrt{3}$ | 1 | 1 | 1.7 | 1.7 |
| ***ISO*** | Probe isotropy(±%) | 7.6 | R | $\sqrt{3}$ | 1 | 1 | 4.4 | 4.4 |
| ***DAE*** | Other probe and data acquisition errors(±%) | 0.7 | N | 1 | 1 | 1 | 0.7 | 0.7 |
| ***AMB*** | RF ambient and noise(±%) | 1.8 | N | 1 | 1 | 1 | 1.8 | 1.8 |
| $\Delta_{xyz}$ | Probe positioning errors(±mm) | 0.006 | N | 1 | 0.14 | 0.14 | 0.08 | 0.08 |
| ***DAT*** | Data processing errors(±%) | 1.2 | N | 1 | 1 | 1 | 1.2 | 1.2 |
| **Phantom and device (DUT or validation antenna) errors** | | | | | | | | |
| $LIQ(\sigma)$ | Conductivity (meas.)(±%) | 0.8 | N | 1 | 0.78 | 0.71 | 0.7 | 0.6 |
| $LIQ(T_c)$ | Conductivity (temp.)(±%) | 4.16 | R | $\sqrt{3}$ | 0.78 | 0.71 | 1.9 | 1.7 |
| ***EPS*** | Phantom Permittivity(±%) | 14 | R | $\sqrt{3}$ | 0 | 0 | 0.0 | 0.0 |
| ***DIS*** | Distance DUT - TSL(±%) | 2 | N | 1 | 2 | 2 | 4.0 | 4.0 |
| $D_{xyz}$ | Device Positioning(±%) | 0.5 | N | 1 | 1 | 1 | 0.5 | 0.5 |
| ***H*** | Device Holder(±%) | 0.9 | N | 1 | 1 | 1 | 0.9 | 0.9 |
| ***MOD*** | DUT Modulationm(±%) | 2.4 | R | $\sqrt{3}$ | 1 | 1 | 1.4 | 1.4 |
| ***TAS*** | Time-average SAR(±%) | 1.7 | R | $\sqrt{3}$ | 1 | 1 | 1.0 | 1.0 |
| $RF_{drift}$ | DUT drift(±%) | 1.6 | N | 1 | 1 | 1 | 1.6 | 1.6 |
| ***VAL*** | Val Antenna Unc.(±%) | 0 | N | 1 | 1 | 1 | 0.0 | 0.0 |
| $P_{in}$ | Unc. Input Power(±%) | 0 | N | 1 | 1 | 1 | 0.0 | 0.0 |
| **Corrections to the SAR result** | | | | | | | | |
| $C(\varepsilon',\sigma)$ | Deviation to Target(±%) | 1.9 | N | 1 | 1 | 0.84 | 1.9 | 1.6 |
| $C(R)$ | SAR scaling(±%) | 0 | R | $\sqrt{3}$ | 1 | 1 | 0.0 | 0.0 |
| $u(\Delta SAR)$ | Combined uncertainty | | | | | | 9.8 | 9.7 |
| | Coverage Factor for 95% | | | | | | k=2 | k=2 |
| ***U*** | Expanded uncertainty | | | | | *U* = | 19.6 | 19.4 |
| a Other probability distributions and divisors may be used if they better represent available knowledge of the quantities concerned. | | | | | | | | |

**Uncertainty Budget for Frequency range of 3 GHz to 6 GHz**

| Symbol | Input quantity *Xi* (source of uncertainty) | Unc. Value | Prob. Dist. | Div. | ci (1g) | ci (10g) | Std.Unc. (1g) (±%) | Std.Unc. (10g) (±%) |
|---|---|---|---|---|---|---|---|---|
| **Measurement system errors** | | | | | | | | |
| ***CF*** | Probe calibration(±%) | 13.1 | N | 2 | 1 | 1 | 6.6 | 6.6 |
| $CF_{drift}$ | Probe calibration drift(±%) | 1.7 | R | $\sqrt{3}$ | 1 | 1 | 1.0 | 1.0 |
| ***LIN*** | Probe linearity and detection limit(±%) | 4.7 | R | $\sqrt{3}$ | 1 | 1 | 2.7 | 2.7 |
| ***BBS*** | Broadband signal(±%) | 2.6 | R | $\sqrt{3}$ | 1 | 1 | 1.5 | 1.5 |
| ***ISO*** | Probe isotropy(±%) | 7.6 | R | $\sqrt{3}$ | 1 | 1 | 4.4 | 4.4 |
| ***DAE*** | Other probe and data acquisition errors(±%) | 1.2 | N | 1 | 1 | 1 | 1.2 | 1.2 |
| ***AMB*** | RF ambient and noise(±%) | 1.8 | N | 1 | 1 | 1 | 1.8 | 1.8 |
| $\Delta_{xyz}$ | Probe positioning errors(±mm) | 0.005 | N | 1 | 0.29 | 0.29 | 0.15 | 0.15 |
| ***DAT*** | Data processing errors(±%) | 2.3 | N | 1 | 1 | 1 | 2.3 | 2.3 |
| **Phantom and device (DUT or validation antenna) errors** | | | | | | | | |
| $LIQ(\sigma)$ | Conductivity (meas.)(±%) | 0.7 | N | 1 | 0.78 | 0.71 | 0.6 | 0.5 |
| $LIQ(T_c)$ | Conductivity (temp.)(±%) | 2.45 | R | $\sqrt{3}$ | 0.78 | 0.71 | 1.1 | 1.0 |
| ***EPS*** | Phantom Permittivity(±%) | 14 | R | $\sqrt{3}$ | 0.25 | 0.25 | 2.0 | 2.0 |
| ***DIS*** | Distance DUT - TSL(±%) | 2 | N | 1 | 2 | 2 | 4.0 | 4.0 |
| $D_{xyz}$ | Device Positioning(±%) | 0.3 | N | 1 | 1 | 1 | 0.3 | 0.3 |
| ***H*** | Device Holder(±%) | 2.2 | N | 1 | 1 | 1 | 2.2 | 2.2 |
| ***MOD*** | DUT Modulationm(±%) | 2.4 | R | $\sqrt{3}$ | 1 | 1 | 1.4 | 1.4 |
| ***TAS*** | Time-average SAR(±%) | 1.7 | R | $\sqrt{3}$ | 1 | 1 | 1.0 | 1.0 |
| $RF_{drift}$ | DUT drift(±%) | 0.2 | N | 1 | 1 | 1 | 0.2 | 0.2 |
| ***VAL*** | Val Antenna Unc.(±%) | 0 | N | 1 | 1 | 1 | 0.0 | 0.0 |
| $P_{in}$ | Unc. Input Power(±%) | 0 | N | 1 | 1 | 1 | 0.0 | 0.0 |
| **Corrections to the SAR result** | | | | | | | | |
| $C(\varepsilon',\sigma)$ | Deviation to Target(±%) | 1.9 | N | 1 | 1 | 0.84 | 1.9 | 1.6 |
| $C(R)$ | SAR scaling(±%) | 0 | R | $\sqrt{3}$ | 1 | 1 | 0.0 | 0.0 |
| $u(\Delta SAR)$ | Combined uncertainty | | | | | | 10.8 | 10.7 |
| | Coverage Factor for 95% | | | | | | k=2 | k=2 |
| ***U*** | Expanded uncertainty | | | | | *U* = | 21.5 | 21.4 |
| a Other probability distributions and divisors may be used if they better represent available knowledge of the quantities concerned. | | | | | | | | |

