



SAR TEST REPORT

No. I21Z70032-SEM02

For

Samsung Electronics Co., Ltd.

Notebook PC

Model name: NP750XDA

With

Hardware Version: REV1.0

Software Version: Windows10-Pro

FCC ID: ZCANP750XDA

Issued Date: 2021-4-9

Note:

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REPORT HISTORY

| Report Number | Revision | Issue Date | Description |
|-----------------|----------|------------|--|
| I21Z70032-SEM02 | Rev.0 | 2021-4-1 | Initial creation of test report |
| I21Z70032-SEM02 | Rev.1 | 2021-4-9 | Update the testing start/end date on page 5 of test report. Update the dipole information on page 42 and dipole calibration report on page 88 of test report. |

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1 Test Laboratory

1.1 Testing Location

| | |
|---------------|---|
| Company Name: | CTTL(Shouxiang) |
| Address: | No. 51 Shouxiang Science Building, Xueyuan Road, Haidian District, Beijing, P. R. China100191 |

1.2 Testing Environment

| | |
|-----------------------------|----------------|
| Temperature: | 18°C~25°C, |
| Relative humidity: | 30%~ 70% |
| Ground system resistance: | < 0.5 Ω |
| Ambient noise & Reflection: | < 0.012 W/kg |

1.3 Project Data

| | |
|---------------------|----------------|
| Project Leader: | Qi Dianyuan |
| Test Engineer: | Lin Xiaojun |
| Testing Start Date: | March 27, 2021 |
| Testing End Date: | March 28, 2021 |

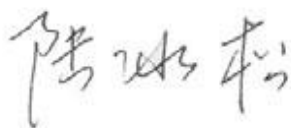
1.4 Signature



Lin Xiaojun
(Prepared this test report)



Qi Dianyuan
(Reviewed this test report)



Lu Bingsong
Deputy Director of the laboratory
(Approved this test report)

2 Statement of Compliance

The maximum results of SAR found during testing for Samsung Electronics Co., Ltd. Notebook PC NP750XDA are as follows:

Table 2.1: Highest Reported SAR (1g)

| Exposure Configuration | Technology Band | Highest Reported SAR 1g(W/kg) | Equipment Class |
|------------------------|----------------------------|-------------------------------|-----------------|
| Hotspot (Body) | WLAN 2.4 GHz Main. Antenna | 1.03 | DTS |
| | WLAN 2.4 GHz Aux Antenna | 1.37 | |
| | WLAN 2.4 GHz MIMO Antenna | 0.62 | |
| | WLAN 5 GHz Main. Antenna | 1.00 | UNII |
| | WLAN 5 GHz Aux Antenna | 1.24 | |
| | WLAN 5 GHz MIMO Antenna | 0.57 | |
| | BT | 0.04 | |

The SAR values found for the Mobile Phone are below the maximum recommended levels of 1.6 W/Kg as averaged over any 1g tissue according to the ANSI C95.1-1992.

For body operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory that contains no metal and which provides a minimum separation distance of 0mm between this device and the body of the user. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output.

The measurement together with the test system set-up is described in annex C of this test report. A detailed description of the equipment under test can be found in chapter 4 of this test report. The highest reported SAR value is obtained at the case of **(Table 2.1)**, and the values are: **1.37 W/kg (1g)**.

Table 2.2: The sum of reported SAR values for WIFI2.4GHz (Aux Antenna) and BT

| | Position | WIFI2.4GHz | BT | Sum |
|-------------------------------------|----------|------------|------|------|
| Maximum reported SAR value for Body | Rear 0mm | 1.37 | 0.04 | 1.41 |

Table 2.3: The sum of reported SAR values for WIFI5GHz (Aux Antenna) and BT

| | Position | WIFI5GHz | BT | Sum |
|-------------------------------------|----------|----------|------|------|
| Maximum reported SAR value for Body | Rear 0mm | 1.24 | 0.04 | 1.28 |

Table 2.4: The sum of reported SAR values for WIFI5GHz (MIMO Antenna) and BT

| | Position | WIFI5GHz | BT | Sum |
|-------------------------------------|----------|----------|------|------|
| Maximum reported SAR value for Body | Rear 0mm | 0.57 | 0.04 | 0.61 |

According to the above tables, the highest sum of reported SAR values is **1.41 W/kg (1g)**. The detail for simultaneous transmission consideration is described in chapter 13.

