| | | | | |
|---|---|---|---|---|
| **Prüfbericht-Nr.:** *Test report no.:* | **CN22ZE75 004** | **Auftrags-Nr.:** *Order no.*: | 168344875 | Seite 1 von 39 *Page 1 of* 39 |
| **Kunden-Referenz-Nr.:** *Client reference no.:* | N/A | **Auftragsdatum:** *Order date:* | 2021-11-24 | |
| **Auftraggeber:** *Client:* | **SZ DJI TECHNOLOGY CO., LTD**<br>14th Floor, West Wing, Skyworth Semiconductor Design Building No.18 Gaoxin South 4th Ave Nanshan District, Shenzhen, P.R. China | | | |
| **Prüfgegenstand:** *Test item:* | DJI Goggles 2 | | | |
| **Bezeichnung / Typ-Nr.:** *Identification / Type no.:* | RCDS18, RCDS18B | | | |
| **Auftrags-Inhalt:** *Order content*: | Test Report | | | |
| **Prüfgrundlage:** *Test specification:* | FCC 47 CFR § 2.1093<br>RSS-102 Issue 5 | | | |

| | | |
|---|---|---|
| **Wareneingangsdatum:** *Date of sample receipt:* | 2021-11-08 | Please refer to Photo Document |
| **Prüfmuster-Nr.:** *Test sample no:* | A003185055-005 | |
| **Prüfzeitraum:** *Testing period:* | 2021-12-28 | |
| **Ort der Prüfung:** *Place of testing:* | TÜV Rheinland (Shenzhen) Co., Ltd. | |
| **Prüflaboratorium:** *Testing laboratory:* | TÜV Rheinland (Shenzhen) Co., Ltd. | |
| **Prüfergebnis*:** *Test result*:* | Pass | |

| | | | |
|---|---|---|---|
| **geprüft von:** *tested by:* | X Hardy Suo | **genehmigt von:** *authorized by:* | X Lin Lin |
| **Datum:** *Date:* 2022-02-18 | | **Ausstellungsdatum:** *Issue date:* 2022-02-18 | |
| **Stellung** / *Position:* | Sachverständige(r) / Expert | **Stellung** / *Position:* | Sachverständige(r) / Expert |

**Sonstiges** / *Other:* FCC ID: SS3-RCDS1821, IC: 11805A-RCDS1821, HVIN: RCDS18, RCDS18B

**Zustand des Prüfgegenstandes bei Anlieferung:** Prüfmuster vollständig und unbeschädigt
*Condition of the test item at delivery:* *Test item complete and undamaged*

| | | | | | |
|---|---|---|---|---|---|
| * Legende: | 1 = sehr gut | 2 = gut | 3 = befriedigend | 4 = ausreichend | 5 = mangelhaft |
| | P(ass) = entspricht o.g. Prüfgrundlage(n) | | F(ail) = entspricht nicht o.g. Prüfgrundlage(n) | N/A = nicht anwendbar | N/T = nicht getestet |
| ** Legend:* | *1 = very good* | *2 = good* | *3 = satisfactory* | *4 = sufficient* | *5 = poor* |
| | *P(ass) = passed a.m. test specification(s)* | | *F(ail) = failed a.m. test specification(s)* | *N/A = not applicable* | *N/T = not tested* |

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# 1. General Information

## 1.1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for the EUT are as follows:

| Equipment Class | Mode | Highest Reported Head $SAR_{1g}$ (W/kg) |
|---|---|---|
| DTS | 2.4GHz WLAN | 0.61 |
| NII | 5.2GHz WLAN | 0.96 |
| | 5.8GHz WLAN | 1.01 |
| SDR | SDR-2.4GHz | 0.10 |
| | SDR-5.8GHz | 0.54 |
| DTS | Bluetooth | 0.00 |
| Highest Simultaneous Transmission SAR | | Head $SAR_{1g}$ (W/kg) |
| SDR-2.4GHz+NII+DTS | | 1.16 |
| SDR-5.8GHz+DTS | | 1.15 |

**Note:**
This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6W/kg as averaged over any 1 gram of tissue; 10-gram SAR for Product Specific 10g SAR, limit: 4.0W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

## 1.2. Equipment Under Test (EUT) Information

### 1.2.1. General Information

The EUT (**E**quipment **U**nder **T**est) is a DJI Goggles 2. It supports Bluetooth, 2.4GHz SDR, 2.4GHz Wi-Fi, 5.2/5.8GHz Wi-Fi and 5.8GHz SDR functions.
*remark: SDR means specific defined radio, and cannot changes radio specification via software/firmware by end-users.

According to the declaration of the applicant, the electrical circuit design and PCB layout are identical, only the model no. is different for market strategy.

For details refer to the User Manual, Technical Description and Circuit Diagram.

### 1.2.2. Wireless Technologies

| General Information of EUT | Value |
|---|---|
| Kind of Equipment | DJI Goggles 2 |
| Type Designation | RCDS18, RCDS18B |
| Operating Voltage | External Battery operated (Max 9V, 1800 mAh) |
| Extreme Temperature Range | 0°C ~ 40 °C |
| FCC ID | SS3-RCDS1821 |
| IC | 11805A-RCDS1821 |
| HVIN | RCDS18, RCDS18B |
| Radiofrequency operating mode: | 1) Bluetooth: operating within 2400-2483.5MHz, Bluetooth BLE, 1Mbps&2Mbps<br>2) 2.4GHz SDR: operating within 2400-2483.5MHz, supports 1.4MHz/3MHz/10MHz/20MHz/40MHz Bandwidth<br>3) 2.4GHz Wi-Fi: operating within 2400-2483.5MHz, supports 20MHz/40MHz Bandwidth and IEEE 802.11 b/g/n20/n40<br>4) 5.2GHz Wi-Fi: operating with 5150-5250MHz, supports 20MHz/40MHz/80MHz Bandwidth and IEEE 802.11 a/n20/n40/ac20/ac40/ac80<br>5) 5.8GHz SDR: operating within 5725-5850MHz, supports 1.4MHz/3MHz/10MHz/20MHz/40MHz Bandwidth<br>6) 5.8GHz Wi-Fi: operating within 5725-5850MHz, supports 20MHz/40MHz/80MHz Bandwidth and IEEE 802.11 a/n20/n40/ac20/ac40/ac80 |
| **Technical Specification of Bluetooth** | |
| Operating Frequency | 2402-2480MHz |
| Type of Modulation | GFSK |
| Data Rate | 1Mbps, 2Mbps |
| Channel Number | 40 channels for Bluetooth BLE |
| Channel Separation | 1MHz and 2MHz |
| Antenna Type | Integral Antenna |
| Antenna Number | 1Tx1Rx |
| Antenna Gain | 1 dBi |
| The type of wideband data transmission equipment | Non-FHSS for Bluetooth BLE |
| **Technical Specification of 2.4GHz SDR** | |
| Operating Frequency | 2409.5-2464.5MHz for 1.4MHz Bandwidth<br>2411.12-2465.12MHz for 1.4MHz Bandwidth (CA mode) |

| | |
|---|---|
| | 2410.5-2461.5MHz for 3MHz Bandwidth<br>2413.2-2464.2MHz for 3MHz Bandwidth (CA mode)<br>2405.5-2476.5MHz for 10MHz Bandwidth<br>2410.5-2472.5MHz for 20MHz Bandwidth<br>2422.5-2452.5MHz for 40MHz Bandwidth |
| Type of Modulation | OFDM (QPSK, 16QAM, 64QAM) |
| Channel Number | 28 channels for 1.4MHz Bandwidth<br>28 channels for 1.4MHz Bandwidth (CA mode)<br>18 channels for 3MHz Bandwidth<br>18 channels for 3MHz Bandwidth (CA mode)<br>72 channels for 10MHz Bandwidth<br>63 channels for 20MHz Bandwidth<br>31 channels for 40MHz Bandwidth |
| Channel Separation | 2MHz for 1.4MHz Bandwidth<br>2MHz for 1.4MHz Bandwidth (CA mode)<br>3MHz for 3MHz Bandwidth<br>3MHz for 3MHz Bandwidth (CA mode)<br>1MHz for 10MHz Bandwidth<br>1MHz for 20MHz Bandwidth<br>1MHz for 40MHz Bandwidth |
| Antenna Type | Two Integral Antennas, and<br>Two External Antennas |
| Antenna Number | 1Tx4Rx for SISO mode (ANT0 or ANT1 only)<br>2Tx4Rx for MIMO mode (ANT0+ANT1 only) |
| Antenna Gain | 2.5dBi for ANT0<br>2.5dBi for ANT1 |
| The type of wideband data transmission equipment | DTS |
| **Technical Specification of 2.4GHz Wi-Fi** | |
| Operating Frequency | 2412 - 2462MHz for 802.11b/g/n(HT20)<br>2422 - 2452MHz for 802.11n(HT40) |
| Type of Modulation | DSSS(DBPSK/DQPSK/CCK)<br>OFDM(BPSK/QPSK/16QAM/64QAM) |
| Data Rate | 1/2/5.5/11 Mbps for 802.11b<br>6/9/12/18/24/36/48/54 Mbps for 802.11g<br>MCS0 ~ MCS7 for 802.11n |
| Channel Number | 11 channels for 802.11b/g/n(HT20)<br>7 channels for 802.11n(HT40) |
| Channel Separation | 5 MHz |
| Antenna Type | Integral Antenna |
| Antenna Number | 1Tx1Rx |
| Antenna Gain | 1dBi |
| The type of wideband data transmission equipment | DTS |
| **Technical Specification of 5.2GHz Wi-Fi** | |
| Operating Frequency | 5180-5240MHz, 802.11a/n20/n40/ac20/ac40/ac80 |
| Type of Modulation | OFDM(BPSK/QPSK/16QAM/64QAM/256QAM) |
| Data Rate | 6/9/12/18/24/36/48/54 Mbps for 802.11a<br>MCS 0 ~ MCS 7 for 802.11 n20/n40<br>VHT-MCS 0 ~ VHT-MCS 8 for 802.11 ac20<br>VHT-MCS 0 ~ VHT-MCS 9 for 802.11 ac40 |