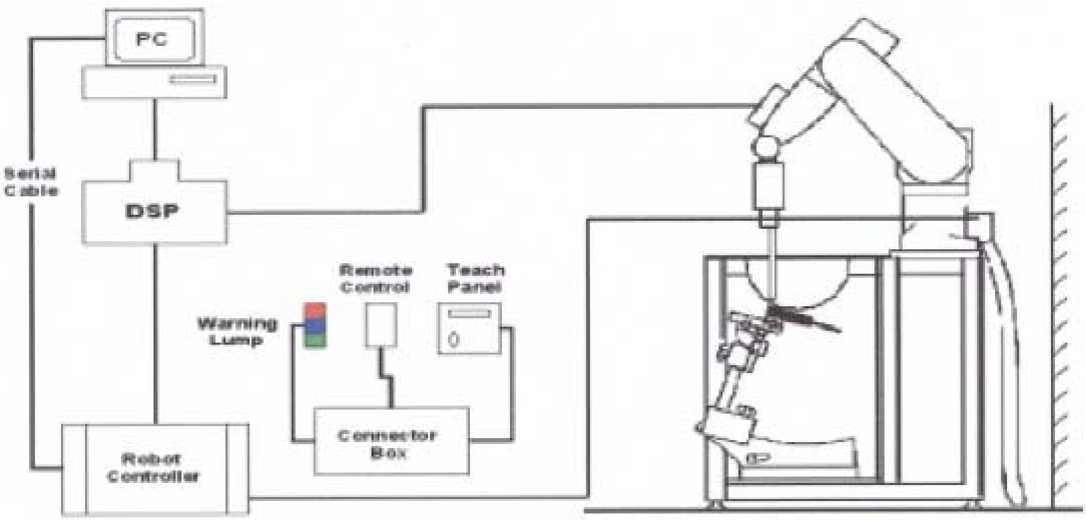
# 3. SAR MEASUREMENTS SYSTEM CONFIGURATION

## 3.1 SAR MEASUREMENT SET-UP

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

1. A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
2. 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.
3. A data acquisition electronic (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.
4. A unit to operate the optical surface detector which is connected to the EOC.
5. The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY measurement server.
6. TheDASY measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows.
7. DASY software and SEMCAD data evaluation software.
8. Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
9. The generic twin phantom enabling the testing of left-hand and right-hand usage.
10. The device holder for handheld mobile phones.
11. Tissue simulating liquid mixed according to the given recipes.
12. System validation dipoles allowing to validate the proper functioning of the system.

### 3.1.1 TEST SETUP LAYOUT



### 3.2 DASY E-FIELD PROBE SYSTEM

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

#### 3.2.1 PROBE SPECIFICATION

EX3DV4

| | |
|---|---|
| Construction | Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE) |
| Calibration | ISO/IEC 17025 calibration service available |
| Frequency | 4 MHz to 10 GHz<br>Linearity: ± 0.2 dB (30 MHz to 10 GHz) |
| Directivity | ± 0.1 dB in TSL (rotation around probe axis)<br>± 0.3 dB in TSL (rotation normal to probe axis) |
| Dynamic Range | 10 μW/g to > 100 mW/g<br>Linearity: ± 0.2dB(noise: typically <1 μW/g) |
| Dimensions | Overall length: 337 mm (Tip: 9 mm)<br>Tip diameter: 2.5 mm (Body: 12 mm)<br>Typical distance from probe tip to dipole centers: 1.0 mm |

Note: This size is only the standard information for the E-Field Probe device. For the exact dimensions, please refer to the calibration report in the appendix.

| | |
|---|---|
|  |  |

**E-field Probe**

### 3.2.2 E-FIELD PROBE CALIBRATION

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ±10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermostat-based temperature probe is used in conjunction with the E-field probe.

$$\mathbf{SAR} = \mathbf{C}\frac{\Delta T}{\Delta t}$$

Where: $\Delta t$=Exposure time (30 seconds),
C =Heat capacity of tissue (brain or muscle),
$\Delta T$=Temperature increase due to RF exposure.

Or $$\mathbf{SAR} = \frac{|E|^2 \sigma}{\rho}$$

Where: $\sigma$= Simulated Tissue Conductivity,
$\rho$=Tissue density (kg/m3).

### 3.2.3 OTHER TEST EQUIPMENT

#### 3.2.3.1. Device Holder for Transmitters

**Construction:** Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices (e.g., laptops, cameras, etc.) It is light weight and fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin SAM, ELI and SAM v6.0 Phantoms.
**Material:** POM, Acrylic glass, Foam

#### 3.2.3.2 Phantom

| | | |
|---|---|---|
| Model | ELI Phantom |  |
| Construction | The ELI phantom is used for compliance testing of handheld and body-mounted wireless devices in the frequency range of 4 MHz to 10 GHz. ELI is fully compatible with the IEC/IEEE 62209-1528 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 of SPEAG's dosimetric probes and dipoles. | |
| Shell Thickness | 2±0.2 mm | |
| Filling Volume | Approx. 30 liters | |
| Dimensions | Length: 600 mm; Width: 190mm<br>Height: adjustable feet | |
| Aailable | Special | |

### 3.2.4 SCANNING PROCEDURE

The DASY system installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

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. The indicated drift is mainly the variation of the DUT’s output power and should vary max. ± 5 %.

Both area scanning and zoom scanning comply with the IEC/IEEE 62209-1528 standard.

- Area Scan

**Table 3 – Area scan parameters**

| Parameter | DUT transmit frequency being tested | |
|---|---|---|
| | $f \leq 3$ GHz | 3 GHz $< f \leq 10$ GHz |
| Maximum distance between the measured points (geometric centre of the sensors) and the inner phantom surface ($z_{M1}$ in Figure 20 in mm) | 5 ± 1 | $\delta \ln(2)/2 \pm 0{,}5$ [a] |
| Maximum spacing between adjacent measured points in mm (see O.8.3.1)[b] | 20, or half of the corresponding zoom scan length, whichever is smaller | $60/f$, or half of the corresponding zoom scan length, whichever is smaller |
| Maximum angle between the probe axis and the phantom surface normal ($\alpha$ in Figure 20)[c] | 5° (flat phantom only)<br>30° (other phantoms) | 5° (flat phantom only)<br>20° (other phantoms) |
| Tolerance in the probe angle | 1° | 1° |

[a] $\delta$ is the penetration depth for a plane-wave incident normally on a planar half-space.

[b] See Clause O.8 on how $\Delta x$ and $\Delta y$ may be selected for individual area scan requirements.

[c] The probe angle relative to the phantom surface normal is restricted due to the degradation in the measurement accuracy in fields with steep spatial gradients. The measurement accuracy decreases with increasing probe angle and increasing frequency. This is the reason for the tighter probe angle restriction at frequencies above 3 GHz.