3 Client Information

3.1 Applicant Information

| | |
|-----------------|---|
| Company Name: | Samsung Electronics Co., Ltd. |
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| Telephone: | +1-201-937-4203 |
| Fax: | / |

3.2 Manufacturer Information

| | |
|-----------------|--|
| Company Name: | Samsung Electronics Co., Ltd. |
| Address/Post: | Samsung R5, Maetan dong 129, Samsung ro Youngtong gu, Suwon city 443 742, Korea |
| Contact Person: | Sunghoon Cho |
| E-mail: | ggobi.cho@samsung.com |
| Telephone: | +82-10-2722-4159 |
| Fax: | / |

4 Equipment Under Test (EUT) and Ancillary Equipment (AE)

4.1 About EUT

| | |
|-------------------------------------|-------------------------------|
| Description: | Notebook PC |
| Model name: | NP750XDA |
| Operating mode(s): | BT, Wi-Fi2.4G/5G |
| Tested Tx Frequency: | 2412 – 2462 MHz (Wi-Fi 2.4G) |
| | 5150-5825 MHz (Wi-Fi 5G) |
| | 2400 – 2483.5 MHz (Bluetooth) |
| Test device Production information: | Production unit |
| Device type: | Portable device |
| Antenna type: | Integrated antenna |

4.2 Internal Identification of EUT used during the test

| EUT ID* | IMEI | HW | SW Version |
|---------|----------------|--------|---------------|
| EUT1 | I21Z70032UT11a | REV1.0 | Windows10-Pro |
| EUT2 | I21Z70032UT21a | REV1.0 | Windows10-Pro |
| EUT3 | I21Z70032UT35a | REV1.0 | Windows10-Pro |
| EUT4 | I21Z70032UT43a | REV1.0 | Windows10-Pro |
| EUT5 | I21Z70032UT51a | REV1.0 | Windows10-Pro |
| EUT6 | I21Z70032UT14a | REV1.0 | Windows10-Pro |

*EUT ID: is used to identify the test sample in the lab internally.

Note: It is performed to test SAR with the EUT1~5 and conducted power with the EUT6.

4.3 Internal Identification of AE used during the test

| AE ID* | Description | Model | SN | Manufacturer |
|--------|-------------|------------|----|----------------------|
| AE1 | Battery | AA-PBSN4AF | / | SAMSUNG SDI CO., LTD |

*AE ID: is used to identify the test sample in the lab internally.

5 TEST METHODOLOGY

5.1 Applicable Limit Regulations

ANSI C95.1–1992:IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

5.2 Applicable Measurement Standards

IEEE 1528–2013: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

KDB616217 D04 SAR for laptop and tablets v01r02 SAR Evaluation Considerations for Laptop, Notebook, Notebook and Tablet Computers.

KDB648474 D04 Handset SAR v01r03: SAR Evaluation Considerations for Wireless Handsets.

KDB248227 D01 802.11 Wi-Fi SAR v02r02: SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS

KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz.

KDB865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations

6 Specific Absorption Rate (SAR)

6.1 Introduction

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.

6.2 SAR Definition

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:

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

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be either related to the temperature elevation in tissue by