| | |
|---|---|
| | VHT-MCS 0 ~ VHT-MCS 9 for 802.11 ac80 |
| Channel Number | 4 channels for 802.11a/n20/ac20<br>2 channels for 802.11n40/ac40<br>1 channels for 802.11ac80 |
| Channel Separation | 20MHz, 40MHz, 80MHz |
| Antenna Type | Integral Antenna |
| Antenna Number | 1Tx1Rx |
| Antenna Gain | 2dBi |
| The type of wideband data transmission equipment | DTS |
| **Technical Specification of 5.8GHz SDR** | |
| Operating Frequency | 5728.5-5846.5MHz for 1.4MHz Bandwidth<br>5730.12-5848.12MHz for 1.4MHz Bandwidth (CA mode)<br>5727.5-5844.5MHz for 3MHz Bandwidth<br>5730.2-5847.2MHz for 3MHz Bandwidth (CA mode)<br>5730.5-5844.5MHz for 10MHz Bandwidth<br>5735.5-5839.5MHz for 20MHz Bandwidth<br>5745.5-5829.5MHz for 40MHz Bandwidth |
| Type of Modulation | OFDM (QPSK, 16QAM, 64QAM) |
| Channel Number | 60 channels for 1.4MHz Bandwidth<br>60 channels for 1.4MHz Bandwidth (CA mode)<br>40 channels for 3MHz Bandwidth<br>40 channels for 3MHz Bandwidth (CA mode)<br>115 channels for 10MHz Bandwidth<br>105 channels for 20MHz Bandwidth<br>85 channels for 40MHz Bandwidth |
| Channel Separation | 2MHz for 1.4MHz Bandwidth<br>2MHz for 1.4MHz Bandwidth (CA mode)<br>3MHz for 3MHz Bandwidth<br>3MHz for 3MHz Bandwidth (CA mode)<br>1MHz for 10MHz Bandwidth<br>1MHz for 20MHz Bandwidth<br>1MHz for 40MHz Bandwidth |
| Antenna Type | Two Integral Antennas, and<br>Two External Antennas |
| Antenna Number | 1Tx4Rx for SISO mode (ANT0 or ANT1 only)<br>2Tx4Rx for MIMO mode (ANT0+ANT1 only) |
| Antenna Gain | 3dBi for ANT0<br>3dBi for ANT1 |
| The type of wideband data transmission equipment | DTS |
| **Technical Specification of 5.8GHz Wi-Fi** | |
| Operating Frequency | 5745–5825MHz for 802.11 a/n20/n40/ac20/ac40/ac80 |
| Type of Modulation | OFDM(BPSK/QPSK/16QAM/64QAM/256QAM) |
| Data Rate | 6/9/12/18/24/36/48/54 Mbps for 802.11a<br>MCS 0 ~ MCS 7 for 802.11 n20/n40<br>VHT-MCS 0 ~ VHT-MCS 8 for 802.11 ac20<br>VHT-MCS 0 ~ VHT-MCS 9 for 802.11 ac40<br>1) VHT-MCS 0 ~ VHT-MCS 9 for 802.11 ac80 |
| Channel Number | 5 channels for 802.11a/n20/ac20<br>2 channels for 802.11n40/ac40 |

| | |
|---|---|
| | 1 channels for 802.11ac80 |
| Channel Separation | 20MHz, 40MHz, 80MHz |
| Antenna Type | Integral Antenna |
| Antenna Number | 1Tx1Rx |
| Antenna Gain | 3dBi |
| The type of wideband data transmission equipment | Non-FHSS |

**Note:**

The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

**1.2.3.List of Accessory**

| | | |
|---|---|---|
| Battery | Brand Name | DJI |
| | Model Name | BZX900-2600-7.2 |
| | Ratings | Input: 5V⎓2A/9V⎓1.4A<br>Output: 7-9V⎓1.5A |
| | Li-ion Battery Energy | 18Wh |
| | Rated Capacity | 1800mAh |

# 2. Test Sites

## 2.1. Test Facilities

**TÜV Rheinland (Shenzhen) Co., Ltd.**

No. 362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China

A2LA Cert. No.: 5162.01

FCC Registration No.: 694916

IC Registration No.: 25069

## 2.2. Ambient Condition

| | |
|---|---|
| Ambient Temperature | 18°C - 25°C |
| Relative Humidity | 30% - 70% |

## 2.3. List of Test and Measurement Instruments

| Equipment | Manufacturer | Model | SN | Cal. Date | Cal. Interval |
|---|---|---|---|---|---|
| System Validation Dipole | SPEAG | D2450V2 | 1014 | May. 19, 2021 | 3 years |
| System Validation Dipole | SPEAG | D5GHzV2 | 1280 | May. 17, 2021 | 1 year |
| Dosimetric E-Field Probe | SPEAG | EX3DV4 | 7506 | May. 26, 2021 | 1 year |
| Data Acquisition Electronics | SPEAG | DAE4 | 1557 | May. 20, 2021 | 1 year |
| Signal Analyzer | R&S | FSV 7 | 103665 | Aug. 06, 2021 | 1 year |
| Vector Network Analyzer | R&S | ZNB 8 | 107040 | Aug. 06, 2021 | 1 year |
| Dielectric assessment Kit | SPEAG | DAK-3.5 | 1269 | May. 19, 2021 | 1 year |
| Signal Generator | R&S | SMB 100A | 180840 | Aug. 07, 2021 | 1 year |
| EPM Series Power Meter | Keysight | N1914A | MY58240005 | Dec. 02, 2021 | 2 years |
| Power Sensor | Keysight | N8481H | MY58250002 | Dec. 02, 2021 | 1 year |
| Power Sensor | Keysight | N8481H | MY58250006 | Dec. 02, 2021 | 1 year |
| DC Power Supply | Topward | 3303D | 809332 | Dec. 02, 2021 | 1 year |
| Coaxial Directional Couper | Keysight | 773D | MY52180552 | Dec. 02, 2021 | 1 year |
| Coaxial Directional Couper | shhuaxiang | DTO-0.4/3.9-10 | 18052101 | Dec. 02, 2021 | 1 year |
| Coaxial attenuator | Keysight | 8491A | MY52463219 | Dec. 02, 2021 | 1 year |
| Coaxial attenuator | Keysight | 8491A | MY52463210 | Dec. 02, 2021 | 1 year |
| Coaxial attenuator | Keysight | 8491A | MY52463222 | Dec. 02, 2021 | 1 year |
| Digital Thermometer | LKM | DTM3000 | 3116 | Dec. 02, 2021 | 1 year |
| Power Amplifier Mini circuit | mini-circuits | ZHL-42W | SN002101809 | N/A | N/A |
| Power Amplifier Mini circuit | mini-circuits | ZVE-8G | SN070501814 | N/A | N/A |
| PHANTOM | SPEAG | ELI V8.0 | 2094 | N/A | N/A |
| PHANTOM | SPEAG | SAM-Twin V8.0 | 1961 | N/A | N/A |

# 3. Measurement Uncertainty

| Source of Uncertainty | Tolerance (± %) | Probability Distribution | Divisor | Ci 1g | Ci 10g | Standard Uncertainty 1g (± %) | Standard Uncertainty 10g (± %) | Vi Veff |
|---|---|---|---|---|---|---|---|---|
| **Measurement System** | | | | | | | | |
| Probe Calibration | 6.65 | Normal | 1 | 1 | 1 | 6.65 | 6.65 | ∞ |
| Axial Isotropy | 4.7 | Rectangular | √3 | 0.7 | 0.7 | 1.9 | 1.9 | ∞ |
| Hemispherical Isotropy | 9.6 | Rectangular | √3 | 0.7 | 0.7 | 3.9 | 3.9 | ∞ |
| Boundary Effects | 1 | Rectangular | √3 | 1 | 1 | 0.6 | 0.6 | ∞ |
| Linearity | 4.7 | Rectangular | √3 | 1 | 1 | 2.7 | 2.7 | ∞ |
| Detection Limits | 0.25 | Rectangular | √3 | 1 | 1 | 0.1 | 0.1 | ∞ |
| Modulation Response | 2.4 | Rectangular | √3 | 1 | 1 | 1.4 | 1.4 | ∞ |
| Readout Electronics | 0.3 | Normal | 1 | 1 | 1 | 0.3 | 0.3 | ∞ |
| Response Time | 0 | Rectangular | √3 | 1 | 1 | 0.0 | 0.0 | ∞ |
| Integration Time | 1.7 | Rectangular | √3 | 1 | 1 | 1.0 | 1.0 | ∞ |
| RF Ambient – Noise | 3 | Rectangular | √3 | 1 | 1 | 1.7 | 1.7 | ∞ |
| RF Ambient – Reflections | 3 | Rectangular | √3 | 1 | 1 | 1.7 | 1.7 | ∞ |
| Probe Positioner | 0.4 | Rectangular | √3 | 1 | 1 | 0.2 | 0.2 | ∞ |
| Probe Positioning | 2.9 | Rectangular | √3 | 1 | 1 | 1.7 | 1.7 | ∞ |
| Max. SAR Evaluation | 2 | Rectangular | √3 | 1 | 1 | 1.2 | 1.2 | ∞ |
| **Test Sample Related** | | | | | | | | |
| Device Positioning | 2.2 / 2.6 | Normal | 1 | 1 | 1 | 2.2 | 2.6 | 30 |
| Device Holder | 3.3 / 3.4 | Normal | 1 | 1 | 1 | 3.3 | 3.4 | 30 |
| Power Drift | 5 | Rectangular | √3 | 1 | 1 | 2.9 | 2.9 | ∞ |
| Power Scaling | 0 | Rectangular | √3 | 1 | 1 | 0.0 | 0.0 | ∞ |
| **Phantom and Setup** | | | | | | | | |
| Phantom Uncertainty | 7.5 | Rectangular | √3 | 1 | 1 | 4.3 | 4.3 | ∞ |
| SAR correction | 1.2 / 0.97 | Rectangular | √3 | 1 | 0.84 | 0.7 | 0.5 | ∞ |
| Liquid Conductivity (Meas.) | 2.5 | Normal | 1 | 0.78 | 0.71 | 2.0 | 1.8 | 20 |
| Liquid Permittivity (Meas.) | 2.5 | Normal | 1 | 0.23 | 0.26 | 0.6 | 0.7 | 20 |
| Temp. unc. - Conductivity | 5.2 | Rectangular | √3 | 0.78 | 0.71 | 2.3 | 2.1 | ∞ |
| Temp. unc. - Permittivity | 0.8 | Rectangular | √3 | 0.23 | 0.26 | 0.1 | 0.1 | ∞ |
| **Combined Standard Uncertainty (K = 1)** | | | | | | 11.11 | 11.13 | |
| **Expanded Uncertainty (K = 2)** | | | | | | **22.2** | **22.3** | |