- Zoom Scan

**Table 4 – Zoom scan parameters**

| Parameter | DUT transmit frequency being tested | |
|---|---|---|
| | $f \leq 3$ GHz | 3 GHz $< f \leq 10$ GHz |
| Maximum distance between the closest measured points and the phantom surface ($z_{M1}$ in Figure 20 and Table 3, in mm) | 5 | $\delta$ ln(2)/2 [a] |
| Maximum angle between the probe axis and the phantom surface normal ($\alpha$ in Figure 20) | 5° (flat phantom only)<br>30° (other phantoms) | 5° (flat phantom only)<br>20° (other phantoms) |
| Maximum spacing between measured points in the $x$- and $y$-directions ($\Delta x$ and $\Delta y$, in mm) | 8 | $24 / f$ [b] |
| For uniform grids:<br>Maximum spacing between measured points in the direction normal to the phantom shell ($\Delta z_1$ in Figure 20, in mm) | 5 | $10 / (f - 1)$ |
| For graded grids:<br>Maximum spacing between the two closest measured points in the direction normal to the phantom shell ($\Delta z_1$ in Figure 20, in mm) | 4 | $12 / f$ |
| For graded grids:<br>Maximum incremental increase in the spacing between measured points in the direction normal to the phantom shell ($R_z = \Delta z_2 / \Delta z_1$ in Figure 20) | 1,5 | 1,5 |
| Minimum edge length of the zoom scan volume in the $x$- and $y$-directions ($L_z$ in O.8.3.2, in mm) | 30 | 22 |
| Minimum edge length of the zoom scan volume in the direction normal to the phantom shell ($L_h$ in O.8.3.2 in mm) | 30 | 22 |
| Tolerance in the probe angle | 1° | 1° |

[a] $\delta$ is the penetration depth for a plane-wave incident normally on a planar half-space.

[b] This is the maximum spacing allowed, which might not work for all circumstances.

### 3.2.5 SPATIAL PEAK SAR EVALUATION

The spatial peak SAR - value for 1 and 10 g is evaluated after the Cube measurements have been done. The basis of the evaluation are the SAR values measured at the points of the fine cube grid consisting of 5 x 5 x 7 points (with 8mm horizontal resolution) or 7 x 7 x 7 points (with 5mm horizontal resolution) or 8 x 8 x 7 points (with 4mm horizontal resolution). The algorithm that finds the maximal averaged volume is separated into three different stages.

- The data between the dipole center of the probe and the surface of the phantom are extrapolated. This data cannot be measured since the center of the dipole is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is about 1 mm (see probe calibration sheet). The extrapolated data from a cube measurement can be visualized by selecting “Graph Evaluated”.
- The maximum interpolated value is searched with a straight-forward algorithm. Around this maximum the SAR - values averaged over the spatial volumes (1g or 10 g) are computed using the 3d-spline interpolation algorithm. If the volume cannot be evaluated (i.e., if a part of the grid was cut off by the boundary of the measurement area) the evaluation will be started on the corners of the bottom plane of the cube.
- All neighboring volumes are evaluated until no neighboring volume with a higher average value is found.

**Extrapolation**

The extrapolation is based on a least square algorithm [W. Gander, Computer mathematic, p.168-180]. Through the points in the first 3 cm along the z-axis, polynomials of order four are calculated. These polynomials are then used to evaluate the points between the surface and the probe tip. The points, calculated from the surface, have a distance of 1 mm from each other.

**Interpolation**

The interpolation of the points is done with a 3d-Spline. The 3d-Spline is composed of three one-dimensional splines with the "Not a knot"-condition [W. Gander, Computer mathematic, p.141-150] (x, y and z -direction) [Numerical Recipes in C, Second Edition, p.123ff].

**Volume Averaging**

At First the size of the cube is calculated. Then the volume is integrated with the trapezoidal algorithm. 8000 points (20x20x20) are interpolated to calculate the average.

**Advanced Extrapolation**

DASY uses the advanced extrapolation option which is able to compensate boundary effects on E-field probes.

### 3.2.6 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, $a_{i0}$, $a_{i1}$, $a_{i2}$ |
| | Conversion factor | $ConvF_i$ |
| | Diode compression point | $Dcp_i$ |
| Device parameters: | Frequency | f |
| | Crest factor | cf |
| Media parameters: | Conductivity | |
| | Density | |

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 multi meter 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 )

$Norm_i$ = sensor sensitivity of channel i ( i = x, y, z )

$[mV/(V/m)^2]$ for E-field Probes

ConvF = sensitivity enhancement in solution

aij = 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.

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

With SAR = local specific absorption rate in mW/g

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

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

= equivalent tissue density in $g/cm^3$

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.

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

With $P_{pwe}$ = equivalent power density of a plane wave in $mW/cm^2$

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

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

# 4. SYSTEM VERIFICATION PROCEDURE

## 4.1 TISSUE VERIFICATION

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectic parameter are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within ± 5% of the target values.
The following materials are used for producing the tissue-equivalent materials.

| Tissue Type | Bactericide | DGBE | HEC | NaCl | Sucrose | Triton X-100 | Water | Diethylene Glycol Mono-hexylether |
|---|---|---|---|---|---|---|---|---|
| Head 2450 | - | 45.0 | - | 0.1 | - | - | 54.9 | - |
| Head 5G | - | - | - | - | - | 17.2 | 65.5 | 17.3 |

Salt: 99+% Pure Sodium Chloride; Sugar: 98+% Pure Sucrose; Water: De-ionized, 16M + resistivity
HEC: Hydroxyethyl Cellulose; DGBE: 99+% Di(ethylene glycol) butyl ether,[2-(2-butoxyethoxy)ethanol]
Triton X-100(ultra pure): Polyethylene glycol mono [4-(1,1,3,3-tetramethylbutyl)phenyl]ether

| Tissue Verification | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Tissue Type | Frequency (MHz) | Liquid Temp. (℃) | Conductivity (σ) | Permittivity (εr) | Targeted Conductivity (σ) | Targeted Permittivity (εr) | Deviation Conductivity (σ) (%) | Deviation Permittivity (εr) (%) | Date |
| Head | 2450 | 22.3 | 1.875 | 39.905 | 1.80 | 39.2 | 4.17 | 1.80 | Jul. 23, 2026 |
| Head | 5250 | 22.3 | 4.749 | 36.228 | 4.71 | 36.0 | 0.83 | 0.77 | Jul. 23, 2026 |
| Head | 5850 | 22.3 | 5.319 | 35.047 | 5.32 | 35.3 | -0.02 | -0.58 | Jul. 23, 2026 |

Note:
1) dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.
2) KDB 865664 was ensured to be applied for probe calibration frequencies greater than or equal to 50MHz of the EUT frequencies.
3) The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies. The SAR test plots may slightly differ from the table above since the DASY rounds to three significant digits.