$$SAR = c \left(\frac{\delta T}{\delta t} \right)$$

Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

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

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

7 Tissue Simulating Liquids

7.1 Targets for tissue simulating liquid

Table 7.1: Targets for tissue simulating liquid

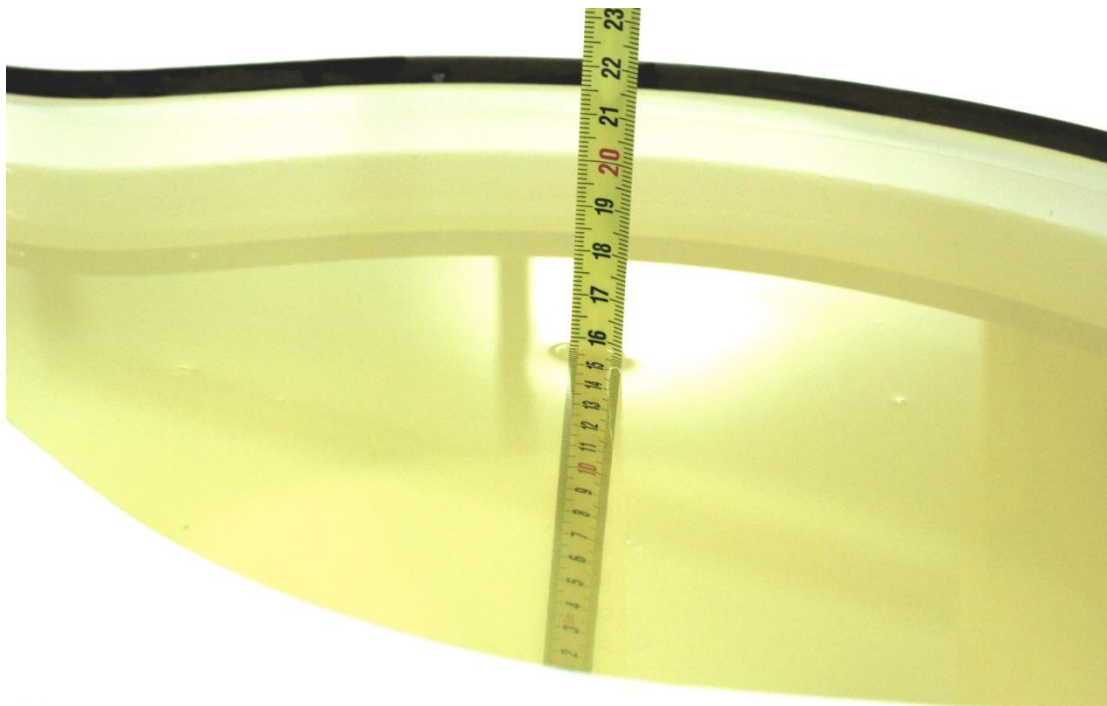
| Frequency(MHz) | Liquid Type | Conductivity(σ) | $\pm 5\%$ Range | Permittivity(ϵ) | $\pm 5\%$ Range |
|----------------|-------------|--------------------------|-----------------|----------------------------|-----------------|
| 2600 | Head | 1.96 | 1.86~2.06 | 39.01 | 37.1~41.0 |
| 5250 | Head | 4.71 | 4.47~4.95 | 35.93 | 34.13~37.73 |
| 5600 | Head | 5.07 | 4.82~5.32 | 35.53 | 33.8~37.3 |

7.2 Dielectric Performance

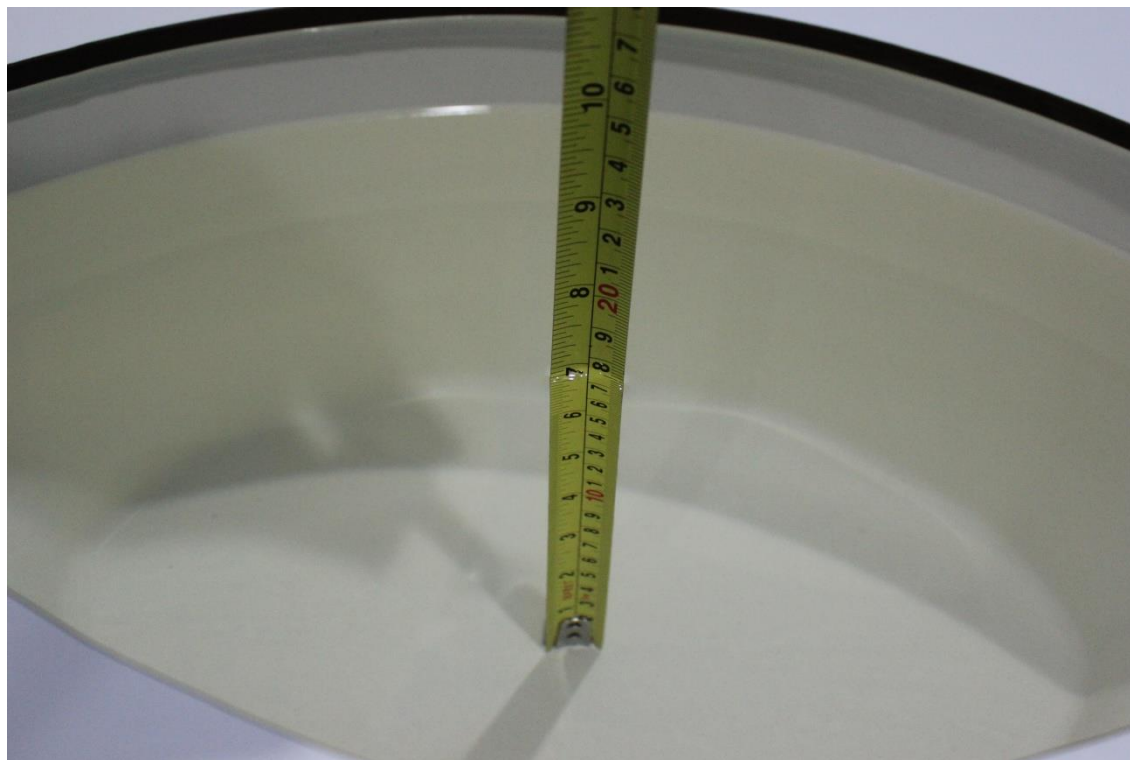
Table 7.2: Dielectric Performance of Tissue Simulating Liquid