**Uncertainty budget for frequency range 300 MHz to 3 GHz**

| Source of Uncertainty | Tolerance (± %) | Probability Distribution | Divisor | Ci 1g | Ci 10g | Standard Uncertainty 1g (± %) | Standard Uncertainty 10g (± %) | Vi Veff |
|---|---|---|---|---|---|---|---|---|
| **Measurement System** | | | | | | | | |
| Probe Calibration | 6.65 | Normal | 1 | 1 | 1 | 6.65 | 6.65 | ∞ |
| Axial Isotropy | 4.7 | Rectangular | √3 | 0.7 | 0.7 | 1.9 | 1.9 | ∞ |
| Hemispherical Isotropy | 9.6 | Rectangular | √3 | 0.7 | 0.7 | 3.9 | 3.9 | ∞ |
| Boundary Effects | 2 | Rectangular | √3 | 1 | 1 | 1.2 | 1.2 | ∞ |
| Linearity | 4.7 | Rectangular | √3 | 1 | 1 | 2.7 | 2.7 | ∞ |
| Detection Limits | 0.25 | Rectangular | √3 | 1 | 1 | 0.1 | 0.1 | ∞ |
| Modulation Response | 2.4 | Rectangular | √3 | 1 | 1 | 1.4 | 1.4 | ∞ |
| Readout Electronics | 0.3 | Normal | 1 | 1 | 1 | 0.3 | 0.3 | ∞ |
| Response Time | 0 | Rectangular | √3 | 1 | 1 | 0.0 | 0.0 | ∞ |
| Integration Time | 1.7 | Rectangular | √3 | 1 | 1 | 1.0 | 1.0 | ∞ |
| RF Ambient – Noise | 3 | Rectangular | √3 | 1 | 1 | 1.7 | 1.7 | ∞ |
| RF Ambient – Reflections | 3 | Rectangular | √3 | 1 | 1 | 1.7 | 1.7 | ∞ |
| Probe Positioner | 0.4 | Rectangular | √3 | 1 | 1 | 0.2 | 0.2 | ∞ |
| Probe Positioning | 6.7 | Rectangular | √3 | 1 | 1 | 3.9 | 3.9 | ∞ |
| Max. SAR Evaluation | 4 | Rectangular | √3 | 1 | 1 | 2.3 | 2.3 | ∞ |
| **Test Sample Related** | | | | | | | | |
| Device Positioning | 2.2 / 2.6 | Normal | 1 | 1 | 1 | 2.2 | 2.6 | 30 |
| Device Holder | 3.3 / 3.4 | Normal | 1 | 1 | 1 | 3.3 | 3.4 | 30 |
| Power Drift | 5 | Rectangular | √3 | 1 | 1 | 2.9 | 2.9 | ∞ |
| Power Scaling | 0 | Rectangular | √3 | 1 | 1 | 0.0 | 0.0 | ∞ |
| **Phantom and Setup** | | | | | | | | |
| Phantom Uncertainty | 7.9 | Rectangular | √3 | 1 | 1 | 4.6 | 4.6 | ∞ |
| SAR correction | 1.2 / 0.97 | Rectangular | √3 | 1 | 0.84 | 0.7 | 0.5 | ∞ |
| Liquid Conductivity (Meas.) | 2.5 | Normal | 1 | 0.78 | 0.71 | 2.0 | 1.8 | 20 |
| Liquid Permittivity (Meas.) | 2.5 | Normal | 1 | 0.23 | 0.26 | 0.6 | 0.7 | 20 |
| Temp. unc. - Conductivity | 3.4 | Rectangular | √3 | 0.78 | 0.71 | 1.5 | 1.4 | ∞ |
| Temp. unc. - Permittivity | 0.4 | Rectangular | √3 | 0.23 | 0.26 | 0.1 | 0.1 | ∞ |
| **Combined Standard Uncertainty (K = 1)** | | | | | | 11.86 | 11.91 | |
| **Expanded Uncertainty (K = 2)** | | | | | | **23.7** | **23.8** | |

**Uncertainty budget for frequency range 3 GHz to 6 GHz**

## 4. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE STD 1528- 2013, the following FCC Published RF exposure KDB procedures & manufacturer KDB inquiries:

- IC RSS-102 Issue 5:March 2015
- IEEE 1528:2013
- KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- KDB 865664 D02 RF Exposure Reporting v01r02
- KDB 248227 D01 802 11 Wi-Fi SAR v02r02
- KDB 447498 D01 General RF Exposure Guidance v06
- 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)

In addition to the above, the following information was used:

- TCB workshop April, 2019; Page 19, Tissue Simulating Liquids(TSL)

# 5. SAR Measurement System

## 5.1. Definition of Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\mathbf{SAR} = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\mathbf{dm}}\right) = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\boldsymbol{\rho}\mathbf{dv}}\right)$$

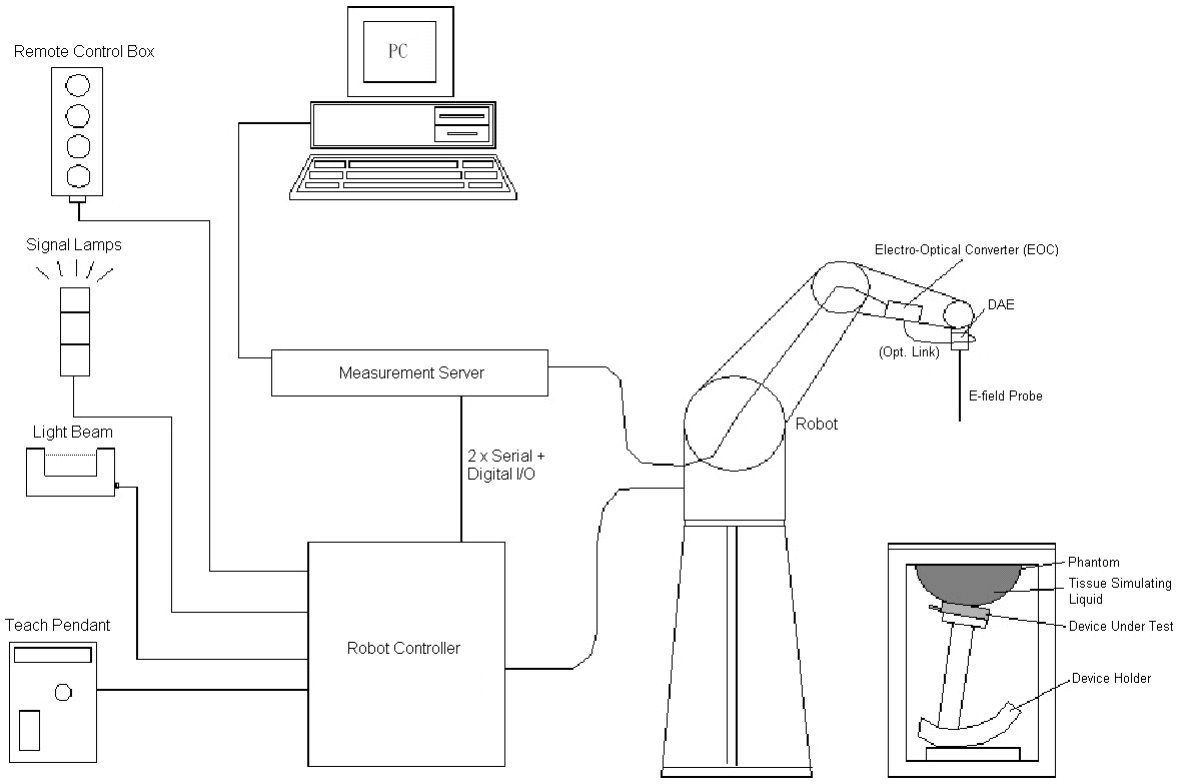
SAR is expressed in units of Watts per kilogram (W/kg)
SAR measurement can be related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

## 5.2. SPEAG DASY System

DASY system consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY5 software defined. The DASY software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion form the optical into digital electric signal of the DAE and transfers data to the PC.

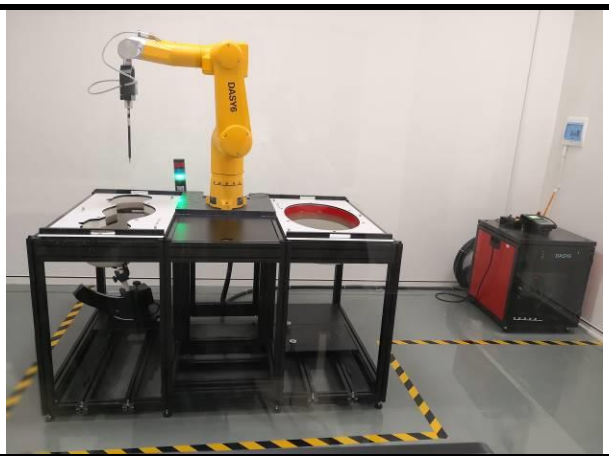



**DASY System Setup**

### 5.2.1.Robot

The DASY system uses the high precision robots from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability ±0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)



**DASY6**

### 5.2.2. Probes

The SAR measurement is conducted with the dosimetric probe. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency.

| | |
|---|---|
| **Model** | EX3DV4 |
| **Construction** | Symmetrical design with triangular core. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE). |
| **Frequency** | 10 MHz to 6 GHz<br>Linearity: ± 0.2 dB |
| **Directivity** | ± 0.3 dB in HSL (rotation around probe axis)<br>± 0.5 dB in tissue material (rotation normal to probe axis) |
| **Dynamic Range** | 10 µW/g to 100 mW/g<br>Linearity: ± 0.2 dB (noise: typically < 1 µW/g) |
| **Dimensions** | Overall length: 337 mm (Tip: 20 mm)<br>Tip diameter: 2.5 mm (Body: 12 mm)<br>Typical distance from probe tip to dipole centers: 1 mm |

### 5.2.3.Data Acquisition Electronics (DAE)

| | |
|---|---|
| **Model** | DAE4 |
| **Construction** | Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY 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 fA |
| **Dimensions** | 60 x 60 x 68 mm |