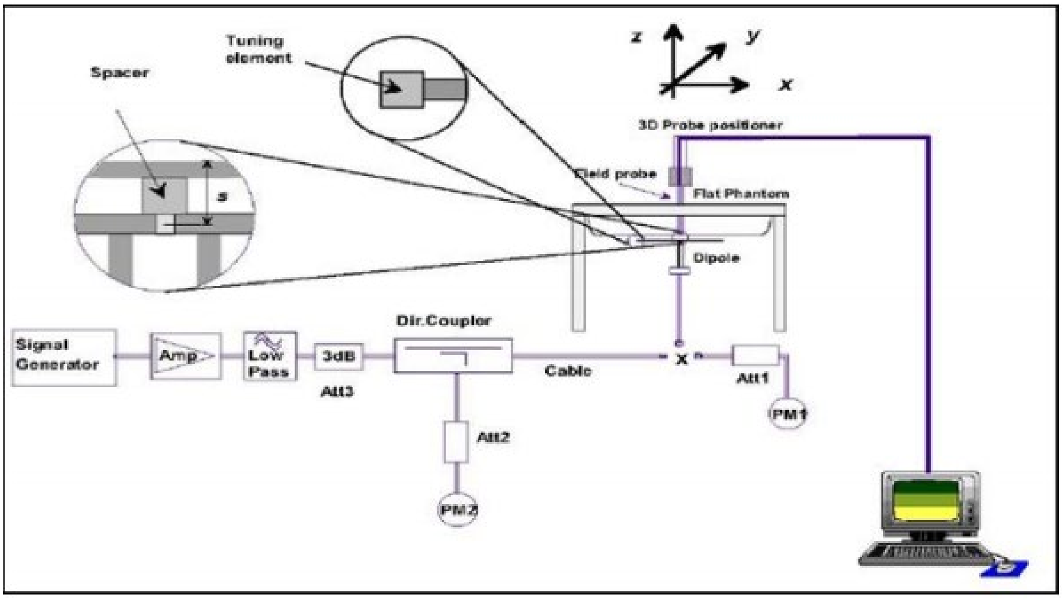
## 4.2 SYSTEM CHECK

The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system check is performed with tissue equivalent material according to IEC/IEEE 62209-1528 (described above). The following table shows system check results for all frequency bands and tissue liquids used during the tests.

| System Check | Date | Frequency (MHz) | Targeted SAR 1g (W/kg) | Measured SAR 1g (W/kg) | normalized SAR 1g (W/kg) | Deviation 1g (%) | Dipole S/N |
|---|---|---|---|---|---|---|---|
| Head | Jul. 23, 2026 | 2450 | 53.10 | 5.11 | 51.10 | -3.77 | 919 |
| Head | Jul. 23, 2026 | 5250 | 78.70 | 7.81 | 78.10 | -0.76 | 1160 |
| Head | Jul. 23, 2026 | 5850 | 80.60 | 8.34 | 83.40 | 3.47 | 1160 |

## 4.3 SYSTEM CHECK PROCEDURE

The system check is performed by using a system check dipole which is positioned parallel to the planar part of the phantom at the reference point. The distance of the dipole to the SAM phantom is determined by a plexiglass spacer. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. The forward power supplied to the system check antenna shall produce a psSAR of at least 0,4 W/kg. The 1 g or 10 g psSAR range is 0,4 W/kg to 10 W/kg.
The power sensor is connected to the cable before the system check to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system check to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test. System check results have to be equal or near the values determined during dipole calibration (target SAR in table above) with the relevant liquids and test system (±10 %).



# 5. SAR MEASUREMENT VARIABILITY AND UNCERTAINTY

## 5.1 SAR MEASUREMENT VARIABILITY

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz, 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.

The detailed repeated measurement results are shown in Section 7.2.

# 6. OPERATIONAL CONDITIONS DURING TEST

## 6.1 SAR TEST CONFIGURATION

### 6.1.1 WIFI TEST CONFIGURATION

For WLAN / BT SAR testing, WLAN / BT engineering testing software installed on the DUT can provide continuous transmitting RF signal.

For WiFi SAR testing, a communication link is set up with the test mode software for WiFi mode test. During the test, at the each test frequency channel, the EUT is operated at the RF continuous emission mode. The test procedures in KDB 248227 D01 are applied.

<table>
<tr><th>Duty Cycle</th><th>Duty Cycle</th></tr>
<tr><td>WiFi 2.4G</td><td>WiFi 5G</td></tr>
<tr><td>99%</td><td>99%</td></tr>
<tr><td>
</td><td>
</td></tr>
</table>

#### 6.1.1.1 2.4G SAR Test Requirements

**802.11b DSSS SAR Test Requirements**

SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:
1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
2) When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

**2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements**

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied. SAR is not required for the following 2.4 GHz OFDM conditions.
1) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
2) When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

**SAR Test Requirements for OFDM configurations**

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, each stand alone. And frequency aggregated band is considered separately for SAR test reduction. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

#### 6.1.1.2 5G SAR Test Requirements

✧ **U-NII-1 and U-NII-2A Band**

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, both bands are tested independently for SAR. When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, both bands are tested independently for SAR.

✧ **U-NII-2C, U-NII-3 Bands**

The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification.
Unless band gap channels are permanently disabled, they must be considered for SAR testing. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels.11 When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

#### 6.1.1.3 OFDM transmission mode and SAR test channel selection

For the 2.4GHz and 5GHz bands, when the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations (for example 802.11a, 802.11n and 802.11ac, or 802.11g and 802.11n, with the same channel bandwidth, modulation, and data rate, etc.), the lower order 802.11 mode (i.e.802.11a then 802.11n and 802.11ac, or 802.11g then 802.11n) is used for SAR measurement. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

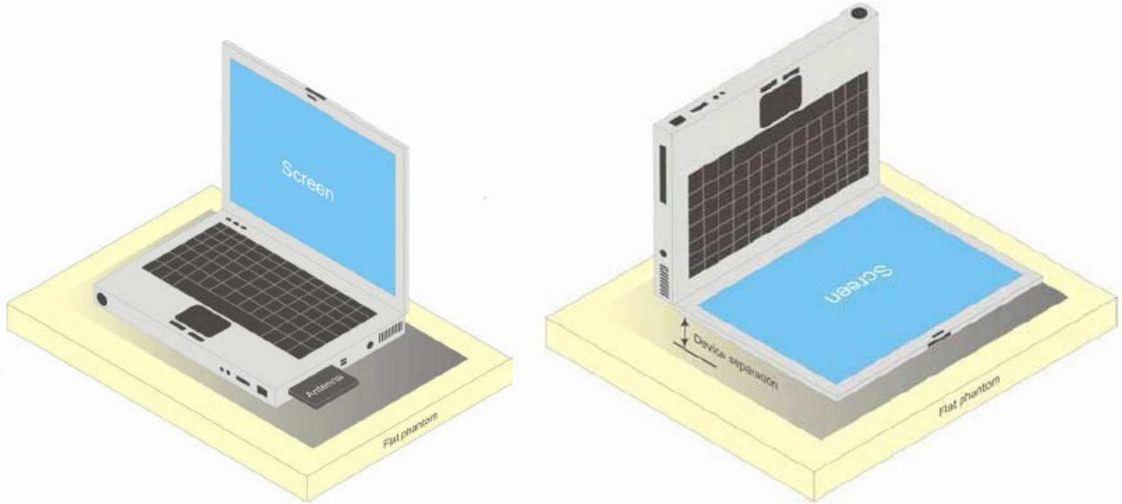
#### 6.1.1.4 Initial test configuration procedure

For OFDM, in both 2.4G and 5GHz bands, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, and lowest data rate. If the average RF output powers of the highest identical transmission modes are within 0.25 dB of each other, mid channel of the transmission mode with highest average RF output powers is the initial test channel. Otherwise, the channel of the transmission mode with the highest average RF output power will be the initial test configuration.
When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurement.

## 6.2 TEST POSITION

### 6.2.1 NOTEBOOK MODE

This DUT was tested in 2 different positions. They are back of keyboard and back of screen as illustrated below:




a) Portable computer with back of keyboard and back of screen.

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 near the end of 4.3 also apply.
When the modular approach is applied, transmitters and modules must be tested initially without using a representative host for incorporation in the display and/or keyboard of qualified laptop computers for standalone use according to the following minimum test separation distance and antenna installation requirements. The separation distance required for incorporation in qualified hosts is described in KDB Publication 447498 D04; item e) of 4.1 and item a) of 5.2.2 etc.
a) ≤ 25 mm between the antenna and user for incorporation in laptop display screens15
b) ≤ 5 mm between the antenna and user; only when incorporation in the keyboard compartment is required by the hosts, for bottom surface and edge exposure conditions
c) the antennas used by the host must have been tested for equipment approval or qualify for SAR test exclusion
d) the antenna polarization, physical orientation, rotation and installation configurations used by the host must have been tested for compliance for the required display and/or keyboard installation conditions and test separation distance(s) or qualify for SAR test exclusion
e) when the SAR Test Exclusion Threshold in KDB Publication 447498 D04 applies, a minimum test separation distance of 25 mm is required to determine test exclusion for the display, and 5 mm for the keyboard compartment.

The location of the antenna for notebook mode is as below:


The SAR measurement positions of each band are as below:

| Antenna | Back of Keyboard | Back of Screen |
|---|---|---|
| Main Ant | Yes | Yes |
| Aux Ant | Yes | Yes |

Note: According to the antenna location shown as above, particular DUT edges were not required to be evaluated for SAR if the antenna-to-edge distance is greater than 50mm.

# 7. TEST RESULT

## 7.1 CONDUCTED POWER RESULTS

1. Conducted power measurements of BT

| BT | Average Conducted Power(dBm) | | | |
|---|---|---|---|---|
| | Max. Tune up | CH0 | CH39 | CH78 |
| | | 2402MHz | 2441MHz | 2480MHz |
| DH5 | 1.00 | 0.27 | -0.05 | 0.06 |
| 2DH5 | 1.00 | 0.74 | 0.40 | 0.49 |
| 3DH5 | 1.00 | 0.75 | 0.45 | 0.57 |

| BLE | Average Conducted Power(dBm) | | | |
|---|---|---|---|---|
| | Max. Tune up | CH0 | CH19 | CH39 |
| | | 2402MHz | 2440MHz | 2480MHz |
| BLE(1M) | 1.00 | 0.48 | 0.17 | 0.33 |
| BLE(2M) | 1.00 | 0.72 | 0.42 | 0.49 |

Note:
1) The Average conducted power of Bluetooth is measured with RMS detector.
2) The tested channel results are marks in bold.

2. Conducted power measurements of WiFi 2.4G

| Band | Mode | Channel | Frequency (MHz) | Data Rate (Mbps) | Max. Tune up | Average Power(dBm) |
|---|---|---|---|---|---|---|
| 2.4G WIFI_ 1TX_ ANT Main | 802.11b | 1 | 2412 | 1 | 16.00 | 14.54 |
| | | 6 | 2437 | | 16.00 | 15.81 |
| | | 11 | 2462 | | 16.00 | 14.82 |
| | 802.11g | 1 | 2412 | 6 | 16.00 | 14.02 |
| | | 6 | 2437 | | 16.00 | 14.19 |
| | | 11 | 2462 | | 16.00 | 13.08 |
| | 802.11n HT20 | 1 | 2412 | MCS0 | 17.00 | 15.53 |
| | | 6 | 2437 | | 17.00 | 16.44 |
| | | 11 | 2462 | | 17.00 | 15.64 |
| | 802.11n HT40 | 3 | 2422 | MCS0 | 17.00 | 14.76 |
| | | 6 | 2437 | | 17.00 | 15.56 |
| | | 9 | 2452 | | 17.00 | 15.40 |
| | 802.11ax HE20 | 1 | 2412 | MCS0 | 17.00 | 15.66 |
| | | 6 | 2437 | | 17.00 | 16.61 |
| | | 11 | 2462 | | 17.00 | 15.72 |
| | 802.11ax HE40 | 3 | 2422 | MCS0 | 17.00 | 15.42 |
| | | 6 | 2437 | | 17.00 | 15.88 |
| | | 9 | 2452 | | 17.00 | 15.91 |

| Band | Mode | Channel | Frequency (MHz) | Data Rate (Mbps) | Max. Tune up | Average Power(dBm) |
|---|---|---|---|---|---|---|
| 2.4G WIFI_ 1TX_ ANT Aux | 802.11b | 1 | 2412 | 1 | 16.00 | 14.28 |
| | | 6 | 2437 | | 16.00 | 15.58 |
| | | 11 | 2462 | | 16.00 | 14.77 |
| | 802.11g | 1 | 2412 | 6 | 16.00 | 13.34 |
| | | 6 | 2437 | | 16.00 | 14.19 |
| | | 11 | 2462 | | 16.00 | 10.20 |
| | 802.11n HT20 | 1 | 2412 | MCS0 | 16.00 | 13.92 |
| | | 6 | 2437 | | 16.00 | 14.79 |
| | | 11 | 2462 | | 16.00 | 11.00 |
| | 802.11n HT40 | 3 | 2422 | MCS0 | 16.00 | 13.11 |
| | | 6 | 2437 | | 16.00 | 14.05 |
| | | 9 | 2452 | | 16.00 | 14.21 |
| | 802.11ax HE20 | 1 | 2412 | MCS0 | 16.00 | 14.36 |
| | | 6 | 2437 | | 16.00 | 15.23 |
| | | 11 | 2462 | | 16.00 | 14.46 |
| | 802.11ax HE40 | 3 | 2422 | MCS0 | 16.00 | 13.66 |
| | | 6 | 2437 | | 16.00 | 14.80 |
| | | 9 | 2452 | | 16.00 | 14.78 |

| Band | Mode | Channel | Frequency (MHz) | Data Rate (Mbps) | ANT Main Average Power(dBm) | ANT Aux Average Power(dBm) | Max. Tune up | Total Average Power(dBm) |
|---|---|---|---|---|---|---|---|---|
| 2.4G WIFI_ 2TX_ ANT Main +Aux | 802.11n HT20 | 1 | 2412 | MCS8 | 15.53 | 13.92 | 19.50 | 17.81 |
| | | 6 | 2437 | | 16.44 | 14.79 | 19.50 | 18.70 |
| | | 11 | 2462 | | 15.64 | 11.00 | 19.50 | 16.92 |
| | 802.11n HT40 | 3 | 2422 | MCS8 | 14.76 | 13.11 | 19.50 | 17.02 |
| | | 6 | 2437 | | 15.56 | 14.05 | 19.50 | 17.88 |
| | | 9 | 2452 | | 15.40 | 14.21 | 19.50 | 17.86 |
| | 802.11ax HE20 | 1 | 2412 | MCS0 | 15.66 | 14.36 | 19.50 | **18.07** |
| | | 6 | 2437 | | 16.61 | 15.23 | 19.50 | **18.98** |
| | | 11 | 2462 | | 15.72 | 14.46 | 19.50 | **18.15** |
| | 802.11ax HE40 | 3 | 2422 | MCS0 | 15.42 | 13.66 | 19.50 | 17.64 |
| | | 6 | 2437 | | 15.88 | 14.80 | 19.50 | 18.38 |
| | | 9 | 2452 | | 15.91 | 14.78 | 19.50 | 18.39 |

Note:
1) The Average conducted power of WiFi 2.4G is measured with RMS detector.
2) The tested channel results are marks in bold.