### 5.2.4. Phantoms

| | | |
|---|---|---|
| **Model** | Twin SAM |  |
| **Construction** | 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. | |
| **Material** | Vinylester, glass fiber reinforced (VE-GF) | |
| **Shell Thickness** | 2 ± 0.2 mm (6 ± 0.2 mm at ear point) | |
| **Dimensions** | Length: 1000 mm<br>Width: 500 mm<br>Height: adjustable feet | |
| **Filling Volume** | approx. 25 liters | |

| | | |
|---|---|---|
| **Model** | ELI |  |
| **Construction** | 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. | |
| **Material** | Vinylester, glass fiber reinforced (VE-GF) | |
| **Shell Thickness** | 2.0 ± 0.2 mm (bottom plate) | |
| **Dimensions** | Major axis: 600 mm<br>Minor axis: 400 mm | |
| **Filling Volume** | approx. 30 liters | |

### 5.2.5. Device Holder

| | | |
|---|---|---|
| **Model** | Mounting Device |  |
| **Construction** | In combination with the Twin SAM Phantom or ELI4, the Mounting Device enables the rotation of the mounted transmitter device in spherical coordinates. Rotation point is the ear opening point. Transmitter devices can be easily and accurately positioned according to IEC, IEEE, FCC or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat). | |
| **Material** | POM | |

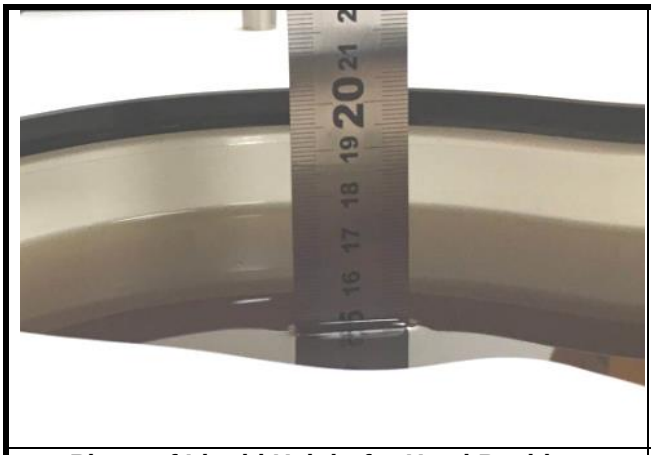
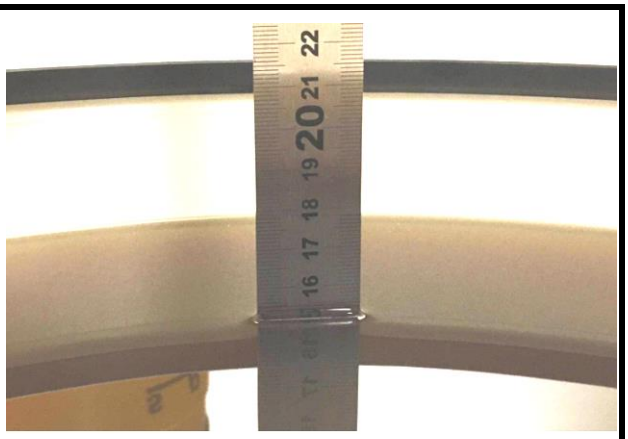
| | | |
|---|---|---|
| **Model** | Laptop Extensions Kit |  |
| **Construction** | Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.). It is lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner. | |
| **Material** | POM, Acrylic glass, Foam | |

### 5.2.6.System Validation Dipoles

| | | |
|---|---|---|
| **Model** | D-Serial |  |
| **Construction** | Symmetrical dipole with l/4 balun. Enables measurement of feed point impedance with NWA. Matched for use near flat phantoms filled with tissue simulating solutions. | |
| **Frequency** | 750 MHz to 5800 MHz | |
| **Return Loss** | > 20 dB | |
| **Power Capability** | > 100 W (f < 1GHz), > 40 W (f > 1GHz) | |

### 5.2.7. Tissue Simulating Liquids

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed.

| | |
|---|---|
|  |  |
| **Photo of Liquid Height for Head Position** | **Photo of Liquid Height for Body Position** |

The dielectric properties of the head tissue simulating liquids are defined in IEEE 1528, and KDB 865664 D01 Appendix A. For the body tissue simulating liquids, the dielectric properties are defined in KDB 865664 D01 Appendix A. The dielectric properties of the tissue simulating liquids were verified prior to the SAR evaluation using a dielectric assessment kit and a network analyzer.

**Targets of Tissue Simulating Liquid**

| Frequency (MHz) | Target Permittivity | Range of ±5% | Target Conductivity | Range of ±5% |
|---|---|---|---|---|
| **For Head** | | | | |
| 750 | 41.9 | 39.8 ~ 44.0 | 0.89 | 0.85 ~ 0.93 |
| 835 | 41.5 | 39.4 ~ 43.6 | 0.90 | 0.86 ~ 0.95 |
| 900 | 41.5 | 39.4 ~ 43.6 | 0.97 | 0.92 ~ 1.02 |
| 1450 | 40.5 | 38.5 ~ 42.5 | 1.20 | 1.14 ~ 1.26 |
| 1640 | 40.3 | 38.3 ~ 42.3 | 1.29 | 1.23 ~ 1.35 |
| 1750 | 40.1 | 38.1 ~ 42.1 | 1.37 | 1.30 ~ 1.44 |
| 1800 | 40.0 | 38.0 ~ 42.0 | 1.40 | 1.33 ~ 1.47 |
| 1900 | 40.0 | 38.0 ~ 42.0 | 1.40 | 1.33 ~ 1.47 |
| 2000 | 40.0 | 38.0 ~ 42.0 | 1.40 | 1.33 ~ 1.47 |
| 2300 | 39.5 | 37.5 ~ 41.5 | 1.67 | 1.59 ~ 1.75 |
| 2450 | 39.2 | 37.2 ~ 41.2 | 1.80 | 1.71 ~ 1.89 |
| 2600 | 39.0 | 37.1 ~ 41.0 | 1.96 | 1.86 ~ 2.06 |
| 3500 | 37.9 | 36.0 ~ 39.8 | 2.91 | 2.76 ~ 3.06 |
| 5200 | 36.0 | 34.2 ~ 37.8 | 4.66 | 4.43 ~ 4.89 |
| 5300 | 35.9 | 34.1 ~ 37.7 | 4.76 | 4.52 ~ 5.00 |
| 5500 | 35.6 | 33.8 ~ 37.4 | 4.96 | 4.71 ~ 5.21 |
| 5600 | 35.5 | 33.7 ~ 37.3 | 5.07 | 4.82 ~ 5.32 |
| 5800 | 35.3 | 33.5 ~ 37.1 | 5.27 | 5.01 ~ 5.53 |
| **For Body** | | | | |
| 750 | 55.5 | 52.7 ~ 58.3 | 0.96 | 0.91 ~ 1.01 |
| 835 | 55.2 | 52.4 ~ 58.0 | 0.97 | 0.92 ~ 1.02 |
| 900 | 55.0 | 52.3 ~ 57.8 | 1.05 | 1.00 ~ 1.10 |
| 1450 | 54.0 | 51.3 ~ 56.7 | 1.30 | 1.24 ~ 1.37 |
| 1640 | 53.8 | 51.1 ~ 56.5 | 1.40 | 1.33 ~ 1.47 |
| 1750 | 53.4 | 50.7 ~ 56.1 | 1.49 | 1.42 ~ 1.56 |
| 1800 | 53.3 | 50.6 ~ 56.0 | 1.52 | 1.44 ~ 1.60 |
| 1900 | 53.3 | 50.6 ~ 56.0 | 1.52 | 1.44 ~ 1.60 |
| 2000 | 53.3 | 50.6 ~ 56.0 | 1.52 | 1.44 ~ 1.60 |
| 2300 | 52.9 | 50.3 ~ 55.5 | 1.81 | 1.72 ~ 1.90 |
| 2450 | 52.7 | 50.1 ~ 55.3 | 1.95 | 1.85 ~ 2.05 |
| 2600 | 52.5 | 49.9 ~ 55.1 | 2.16 | 2.05 ~ 2.27 |
| 3500 | 51.3 | 48.7 ~ 53.9 | 3.31 | 3.14 ~ 3.48 |
| 5200 | 49.0 | 46.6 ~ 51.5 | 5.30 | 5.04 ~ 5.57 |
| 5300 | 48.9 | 46.5 ~ 51.3 | 5.42 | 5.15 ~ 5.69 |
| 5500 | 48.6 | 46.2 ~ 51.0 | 5.65 | 5.37 ~ 5.93 |
| 5600 | 48.5 | 46.1 ~ 50.9 | 5.77 | 5.48 ~ 6.06 |
| 5800 | 48.2 | 45.8 ~ 50.6 | 6.00 | 5.70 ~ 6.30 |

The following table gives the recipes for tissue simulating liquids.

**Recipes of Tissue Simulating Liquid**

| Tissue Type | Bactericide | DGBE | HEC | NaCl | Sucrose | Triton X-100 | Water | Diethylene Glycol Mono-hexylether |
|---|---|---|---|---|---|---|---|---|
| H750 | 0.2 | - | 0.2 | 1.5 | 56.0 | - | 42.1 | - |
| H835 | 0.2 | - | 0.2 | 1.5 | 57.0 | - | 41.1 | - |
| H900 | 0.2 | - | 0.2 | 1.4 | 58.0 | - | 40.2 | - |
| H1450 | - | 43.3 | - | 0.6 | - | - | 56.1 | - |
| H1640 | - | 45.8 | - | 0.5 | - | - | 53.7 | - |
| H1750 | - | 47.0 | - | 0.4 | - | - | 52.6 | - |
| H1800 | - | 44.5 | - | 0.3 | - | - | 55.2 | - |
| H1900 | - | 44.5 | - | 0.2 | - | - | 55.3 | - |
| H2000 | - | 44.5 | - | 0.1 | - | - | 55.4 | - |
| H2300 | - | 44.9 | - | 0.1 | - | - | 55.0 | - |
| H2450 | - | 45.0 | - | 0.1 | - | - | 54.9 | - |
| H2600 | - | 45.1 | - | 0.1 | - | - | 54.8 | - |
| H3500 | - | 8.0 | - | 0.2 | - | 20.0 | 71.8 | - |
| H5G | - | - | - | - | - | 17.2 | 65.5 | 17.3 |
| B750 | 0.2 | - | 0.2 | 0.8 | 48.8 | - | 50.0 | - |
| B835 | 0.2 | - | 0.2 | 0.9 | 48.5 | - | 50.2 | - |
| B900 | 0.2 | - | 0.2 | 0.9 | 48.2 | - | 50.5 | - |
| B1450 | - | 34.0 | - | 0.3 | - | - | 65.7 | - |
| B1640 | - | 32.5 | - | 0.3 | - | - | 67.2 | - |
| B1750 | - | 31.0 | - | 0.2 | - | - | 68.8 | - |
| B1800 | - | 29.5 | - | 0.4 | - | - | 70.1 | - |
| B1900 | - | 29.5 | - | 0.3 | - | - | 70.2 | - |
| B2000 | - | 30.0 | - | 0.2 | - | - | 69.8 | - |
| B2300 | - | 31.0 | - | 0.1 | - | - | 68.9 | - |
| B2450 | - | 31.4 | - | 0.1 | - | - | 68.5 | - |
| B2600 | - | 31.8 | - | 0.1 | - | - | 68.1 | - |
| B3500 | - | 28.8 | - | 0.1 | - | - | 71.1 | - |
| B5G | - | - | - | - | - | 10.7 | 78.6 | 10.7 |