3. Conducted power measurements of WiFi 5.2G

| Band | Mode | Channel | Frequency (MHz) | Data Rate (Mbps) | Max. Tune up | Average Power(dBm) |
|---|---|---|---|---|---|---|
| 5.2G WIFI_ 1TX_ ANT Main | 802.11a | 36 | 5180 | 6 | 15.00 | 12.13 |
| | | 40 | 5200 | | 15.00 | 11.26 |
| | | 48 | 5240 | | 15.00 | 14.13 |
| | 802.11n HT20 | 36 | 5180 | MCS0 | 15.00 | 13.65 |
| | | 40 | 5200 | | 15.00 | 13.93 |
| | | 48 | 5240 | | 15.00 | 14.15 |
| | 802.11n HT40 | 38 | 5190 | MCS0 | 15.00 | 13.96 |
| | | 46 | 5230 | | 15.00 | 14.61 |
| | 802.11ac VHT20 | 36 | 5180 | MCS0 | 15.00 | 13.48 |
| | | 40 | 5200 | | 15.00 | 13.24 |
| | | 48 | 5240 | | 15.00 | 14.11 |
| | 802.11ac VHT40 | 38 | 5190 | MCS0 | 15.00 | 13.96 |
| | | 46 | 5230 | | 15.00 | 14.65 |
| | 802.11ax HE20 | 36 | 5180 | MCS0 | 15.00 | 13.84 |
| | | 40 | 5200 | | 15.00 | 13.17 |
| | | 48 | 5240 | | 15.00 | 13.97 |
| | 802.11ax HE40 | 38 | 5190 | MCS0 | 15.00 | 14.19 |
| | | 46 | 5230 | | 15.00 | 14.59 |
| | 802.11ac VHT80 | 42 | 5210 | MCS0 | 15.00 | 13.29 |
| | 802.11ax HE80 | 42 | 5210 | MCS0 | 15.00 | 13.53 |

| Band | Mode | Channel | Frequency (MHz) | Data Rate (Mbps) | Max. Tune up | Average Power(dBm) |
|---|---|---|---|---|---|---|
| 5.2G WIFI_ 1TX_ ANT Aux | 802.11a | 36 | 5180 | 6 | 15.00 | 11.85 |
| | | 40 | 5200 | | 15.00 | 11.83 |
| | | 48 | 5240 | | 15.00 | 12.56 |
| | 802.11n HT20 | 36 | 5180 | MCS0 | 15.00 | 12.24 |
| | | 40 | 5200 | | 15.00 | 11.77 |
| | | 48 | 5240 | | 15.00 | 12.06 |
| | 802.11n HT40 | 38 | 5190 | MCS0 | 15.00 | 13.61 |
| | | 46 | 5230 | | 15.00 | 13.53 |
| | 802.11ac VHT20 | 36 | 5180 | MCS0 | 15.00 | 12.66 |
| | | 40 | 5200 | | 15.00 | 12.75 |
| | | 48 | 5240 | | 15.00 | 13.51 |
| | 802.11ac VHT40 | 38 | 5190 | MCS0 | 15.00 | 13.19 |
| | | 46 | 5230 | | 15.00 | 13.60 |
| | 802.11ax HE20 | 36 | 5180 | MCS0 | 15.00 | 12.94 |
| | | 40 | 5200 | | 15.00 | 12.42 |
| | | 48 | 5240 | | 15.00 | 13.31 |
| | 802.11ax HE40 | 38 | 5190 | MCS0 | 15.00 | 13.27 |
| | | 46 | 5230 | | 15.00 | 13.88 |
| | 802.11ac VHT80 | 42 | 5210 | MCS0 | 15.00 | 12.46 |
| | 802.11ax HE80 | 42 | 5210 | MCS0 | 15.00 | 12.36 |

| Band | Mode | Channel | Frequency (MHz) | Data Rate (Mbps) | ANT Main Average Power(dBm) | ANT Aux Average Power(dBm) | Max. Tune up | Total Average Power(dBm) |
|---|---|---|---|---|---|---|---|---|
| **5.2G WIFI_ 2TX_ ANT Main +Aux** | **802.11n HT20** | 36 | 5180 | MCS8 | 13.65 | 12.24 | 18.00 | 16.01 |
| | | 40 | 5200 | | 13.93 | 11.77 | 18.00 | 15.99 |
| | | 48 | 5240 | | 14.15 | 12.06 | 18.00 | 16.24 |
| | **802.11n HT40** | 38 | 5190 | MCS8 | 13.96 | 13.61 | 18.00 | 16.80 |
| | | 46 | 5230 | | 14.61 | 13.53 | 18.00 | 17.11 |
| | **802.11ac VHT20** | 36 | 5180 | MCS0 | 13.48 | 12.66 | 18.00 | 16.10 |
| | | 40 | 5200 | | 13.24 | 12.75 | 18.00 | 16.01 |
| | | 48 | 5240 | | 14.11 | 13.51 | 18.00 | 16.83 |
| | **802.11ac VHT40** | 38 | 5190 | MCS0 | 13.96 | 13.19 | 18.00 | 16.60 |
| | | 46 | 5230 | | 14.65 | 13.60 | 18.00 | 17.17 |
| | **802.11ax HE20** | 36 | 5180 | MCS0 | 13.84 | 12.94 | 18.00 | 16.42 |
| | | 40 | 5200 | | 13.17 | 12.42 | 18.00 | 15.82 |
| | | 48 | 5240 | | 13.97 | 13.31 | 18.00 | 16.66 |
| | **802.11ax HE40** | 38 | 5190 | MCS0 | 14.19 | 13.27 | 18.00 | **16.76** |
| | | 46 | 5230 | | 14.59 | 13.88 | 18.00 | **17.26** |
| | **802.11ac VHT80** | 42 | 5210 | MCS0 | 13.29 | 12.46 | 18.00 | 15.91 |
| | **802.11ax HE80** | 42 | 5210 | MCS0 | 13.53 | 12.36 | 18.00 | 15.99 |

Note:
1) The Average conducted power of WiFi 5.2G is measured with RMS detector.
2) The tested channel results are marks in bold.

4. Conducted power measurements of WiFi 5.8G

| Band | Mode | Channel | Frequency (MHz) | Data Rate (Mbps) | Max. Tune up | Average Power(dBm) |
|---|---|---|---|---|---|---|
| 5.8G WIFI_ 1TX_ ANT Main | 802.11a | 149 | 5745 | 6 | 15.00 | 13.74 |
| | | 157 | 5785 | | 15.00 | 14.66 |
| | | 165 | 5825 | | 15.00 | 14.76 |
| | 802.11n HT20 | 149 | 5745 | MCS0 | 15.00 | 13.63 |
| | | 157 | 5785 | | 15.00 | 14.66 |
| | | 165 | 5825 | | 15.00 | 14.70 |
| | 802.11n HT40 | 151 | 5755 | MCS0 | 15.00 | 14.65 |
| | | 159 | 5795 | | 15.00 | 14.94 |
| | 802.11ac VHT20 | 149 | 5745 | MCS0 | 15.00 | 13.89 |
| | | 157 | 5785 | | 15.00 | 14.79 |
| | | 165 | 5825 | | 15.00 | 14.66 |
| | 802.11ac VHT40 | 151 | 5755 | MCS0 | 15.00 | 14.80 |
| | | 159 | 5795 | | 15.00 | 14.84 |
| | 802.11ax HE20 | 149 | 5745 | MCS0 | 15.00 | 13.78 |
| | | 157 | 5785 | | 15.00 | 14.83 |
| | | 165 | 5825 | | 15.00 | 14.39 |
| | 802.11ax HE40 | 151 | 5755 | MCS0 | 15.00 | 14.71 |
| | | 159 | 5795 | | 15.00 | 14.87 |
| | 802.11ac VHT80 | 155 | 5775 | MCS0 | 15.00 | 12.97 |
| | 802.11ax HE80 | 155 | 5775 | MCS0 | 15.00 | 13.47 |

| Band | Mode | Channel | Frequency (MHz) | Data Rate (Mbps) | Max. Tune up | Average Power(dBm) |
|---|---|---|---|---|---|---|
| 5.8G WIFI_ 1TX_ ANT Aux | 802.11a | 149 | 5745 | 6 | 15.00 | 10.88 |
| | | 157 | 5785 | | 15.00 | 13.76 |
| | | 165 | 5825 | | 15.00 | 13.19 |
| | 802.11n HT20 | 149 | 5745 | MCS0 | 15.00 | 10.70 |
| | | 157 | 5785 | | 15.00 | 11.41 |
| | | 165 | 5825 | | 15.00 | 13.81 |
| | 802.11n HT40 | 151 | 5755 | MCS0 | 15.00 | 13.97 |
| | | 159 | 5795 | | 15.00 | 13.82 |
| | 802.11ac VHT20 | 149 | 5745 | MCS0 | 15.00 | 12.46 |
| | | 157 | 5785 | | 15.00 | 14.09 |
| | | 165 | 5825 | | 15.00 | 13.87 |
| | 802.11ac VHT40 | 151 | 5755 | MCS0 | 15.00 | 14.11 |
| | | 159 | 5795 | | 15.00 | 13.75 |
| | 802.11ax HE20 | 149 | 5745 | MCS0 | 15.00 | 13.20 |
| | | 157 | 5785 | | 15.00 | 13.80 |
| | | 165 | 5825 | | 15.00 | 13.89 |
| | 802.11ax HE40 | 151 | 5755 | MCS0 | 15.00 | 13.77 |
| | | 159 | 5795 | | 15.00 | 14.24 |
| | 802.11ac VHT80 | 155 | 5775 | MCS0 | 15.00 | 12.24 |
| | 802.11ax HE80 | 155 | 5775 | MCS0 | 15.00 | 12.18 |

| Band | Mode | Channel | Frequency (MHz) | Data Rate (Mbps) | ANT Main Average Power(dBm) | ANT Aux Average Power(dBm) | Max. Tune up | Total Average Power(dBm) |
|---|---|---|---|---|---|---|---|---|
| 5.8G WIFI_ 2TX_ ANT Main +Aux | 802.11n HT20 | 149 | 5745 | MCS8 | 13.63 | 10.70 | 18.00 | 15.42 |
| | | 157 | 5785 | | 14.66 | 11.41 | 18.00 | 16.34 |
| | | 165 | 5825 | | 14.70 | 13.81 | 18.00 | 17.29 |
| | 802.11n HT40 | 151 | 5755 | MCS8 | 15.05 | 13.97 | 18.00 | 17.55 |
| | | 159 | 5795 | | 15.25 | 13.82 | 18.00 | 17.60 |
| | 802.11ac VHT20 | 149 | 5745 | MCS0 | 13.89 | 12.46 | 18.00 | 16.24 |
| | | 157 | 5785 | | 14.79 | 14.09 | 18.00 | 17.46 |
| | | 165 | 5825 | | 14.66 | 13.87 | 18.00 | 17.29 |
| | 802.11ac VHT40 | 151 | 5755 | MCS0 | 14.80 | 14.11 | 18.00 | 17.48 |
| | | 159 | 5795 | | 14.84 | 13.75 | 18.00 | 17.34 |
| | 802.11ax HE20 | 149 | 5745 | MCS0 | 13.78 | 13.20 | 18.00 | 16.51 |
| | | 157 | 5785 | | 14.83 | 13.80 | 18.00 | 17.36 |
| | | 165 | 5825 | | 14.39 | 13.89 | 18.00 | 17.16 |
| | 802.11ax HE40 | 151 | 5755 | MCS0 | 15.31 | 13.77 | 18.00 | **17.62** |
| | | 159 | 5795 | | 15.17 | 14.24 | 18.00 | **17.74** |
| | 802.11ac VHT80 | 155 | 5775 | MCS0 | 12.97 | 12.24 | 18.00 | 15.63 |
| | 802.11ax HE80 | 155 | 5775 | MCS0 | 13.47 | 12.18 | 18.00 | 15.88 |

Note:
1) The Average conducted power of WiFi 5.8G is measured with RMS detector.
2) The tested channel results are marks in bold.

## 7.2 SAR TEST RESULTS

**General Notes:**

1) Per KDB447498 D04, all measurement SAR results are scaled to the maximum tune-up tolerance limit to demonstrate compliant.
2) Per KDB447498 D04, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is: ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.
3) Per KDB865664 D01, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥ 0.8W/kg; if the deviation among the repeated measurement is ≤ 20%, and the measured SAR < 1.45W/kg, only one repeated measurement is required.
4) Per KDB941225 D06, the DUT Dimension is bigger than 9 cm x 5 cm, so 10mm is chosen as the test separation distance for Hotspot mode. When the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.
5) Per KDB648474 D04, SAR is evaluated without a headset connected to the device. When the standalone reported body-worn SAR is ≤ 1.2 W/kg, no additional SAR evaluations using a headset are required.
6) Per KDB865664 D02, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is > 1.5 W/kg, or > 7.0 W/kg for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing.

**WLAN Notes:**

1. For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other (remaining) test positions. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 for 2.4GHz WIFI single transmission chain operations, the highest measured maximum output power Channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR. See Section7.1 for more information.
3. Justification for test configurations for WLAN per KDB Publication 248227 for 5GHz WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed power. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2W/kg. See Section 7.1 for more information.