**Simulating Head Liquid (HBBL600-6000MHz), Manufactured by SPEAG:**

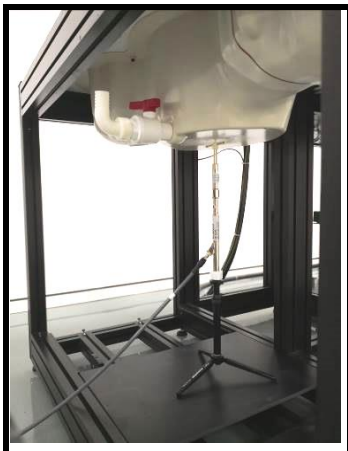
| Water (% by weight) | Esters, Emulsifiers, Inhibitors (% by weight) | Sodium salt (% by weight) |
|---|---|---|
| 50 - 65% | 10 - 30% | 8 - 25% |

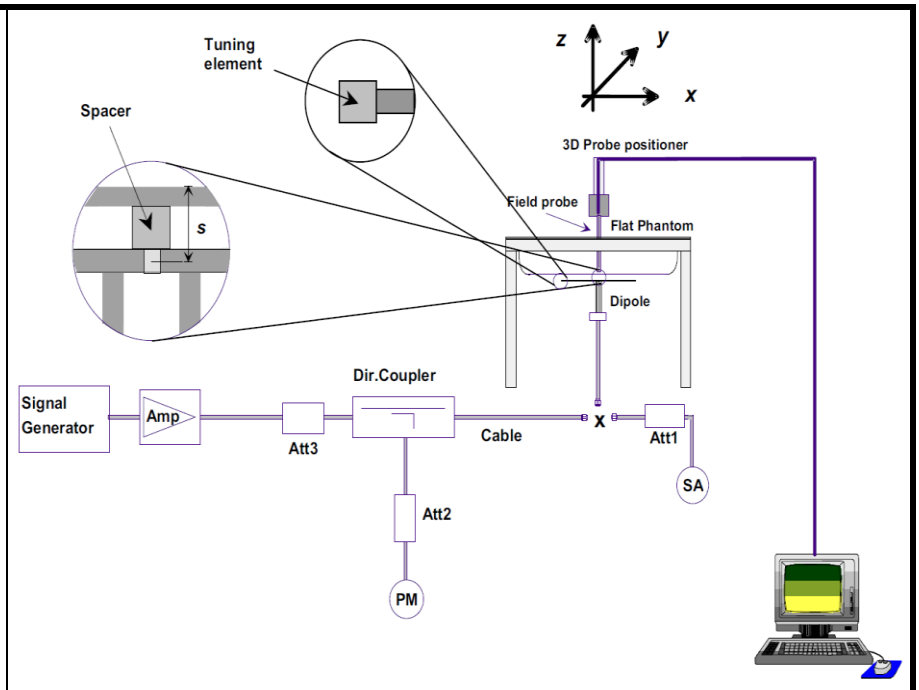
**Simulating Body Liquid (MBBL600-6000MHz), Manufactured by SPEAG:**

| Water (% by weight) | Esters, Emulsifiers, Inhibitors (% by weight) | Sodium salt (% by weight) |
|---|---|---|
| 60 - 80% | 20 - 40% | 0 – 1.5% |

### 5.2.8.SAR System Verification

The system check verifies that the system operates within its specifications. It is performed daily or before every SAR measurement. The system check uses normal SAR measurements in the flat section of the phantom with a matched dipole at a specified distance. The system verification setup is shown as below.






**System Verification Setup**

The validation dipole is placed beneath the flat phantom with the specific spacer in place. The distance spacer is touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The spectrum analyzer measures the forward power at the location of the system check dipole connector. The signal generator is adjusted for the desired forward power (250 mW is used for 700 MHz to 3 GHz, 100 mW is used for 3.5 GHz to 6 GHz) at the dipole connector and the power meter is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter.

After system check testing, the SAR result will be normalized to 1W forward input power and compared with the reference SAR value derived from validation dipole certificate report. The deviation of system check should be within 10 %.

# 6. SAR Measurement Procedure

According to the SAR test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

The SAR measurement procedures for each of test conditions are as follows:

(a) Make EUT to transmit maximum output power
(b) Measure conducted output power through RF cable
(c) Place the EUT in the specific position of phantom
(d) Perform SAR testing steps on the DASY system
(e) Record the SAR value

## 6.1. Area & Zoom Scan Procedure

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. According to KDB 865664 D01, the resolution for Area and Zoom scan is specified in the table below.

| Items | <= 2 GHz | 2-3 GHz | 3-4 GHz | 4-5 GHz | 5-6 GHz |
|---|---|---|---|---|---|
| Area Scan (Δx, Δy) | <= 15 mm | <= 12 mm | <= 12 mm | <= 10 mm | <= 10 mm |
| Zoom Scan (Δx, Δy) | <= 8 mm | <= 5 mm | <= 5 mm | <= 4 mm | <= 4 mm |
| Zoom Scan (Δz) | <= 5 mm | <= 5 mm | <= 4 mm | <= 3 mm | <= 2 mm |
| Zoom Scan Volume | >= 30 mm | >= 30 mm | >= 28 mm | >= 25 mm | >= 22 mm |

**Note:**
When zoom scan is required and report SAR is <= 1.4 W/kg, the zoom scan resolution of Δx / Δy (2-3GHz: <= 8 mm, 3-4GHz: <= 7 mm, 4-6GHz: <= 5 mm) may be applied.

## 6.2. Volume Scan Procedure

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

## 6.3. Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drift more than 5%, the SAR will be retested.

## 6.4. Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

## 6.5. SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard’s method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

# 7. SAR Measurement Evaluation

## 7.1. EUT Configuration and Setting

**<Considerations Related to WLAN for Setup and Testing>**

In general, various vendor specific external test software and chipset based internal test modes are typically used for SAR measurement. These chipset based test mode utilities are generally hardware and manufacturer dependent, and often include substantial flexibility to reconfigure or reprogram a device. A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement. The test frequencies established using test mode must correspond to the actual channel frequencies. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 - 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. In addition, a periodic transmission duty factor is required for current generation SAR systems to measure SAR correctly. The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

According to KDB 248227 D01, this device has installed WLAN engineering testing software which can provide continuous transmitting RF signal. During WLAN SAR testing, this device was operated to transmit continuously at the maximum transmission duty with specified transmission mode, operating frequency, lowest data rate, and maximum output power.

**Initial Test Configuration**

An initial test configuration is determined for OFDM transmission modes in 2.4 GHz and 5 GHz bands according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band.

**Subsequent Test Configuration**

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. Additional power measurements may be required to determine if SAR measurements are required for subsequent highest output power channels in a subsequent test configuration. When the highest reported SAR for the initial test configuration according to the initial test position or fixed exposure position requirements, 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 is not required for that subsequent test configuration.

**SAR Test Configuration and Channel Selection**

When multiple channel bandwidth configurations in a frequency band have the same specified maximum output power, the initial test configuration is using largest channel bandwidth, lowest order modulation, lowest data rate, and lowest order 802.11 mode (i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is

chosen over 802.11n). After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following.
1) The channel closest to mid-band frequency is selected for SAR measurement.
2) For channels with equal separation from mid-band frequency; for example, high and low channels or two mid-band channels, the higher frequency (number) channel is selected for SAR measurement.

**<Considerations Related to Bluetooth for Setup and Testing>**
This device has installed Bluetooth engineering testing software which can provide continuous transmitting RF signal. During Bluetooth SAR testing, this device was operated to transmit continuously at the maximum transmission duty with specified transmission mode, operating frequency, lowest data rate, and maximum output power.

**<Considerations Related to SDR for Setup and Testing>**
This equipment SDR technology SAR test reference 248227 D01 802 11 Wi-Fi SAR
This device has installed SDR engineering testing software which can provide continuous transmitting RF signal. During SDR SAR testing, this device was operated to transmit continuously at the maximum transmission duty with specified transmission mode, operating frequency, lowest data rate, and maximum output power.

**Initial Test Configuration**
An initial test configuration is determined for SDR transmission modes in 2.4 GHz and 5 GHz bands according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band.

**Subsequent Test Configuration**
SAR measurement requirements for the remaining SDR transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. Additional power measurements may be required to determine if SAR measurements are required for subsequent highest output power channels in a subsequent test configuration. When the highest reported SAR for the initial test configuration according to the initial test position or fixed exposure position requirements, 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 is not required for that subsequent test configuration.

## 7.2. EUT Testing Position

The device is a pair of VR glasses that are used in the head position, The SAR assessment is on the inside of the glasses, We test at the neck (simulating the position of the face) of the test platform, and test close to the neck.

### 7.2.1. Head Exposure Conditions

Head exposure is limited to next to the ear voice mode operations. Head SAR compliance is tested according to the test positions defined in IEEE Std 1528-2003 using the SAM phantom illustrated as below.

1. Define two imaginary lines on the handset

(a) The vertical centerline passes through two points on the front side of the handset - the midpoint of the width $w_t$ of the handset at the level of the acoustic output, and the midpoint of the width $w_b$ of the bottom of the handset.

(b) The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.

(c) The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.

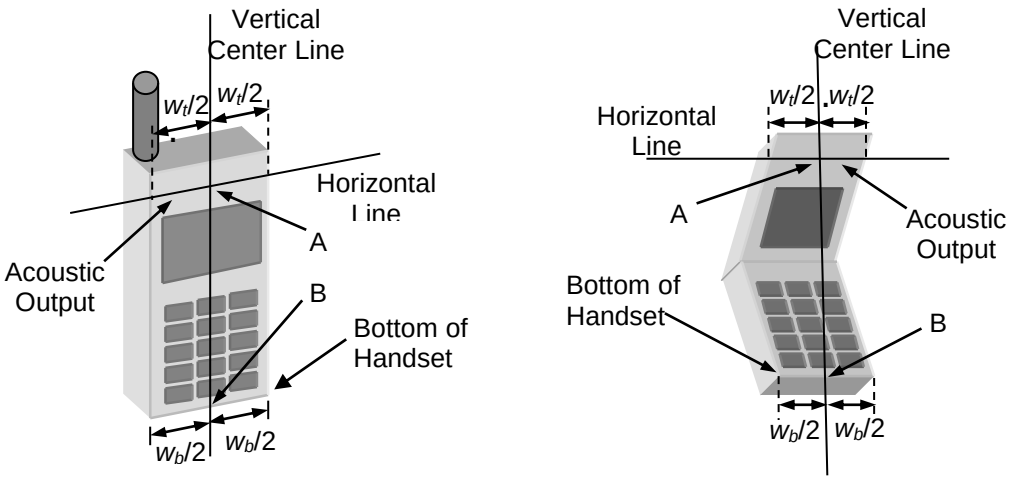



**Illustration for Handset Vertical and Horizontal Reference Lines**

2. Cheek Position

(a) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.

(b) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost (see Fig-4.2).

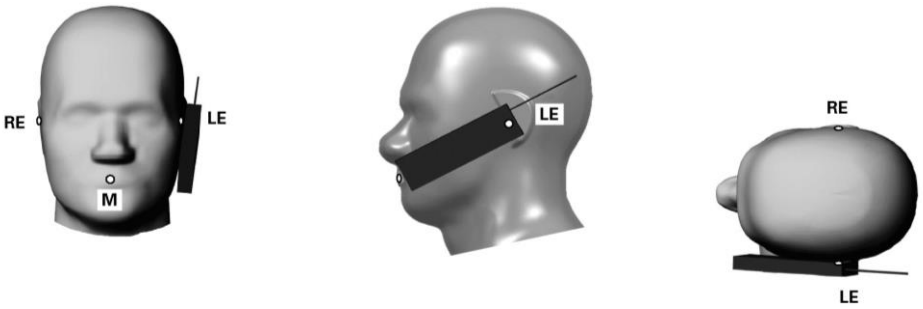



**Illustration for Cheek Position**

3. Tilted Position

(a) To position the device in the “cheek” position described above.

(b) While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost (see Fig-4.3).

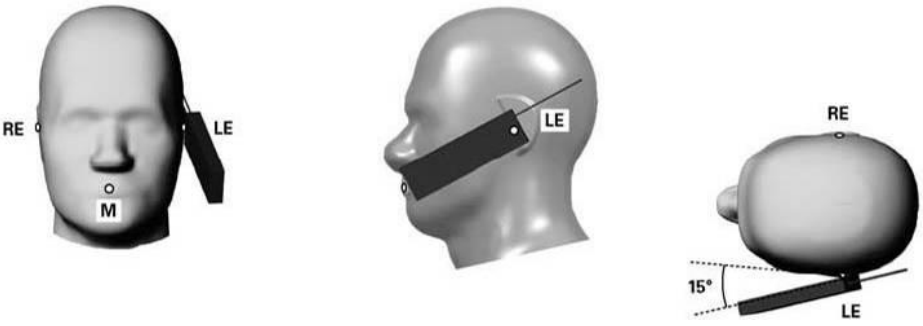



**Illustration for Tilted Position**

## 7.3. Simultaneous Transmission Possibilities

The simultaneous transmission possibilities for this device are listed as below.

| Simultaneous TX Combination | Capable Transmit Configurations | Head |
|---|---|---|
| 1 | SDR 2.4G + WIFI 5G + BT | Yes |
| 2 | SDR 5.8G + WIFI 2.4G + BT | Yes |

**Note :**

1. The 2.4G WLAN and 5G WLAN cannot transmit simultaneously.
2. The SDR 2.4G and SDR 5.8G cannot transmit simultaneously.

## 7.4. Tissue Verification

The measuring results for tissue simulating liquid are shown as below.

| Test Date | Tissue Type | Frequency (MHz) | Measured Conductivity (σ) | Measured Permittivity ($\varepsilon_r$) | Target Conductivity (σ) | Target Permittivity ($\varepsilon_r$) | Conductivity Deviation (%) | Permittivity Deviation (%) |
|---|---|---|---|---|---|---|---|---|
| Dec. 28, 2021 | H2450 | 2450 | 1.827 | 37.984 | 1.80 | 39.20 | 1.50 | -3.10 |
| | | 2402 | 1.787 | 38.020 | 1.76 | 39.27 | 1.65 | -3.18 |
| | | 2437 | 1.816 | 38.000 | 1.79 | 39.22 | 1.57 | -3.11 |
| | | 2461.5 | 1.837 | 37.970 | 1.81 | 39.18 | 1.38 | -3.09 |
| Dec. 28, 2021 | H5G | 5250 | 4.691 | 35.325 | 4.71 | 35.90 | -0.40 | -1.60 |
| | | 5210 | 4.648 | 35.400 | 4.67 | 35.99 | -0.47 | -1.64 |
| Dec. 28, 2021 | H5G | 5800 | 5.249 | 34.536 | 5.27 | 35.30 | -0.40 | -2.16 |
| | | 5775 | 5.218 | 34.588 | 5.25 | 35.32 | -0.51 | -2.07 |
| | | 5784.5 | 5.230 | 35.559 | 5.26 | 35.31 | -0.48 | 0.71 |

**Note:**

The dielectric properties of the tissue simulating liquid must be measured within 24 hours before the SAR testing and within ±5% of the target values. Liquid temperature during the SAR testing must be within ±2 ℃.

## 7.5. System Validation

The SAR measurement system was validated according to procedures in KDB 865664 D01. The validation status in tabulated summary is as below.

| Test Date | Probe S/N | Calibration Point | | Measured Conductivity (σ) | Measured Permittivity ($\varepsilon_r$) | Validation for CW | | | Validation for Modulation | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sensitivity Range | Probe Linearity | Probe Isotropy | Modulation Type | Duty Factor | PAR |
| Dec. 28, 2021 | 7506 | Head | 2450 | 1.827 | 37.984 | Pass | Pass | Pass | OFDM | N/A | Pass |
| Dec. 28, 2021 | 7506 | Head | 5200 | 4.691 | 35.325 | Pass | Pass | Pass | OFDM | N/A | Pass |
| Dec. 28, 2021 | 7506 | Head | 5800 | 5.249 | 34.536 | Pass | Pass | Pass | OFDM | N/A | Pass |

## 7.6. System Verification

The measuring result for system verification is tabulated as below.

| Test Date | Mode | Frequency (MHz) | 1W Target SAR-1g (W/kg) | Measured SAR-1g (W/kg) | Normalized to 1W SAR-1g (W/kg) | Deviation (%) | Dipole S/N | Probe S/N | DAE S/N |
|---|---|---|---|---|---|---|---|---|---|
| Dec. 28, 2021 | Head | 2450 | 51.80 | 12.90 | 51.60 | -0.39 | 1014 | 7506 | 1557 |
| Dec. 28, 2021 | Head | 5250 | 79.20 | 8.07 | 80.70 | 1.89 | 1280 | 7506 | 1557 |
| Dec. 28, 2021 | Head | 5800 | 80.60 | 8.48 | 84.80 | 5.21 | 1280 | 7506 | 1557 |

**Note:**

Comparing to the reference SAR value provided by SPEAG, the validation data should be within its specification of 10 %. The result indicates the system check can meet the variation criterion and the plots can be referred to Appendix A of this report.

# 8. Maximum Output Power

## 8.1. Measured Conducted Power

The maximum conducted average power (Unit: dBm) including tune-up tolerance is shown as below.

| Mode | 2.4G WLAN | 5.2G WLAN | 5.8G WLAN |
|---|---|---|---|
| 802.11b | Ch1: 13.0<br>Ch2 - 10: 17.0<br>Ch11: 12.5 | N/A | N/A |
| 802.11g | Ch1: 13.0<br>Ch2 - 10: 17.0<br>Ch11: 13.5 | N/A | N/A |
| 802.11a | N/A | 17.0 | 15.5 |
| 802.11n/ac20/HT20 | Ch1: 13.5<br>Ch2 - 10: 17.0<br>Ch11: 13.0 | 17.0 | 15.0 |
| 802.11n/ac40/HT40 | Ch3: 13.0<br>Ch4 - 8: 17.0<br>Ch9: 12.5 | 17.0 | 15.0 |
| 802.11ac VHT80 | N/A | 17.0 | 15.5 |

| Mode | 2.4G Bluetooth |
|---|---|
| LE | 5.0 |

| Mode | 2.4G SDR | MIMO 2.4G SDR | 5.8G SDR | MIMO 5.8G SDR |
|---|---|---|---|---|
| 1.4M | 25.5 | 25.5 | 26.0 | 26.0 |
| 1.4M CA Mode | 25.5 | 25.5 | 26.0 | 26.0 |
| 3M | 25.5 | 25.5 | 26.0 | 26.0 |
| 3M CA Mode | 25.5 | 25.5 | 26.0 | 26.0 |
| 10M | 15.5 | 15.5 | 16.0 | 16.5 |
| 20M | 15.5 | 15.5 | 16.0 | 16.5 |
| 40M | 15.5 | 15.5 | 16.0 | 16.5 |

## 8.2. Measured Conducted Power Result

All Rate have been tested, the Worst conducted average power (Unit: dBm) is shown as below.