### 7.2.1 SAR MEASUREMENT RESULT

1. SAR test results of WiFi 2.4G

| Test No. | Band | Mode | Channel | Test Position | Separation Distance (mm) | Ant | Data Rate | Duty Cycle (%) | Maximum Tune-up (dBm) | Conducted Power (dBm) | Power Drift (dB) | SAR 1g (W/kg) | SAR 10g (W/kg) | Reported 1g SAR (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W01 | WiFi 2.4G | 802.11ax20 | 6 | Back of Screen | 0 | Main+Aux | MCS0 | 99 | 19.5 | 18.98 | 0 | 0.0007 | 0.0002 | 0.001 |
| W02 | WiFi 2.4G | 802.11ax20 | 6 | Bottom of Keypad | 0 | Main+Aux | MCS0 | 99 | 19.5 | 18.98 | 0 | 0.0378 | 0.015 | 0.043 |
| W03 | WiFi 2.4G | 802.11ax20 | 1 | Bottom of Keypad | 0 | Main+Aux | MCS0 | 99 | 19.5 | 18.07 | 0 | **0.0504** | **0.0205** | **0.071** |
| W04 | WiFi 2.4G | 802.11ax20 | 11 | Bottom of Keypad | 0 | Main+Aux | MCS0 | 99 | 19.5 | 18.15 | 0 | 0.0254 | 0.00939 | 0.035 |

Note: The value with boldface is the maximum SAR Value of each test band.

2. SAR test results of WiFi 5G

| Test No. | Band | Mode | Channel | Test Position | Separation Distance (mm) | Ant | Data Rate | Duty Cycle (%) | Maximum Tune-up (dBm) | Conducted Power (dBm) | Power Drift (dB) | SAR 1g (W/kg) | SAR 10g (W/kg) | Reported 1g SAR (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W06 | WiFi 5.2G UNII_1 | 802.11ax40 | 46 | Back of Screen | 0 | Main+Aux | MCS0 | 99 | 18 | 17.26 | 0 | 0.0824 | 0.0301 | 0.099 |
| W07 | WiFi 5.2G UNII_1 | 802.11ax40 | 46 | Bottom of Keypad | 0 | Main+Aux | MCS0 | 99 | 18 | 17.26 | 0 | **0.196** | **0.0614** | **0.235** |
| W08 | WiFi 5.2G UNII_1 | 802.11ax40 | 38 | Bottom of Keypad | 0 | Main+Aux | MCS0 | 99 | 18 | 16.76 | 0 | 0.119 | 0.0387 | 0.160 |
| W10 | WiFi 5.8G UNII_3 | 802.11ax40 | 159 | Back of Screen | 0 | Main+Aux | MCS0 | 99 | 18 | 17.74 | 0 | 0.117 | 0.0413 | 0.125 |
| W11 | WiFi 5.8G UNII_3 | 802.11ax40 | 159 | Bottom of Keypad | 0 | Main+Aux | MCS0 | 99 | 18 | 17.74 | 0 | **0.427** | **0.133** | **0.458** |
| W12 | WiFi 5.8G UNII_3 | 802.11ax40 | 151 | Bottom of Keypad | 0 | Main+Aux | MCS0 | 99 | 18 | 17.62 | 0 | 0.375 | 0.107 | 0.413 |

Note: The value with boldface is the maximum SAR Value of each test band.

### 7.3 MULTIPLE TRANSMITTER EVALUATION

The following tables list information which is relevant for the decision if a simultaneous transmit evaluation is necessary according to FCC KDB447498 D04 Interim General RF Exposure Guidance v01.

The location of the antennas inside the EUT is shown as below picture:

### 7.3.1 STAND-ALONE SAR TEST EXCLUSION

Per FCC KDB 447498 D01, the 1-g SAR and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance,mm)][√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for product specific 10-g SAR, where:

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

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

Standalone SAR test exclusion for BT

| Mode | Position | $P_{max}$ (dBm)* | $P_{max}$ (mW) | Distance (mm) | f (GHz) | Calculation Result | SAR Exclusion threshold | SAR test exclusion |
|---|---|---|---|---|---|---|---|---|
| BT | Body | 1 | 1.26 | 1 | 2.48 | 1.98 | 3 | Yes |
| BT | product specific 10-g SAR | 1 | 1.26 | 1 | 2.48 | 1.98 | 7.5 | Yes |

Note:
1)* - maximum possible output power declared by manufacturer
2) Held to ear configurations are not applicable to Bluetooth for this device.

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] •
[ √ f(GHz)/x] W/kg for test separation distances ≤ 50 mm, where x = 7.5 for 1-g SAR and x = 18.75 for 10-g SAR.
When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

According to KDB 447498 D01,when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standslone SAR was estimated according to following formula to result in substantially conservative SAR values of≤0.4W/kg to determine simultaneous transmission SAR test exclusion.

$$\text{Estimated SAR} = \frac{\text{Max. Tune up Power}_{(mW)}}{\text{Min. Test Separation Distance}_{(mm)}} \times \frac{\sqrt{f_{(GHz)}}}{7.5}$$

Estimated SAR calculation

| Mode | Position | $P_{max}$ (dBm)* | $P_{max}$ (mW) | Distance (mm) | f (GHz) | X | Estimated SAR (W/kg)* |
|---|---|---|---|---|---|---|---|
| BT | Body | 1 | 1.26 | 1 | 2.48 | 7.5 | 0.264 |
| BT | product specific 10-g SAR | 1 | 1.26 | 1 | 2.48 | 18.75 | 0.106 |

Note: * - maximum possible output power declared by manufacturer

### 7.3.2 SIMULTANEOUS TRANSMISSION CONDITIONS

Per FCC KDB447498 D04, SAR compliance for simultaneous transmission must be considered when the maximum duration of overlapping transmissions, including network hand-offs, is greater than 30 seconds. This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis.

The Simultaneous Transmission Possibilities of this device are as below:

| No. | Configuration | Body |
|---|---|---|
| 1 | WLAN 2.4G Main Ant + WLAN 2.4G Aux Ant | Yes |
| 2 | WLAN 5.2G Main Ant + WLAN 5.2G Aux Ant | Yes |
| 3 | WLAN 5.8G Main Ant + WLAN 5.8G Aux Ant | Yes |
| 4 | WLAN 2.4G Main Ant + BT Aux Ant | Yes |
| 5 | WLAN 5.2G Main Ant + BT Aux Ant | Yes |
| 6 | WLAN 5.8G Main Ant + BT Aux Ant | Yes |

Note: Only the Aux Ant supports BT function.

### 7.3.3 SAR UMMATION SCENARIO

About WIFI transmit simultaneously:
The results of transmit simultaneous please refer to section 7.2.1.

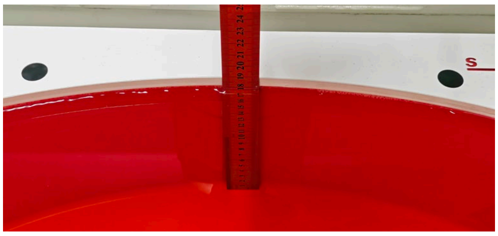
# APPENDIX

## 1. TEST LAYOUT

**Specific Absorption Rate Test Layout**


**Liquid depth in the flat Phantom (≥15cm depth)**

Body_H2300-2700_17.8cm



Body_H4500-6500_17.1cm

# Appendix A. SAR Plots of System Verification

**(Pls See BTL-FCC SAR-1-2607C175_Appendix A.)**

# Appendix B. SAR Plots of SAR Measurement

**(Pls See BTL-FCC SAR-1-2607C175_Appendix B.)**

# Appendix C. Calibration Certificate

**(Pls See BTL-FCC SAR-1-2607C175_Appendix C.)**

# Appendix D. Photographs of the Test Set-Up

**(Pls See BTL-FCC SAR-1-2607C175_Appendix D.)**

**End of Test Report**