**<WLAN 2.4GHz>**

| Mode | 802.11b (1Mbps) | | |
|---|---|---|---|
| Channel / Frequency (MHz) | 1 (2412) | 6 (2437) | 11 (2462) |
| Average Power | 12.65 | **16.46** | 11.86 |
| **Mode** | **802.11g (6Mbps)** | | |
| **Channel / Frequency (MHz)** | **1 (2412)** | **6 (2437)** | **11 (2462)** |
| Average Power | 12.71 | **16.14** | 13.03 |
| **Mode** | **802.11n (HT20) (MCS0)** | | |
| **Channel / Frequency (MHz)** | **1 (2412)** | **6 (2437)** | **11 (2462)** |
| Average Power | 12.93 | **16.58** | 12.49 |
| **Mode** | **802.11n (HT40) (MCS0)** | | |
| **Channel / Frequency (MHz)** | **3 (2422)** | **6 (2437)** | **9 (2452)** |
| Average Power | 11.27 | **14.00** | 11.32 |

**<WLAN 5.2GHz>**

| Mode | 802.11a (6Mbps) | | |
|---|---|---|---|
| Channel / Frequency (MHz) | 36 (5180) | 40 (5200) | 48 (5240) |
| Average Power (ANT0) | **16.67** | 16.52 | 16.59 |
| **Mode** | **802.11n (HT20) (MCS0)** | | |
| **Channel / Frequency (MHz)** | **36 (5180)** | **40 (5200)** | **48 (5240)** |
| Average Power (ANT0) | **16.34** | 16.21 | 16.31 |
| **Mode** | **802.11n (HT40) (MCS0)** | | |
| **Channel / Frequency (MHz)** | **38 (5190)** | **46 (5230)** | |
| Average Power (ANT0) | 16.54 | **16.65** | |
| **Mode** | **802.11ac (VHT80) (MCS0)** | | |
| **Channel / Frequency (MHz)** | **42 (5210)** | | |
| Average Power (ANT0) | **16.39** | | |

**<WLAN 5.8GHz>**

| Mode | 802.11a (6Mbps) | | |
|---|---|---|---|
| Channel / Frequency (MHz) | 149 (5745) | 157 (5785) | 165 (5825) |
| Average Power (ANT0) | 14.98 | 14.78 | **15.01** |
| **Mode** | **802.11n (HT20) (MCS0)** | | |
| **Channel / Frequency (MHz)** | **149 (5745)** | **157 (5785)** | **165 (5825)** |
| Average Power (ANT0) | **14.51** | 14.45 | 14.46 |
| **Mode** | **802.11n (HT40) (MCS0)** | | |
| **Channel / Frequency (MHz)** | **151 (5755)** | **159 (5795)** | |
| Average Power (ANT0) | 14.47 | **14.50** | |
| **Mode** | **802.11ac (VHT80) (MCS0)** | | |
| **Channel / Frequency (MHz)** | **155 (5775)** | | |
| Average Power (ANT0) | **15.18** | | |

**<Bluetooth>**

| Mode | Bluetooth LE | | |
|---|---|---|---|
| Channel / Frequency (MHz) | 0 (2402) | 19 (2440) | 39 (2480) |
| Average Power | **4.09** | 3.90 | 3.15 |

All combinations have been tested, the Worst conducted average (Unit: dBm) is shown as below.

**<SDR-2.4GHz>**

| Mode | 1.4MHz Bandwidth | | |
|---|---|---|---|
| Channel / Frequency (MHz) | Low (2409.5) | Mid (2435.5) | High (2463.5) |
| Average Power (Ant-1) | 24.85 | 24.95 | **25.08** |
| Average Power (Ant-0+ Ant-1) | 24.70 | 24.72 | **24.81** |
| Mode | 1.4MHz Bandwidth (CA Mode) | | |
| Channel / Frequency (MHz) | Low (2411.12) | Mid (2437.12) | High (2465.12) |
| Average Power (Ant-1) | **25.23** | 25.07 | 24.96 |
| Average Power (Ant-0+ Ant-1) | 24.65 | 24.79 | **24.95** |
| Mode | 3MHz Bandwidth | | |
| Channel / Frequency (MHz) | Low (2410.5) | Mid (2434.5) | High (2461.5) |
| Average Power (Ant-1) | 24.78 | 24.75 | **25.07** |
| Average Power (Ant-0+ Ant-1) | 24.90 | **25.06** | 24.65 |
| Mode | 3MHz Bandwidth (CA Mode) | | |
| Channel / Frequency (MHz) | Low (2413.2) | Mid (2437.2) | High (2464.2) |
| Average Power (Ant-1) | 24.76 | 24.85 | **25.01** |
| Average Power (Ant-0+ Ant-1) | **25.15** | 24.69 | 24.68 |
| Mode | 10MHz Bandwidth | | |
| Channel / Frequency (MHz) | Low (2405.5) | Mid (2440.5) | High (2476.5) |
| Average Power (Ant-1) | 14.68 | **14.71** | -1.36 |
| Average Power (Ant-0+ Ant-1) | **15.29** | 14.79 | -1.81 |
| Mode | 20MHz Bandwidth | | |
| Channel / Frequency (MHz) | Low (2410.5) | Mid (2441.5) | High (2472.5) |
| Average Power (Ant-1) | 14.92 | **15.11** | -1.39 |
| Average Power (Ant-0+ Ant-1) | 14.99 | **15.06** | -1.84 |
| Mode | 40MHz Bandwidth | | |
| Channel / Frequency (MHz) | Low (2422.5) | Mid (2437.5) | High (2452.5) |
| Average Power (Ant-1) | 14.91 | **15.38** | 15.07 |
| Average Power (Ant-0+ Ant-1) | **15.23** | 14.98 | 15.07 |

**<SDR-5.8GHz>**

| Mode | 1.4MHz Bandwidth | | |
|---|---|---|---|
| Channel / Frequency (MHz) | Low (5728.5) | Mid (5786.5) | High (5846.5) |
| Average Power (Ant-1) | 25.54 | 25.42 | **25.65** |
| Average Power (Ant-0+ Ant-1) | 25.41 | 25.26 | **25.81** |
| Mode | 1.4MHz Bandwidth (CA Mode) | | |
| Channel / Frequency (MHz) | Low (5730.12) | Mid (5788.12) | High (5848.12) |
| Average Power (Ant-1) | 25.75 | 25.74 | **25.93** |
| Average Power (Ant-0+ Ant-1) | 25.47 | 25.16 | **25.76** |
| Mode | 3MHz Bandwidth | | |
| Channel / Frequency (MHz) | Low (5727.5) | Mid (5784.5) | High (5844.5) |
| Average Power (Ant-1) | 25.78 | **25.86** | 25.26 |
| Average Power (Ant-0+ Ant-1) | 25.35 | **25.71** | 25.44 |
| Mode | 3MHz Bandwidth (CA Mode) | | |
| Channel / Frequency (MHz) | Low (5730.2) | Mid (5787.2) | High (5847.2) |
| Average Power (Ant-1) | 25.34 | **25.83** | 25.21 |
| Average Power (Ant-0+ Ant-1) | 25.50 | **25.59** | 25.47 |
| Mode | 10MHz Bandwidth | | |
| Channel / Frequency (MHz) | Low (5730.5) | Mid (5787.5) | High (5844.5) |
| Average Power (Ant-1) | 15.42 | **15.74** | 15.68 |
| Average Power (Ant-0+ Ant-1) | **16.35** | 16.12 | 15.68 |
| Mode | 20MHz Bandwidth | | |
| Channel / Frequency (MHz) | Low (5735.5) | Mid (5787.5) | High (5839.5) |
| Average Power (Ant-1) | 15.35 | **15.67** | 15.56 |
| Average Power (Ant-0+ Ant-1) | **16.18** | 15.95 | 15.79 |
| Mode | 40MHz Bandwidth | | |
| Channel / Frequency (MHz) | Low (5745.5) | Mid (5787.5) | High (5829.5) |

| | | | |
|---|---|---|---|
| Average Power (Ant-1) | **15.54** | 15.41 | 15.38 |
| Average Power (Ant-0+ Ant-1) | **16.00** | 15.67 | 15.66 |

## 8.3. SAR Testing Results

### 8.3.1. SAR Test Reduction Considerations

**<KDB 447498 D01, General RF Exposure Guidance>**

Testing of other required channels within the operating mode of a frequency band is not required when the reported SAR for the mid-band or highest output power channel is:

(1) ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz

(2) ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz

(3) ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

**<KDB 248227 D01, SAR Guidance for Wi-Fi Transmitters>**

(1) For handsets operating next to ear, hotspot mode or mini-tablet configurations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When the reported SAR of initial test position is <= 0.4 W/kg, SAR testing for remaining test positions is not required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is <= 0.8 W/kg or all test positions are measured.

(2) For WLAN 2.4 GHz, the highest measured maximum output power channel for DSSS was selected for SAR measurement. When the reported SAR is <= 0.8 W/kg, no further SAR testing is required. Otherwise, SAR is evaluated at the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel. For OFDM modes (802.11g/n), SAR is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and it is <= 1.2 W/kg.

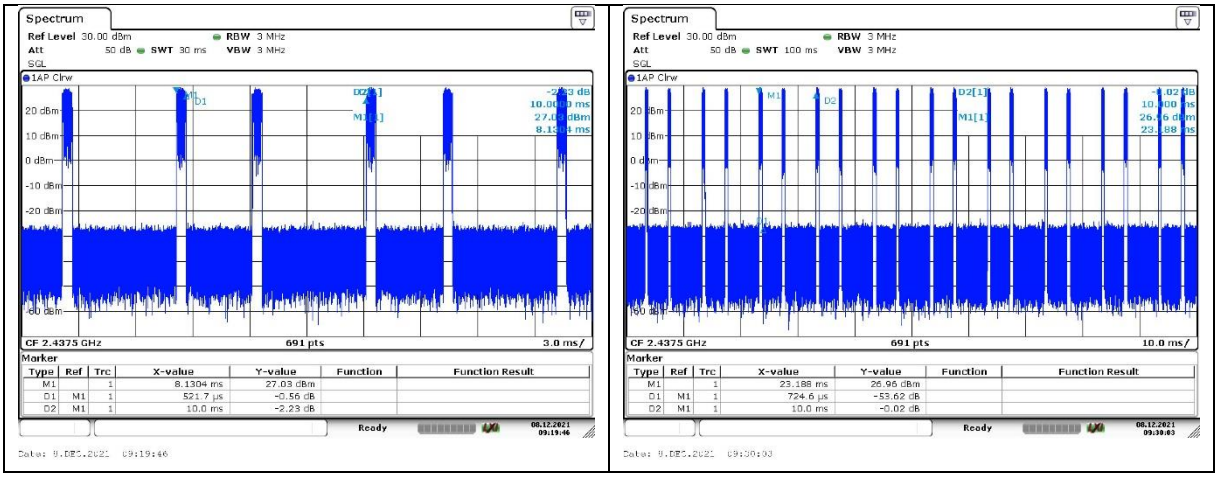
(3) For WLAN 5 GHz, the initial test configuration was selected according to the transmission mode with the highest maximum output power. When the reported SAR of initial test configuration is > 0.8 W/kg, SAR is required for the subsequent highest measured output power channel until the reported SAR result is <= 1.2 W/kg or all required channels are measured. For other transmission modes, SAR is not required when the highest reported SAR for initial test configuration is adjusted by the ratio of subsequent test configuration to initial test configuration specified maximum output power and it is <= 1.2 W/kg.

### 8.3.2. SAR Results for Head Exposure Condition

| Plot No. | Band | Mode | Test Position | Ch. | Fre. | Ant. | Degree | Max. Tune-up Power (dBm) | Measured Conducted Power (dBm) | Scaling Factor | Normal Duty Cycle | Power Drift | Measured SAR-1g (W/kg) | Scaled SAR-1g (W/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 802.11b | - | inside of glasses | 6 | 2437 | - | - | 17.0 | 16.46 | 1.13 | 100% | 0.13 | 0.537 | **0.61** |
| 2 | 802.11ac | VHT80 | inside of glasses | 42 | 5210 | - | - | 17.0 | 16.39 | 1.15 | 100% | 0.05 | 0.836 | **0.96** |
| | 802.11ac | VHT80 | inside of glasses | 42 | 5210 | - | - | 17.0 | 16.39 | 1.15 | 100% | 0.04 | 0.801 | 0.92 |
| 3 | 802.11ac | VHT80 | inside of glasses | 155 | 5775 | - | - | 15.5 | 15.18 | 1.08 | 100% | 0.05 | 0.938 | **1.01** |
| | 802.11ac | VHT80 | inside of glasses | 155 | 5775 | - | - | 15.5 | 15.18 | 1.08 | 100% | 0.03 | 0.884 | 0.95 |
| | SDR-2.4G | 3Mbps | inside of glasses | High | 2461.5 | 0 | 60 | 25.5 | 25.07 | 1.10 | 10.5% | -0.09 | 0.208 | 0.02 |
| | SDR-2.4G | 3Mbps | inside of glasses | High | 2461.5 | 0 | 120 | 25.5 | 25.07 | 1.10 | 10.5% | -0.09 | 0.422 | 0.05 |
| | SDR-2.4G | 3Mbps | inside of glasses | High | 2461.5 | 1 | 60 | 25.5 | 25.07 | 1.10 | 10.5% | 0.05 | 0.136 | 0.02 |
| 4 | SDR-2.4G | 3Mbps | inside of glasses | High | 2461.5 | 1 | 120 | 25.5 | 25.07 | 1.10 | 10.5% | 0.06 | 0.502 | 0.06 |
| 4 | SDR-2.4G | 40Mbps | inside of glasses | Mid | 2437.5 | 1 | 120 | 15.5 | 15.38 | 1.03 | 100% | 0.00 | 0.097 | **0.10** |
| | SDR-5.8G | 3Mbps | inside of glasses | Mid | 5784.5 | 0 | 60 | 26.0 | 25.86 | 1.03 | 10.5% | -0.06 | 5.02 | **0.54** |
| 5 | SDR-5.8G | 3Mbps | inside of glasses | Mid | 5784.5 | 0 | 120 | 26.0 | 25.86 | 1.03 | 10.5% | -0.09 | 1.78 | 0.19 |
| | SDR-5.8G | 3Mbps | inside of glasses | Mid | 5784.5 | 1 | 60 | 26.0 | 25.86 | 1.03 | 10.5% | -0.02 | 4.27 | 0.46 |
| | SDR-5.8G | 3Mbps | inside of glasses | Mid | 5784.5 | 1 | 120 | 26.0 | 25.86 | 1.03 | 10.5% | 0.02 | 1.10 | 0.12 |
| | SDR-5.8G | 3Mbps | inside of glasses | Mid | 5784.5 | 0+1 | 60 | 26.0 | 25.71 | 1.07 | 10.5% | 0.02 | 2.57 | 0.29 |
| | SDR-5.8G | 40Mbps | inside of glasses | Low | 5745.5 | 0 | 60 | 16.0 | 15.54 | 1.11 | 100% | -0.03 | 0.324 | 0.36 |
| 6 | BT | BLE | inside of glasses | 0 | 2402 | - | - | 4.5 | 4.09 | 1.10 | 77.6% | 0.09 | <0.01 | **<0.01** |

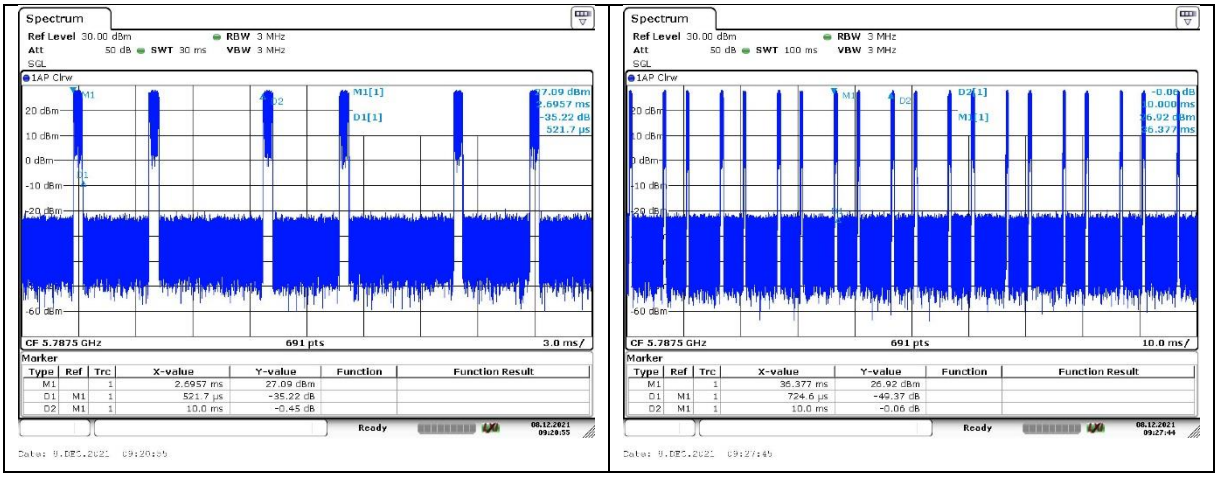
*Normal duty cycle is 10.5% for 2.4GHz and 5.8GHz SDR.

1) 2.4GHz SDR




*Duty cycle=(0.5217*2)/10=10.434%

2) 5.8GHz SDR




*Duty cycle=(0.5217*2)/10=10.434%

### 8.3.3. SAR Measurement Variability

According to KDB 865664 D01, SAR measurement variability was assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. Alternatively, if the highest measured SAR for both head and body tissue-equivalent media are ≤ 1.45 W/kg and the ratio of these highest SAR values, i.e., largest divided by smallest value, is ≤ 1.10, the highest SAR configuration for either head or body tissue-equivalent medium may be used to perform the repeated measurement. These 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.

SAR repeated measurement procedure:

1. When the highest measured SAR is < 0.80 W/kg, repeated measurement is not required.
2. When the highest measured SAR is >= 0.80 W/kg, repeat that measurement once.
3. 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, perform a second repeated measurement.
4. If the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20, and the original, first or second repeated measurement is >= 1.5 W/kg, perform a third repeated measurement.

| Band | Mode | Test Position | Ch. | Original Measured SAR-1g (W/kg) | 1st Repeated SAR-1g (W/kg) | L/S Ratio | 2nd Repeated SAR-1g (W/kg) | L/S Ratio | 3rd Repeated SAR-1g (W/kg) | L/S Ratio |
|---|---|---|---|---|---|---|---|---|---|---|
| 802.11ac | VHT80 | inside of glasses | 42 | 0.836 | 0.801 | 1.04 | N/A | N/A | N/A | N/A |
| 802.11ac | VHT80 | inside of glasses | 155 | 0.938 | 0.884 | 1.06 | N/A | N/A | N/A | N/A |

**Simultaneous Multi-band Transmission Evaluation**

**<SAR Summation Analysis>**

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna. When the sum of $SAR_{1g}$ of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit ($SAR_{1g}$ 1.6 W/kg), the simultaneous transmission SAR is not required. When the sum of $SAR_{1g}$ is greater than the SAR limit ($SAR_{1g}$ 1.6 W/kg), SAR test exclusion is determined by the SPLSR.

**< MIMO-SDR-2.4GHz >**

| Position | Maximum SDR-2.4G Ant-0 $SAR_{1g}$ | Maximum SDR-2.4G Ant-1 $SAR_{1g}$ | Maximum SDR-2.4G Ant- 0+1 $SAR_{1g}$ |
|---|---|---|---|
| inside of glasses | 0.10 | 0.05 | 0.15 |

**< MIMO-SDR-5.8Gz >**

| Position | Maximum SDR-5.8G Ant-0 $SAR_{1g}$ | Maximum SDR-5.8G Ant-1 $SAR_{1g}$ | Maximum SDR-2.4G Ant- 0+1 $SAR_{1g}$ |
|---|---|---|---|
| inside of glasses | 0.54 | 0.46 | 0.29 |

**< SDR 2.4G + WIFI 5Gz + BT >**

| Position | Maximum SDR- 2.4G $SAR_{1g}$ | Maximum WLAN-5G $SAR_{1g}$ | Maximum BT $SAR_{1g}$ | Maximum $SAR_{1g}$ Summation |
|---|---|---|---|---|
| inside of glasses | 0.15 | 1.01 | 0.00 | 1.16 |

**< SDR 5.8G + WIFI 2.4Gz + BT >**

| Position | Maximum SDR- 5.8G $SAR_{1g}$ | Maximum WLAN-2.4G $SAR_{1g}$ | Maximum BT $SAR_{1g}$ | Maximum $SAR_{1g}$ Summation |
|---|---|---|---|---|
| inside of glasses | 0.54 | 0.61 | 0.00 | 1.15 |

# Appendixes

**All attachments are integral parts of this test report. This applies especially to the following appendix:**

**Appendix A: SAR Plots of System Verification**

The plots for system verification with largest deviation for each SAR system combination are shown as follows.

**Appendix B: SAR Plots of SAR Measurement**

The SAR plots for highest measured SAR in each exposure configuration, wireless mode and frequency band combination, and measured SAR > 1.5 W/kg are shown as follows.

**Appendix C: Calibration Certificate for probe and Dipole**

**Appendix D: Photographs of EUT and setup**