| Measurement Date (yyyy-mm-dd) | Type | Frequency | Permittivity ϵ | Drift (%) | Conductivity σ (S/m) | Drift (%) |
|----------------------------------|------|-----------|----------------------------|--------------|--------------------------------|--------------|
| 2021-3-27 | Head | 2450 MHz | 38.54 | -1.68 | 1.777 | -1.28 |
| 2021-3-28 | Head | 5250 MHz | 35.95 | 0.06 | 4.744 | 0.72 |
| 2021-3-28 | Head | 5600 MHz | 34.97 | -1.58 | 5.071 | 0.02 |

Note: The liquid temperature is 22.0°C



Picture 7-1 Liquid depth in the Flat Phantom (2450MHz)

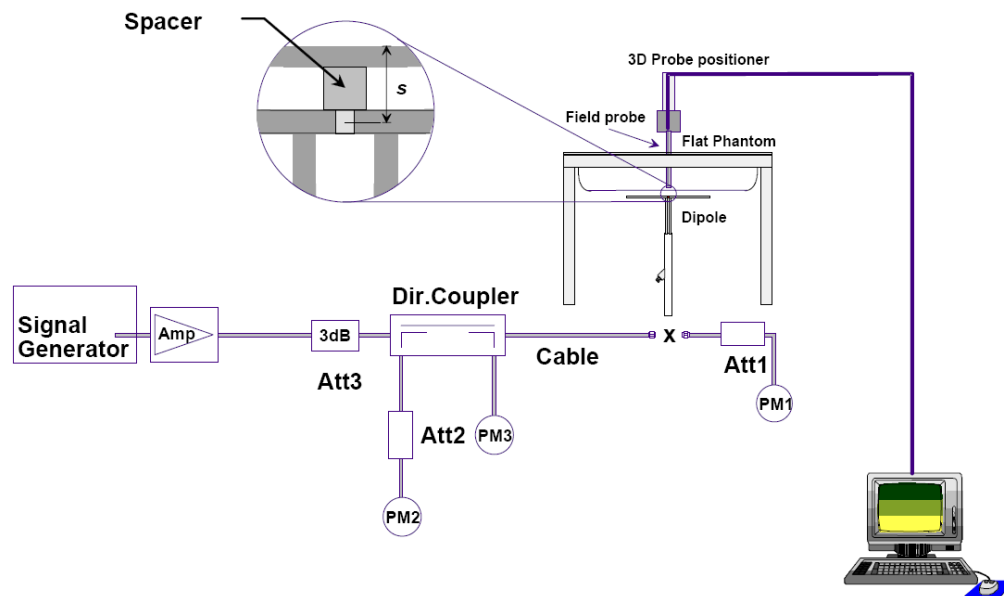


Picture 7-2 Liquid depth in the Flat Phantom (5GHz)

8 System verification

8.1 System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:



Picture 8.1 System Setup for System Evaluation



Picture 8.2 Photo of Dipole Setup

8.2 System Verification

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device.

The system verification results are required that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR. The details are presented in annex B.

Table 8.1: System Verification of Head

| Measurement Date (yyyy-mm-dd) | Frequency | Target value (W/kg) | | Measured value (W/kg) | | Deviation | |
|-------------------------------------|-----------|---------------------|----------------|-----------------------|----------------|-----------------|----------------|
| | | 10 g Average | 1 g Average | 10 g Average | 1 g Average | 10 g Average | 1 g Average |
| 2021/3/27 | 2450 MHz | 24.5 | 52.5 | 24.92 | 52.64 | 1.71% | 0.27% |
| 2021/3/28 | 5250 MHz | 22.9 | 80.5 | 22.7 | 79.4 | -0.96% | -1.37% |
| 2021/3/28 | 5600 MHz | 23.6 | 83.3 | 23.8 | 81.6 | 0.68% | -1.99% |

9 Measurement Procedures

9.1 Tests to be performed

In order to determine the highest value of the peak spatial-average SAR of a handset, all device positions, configurations and operational modes shall be tested for each frequency band according to steps 1 to 3 below. A flowchart of the test process is shown in picture 9.1.

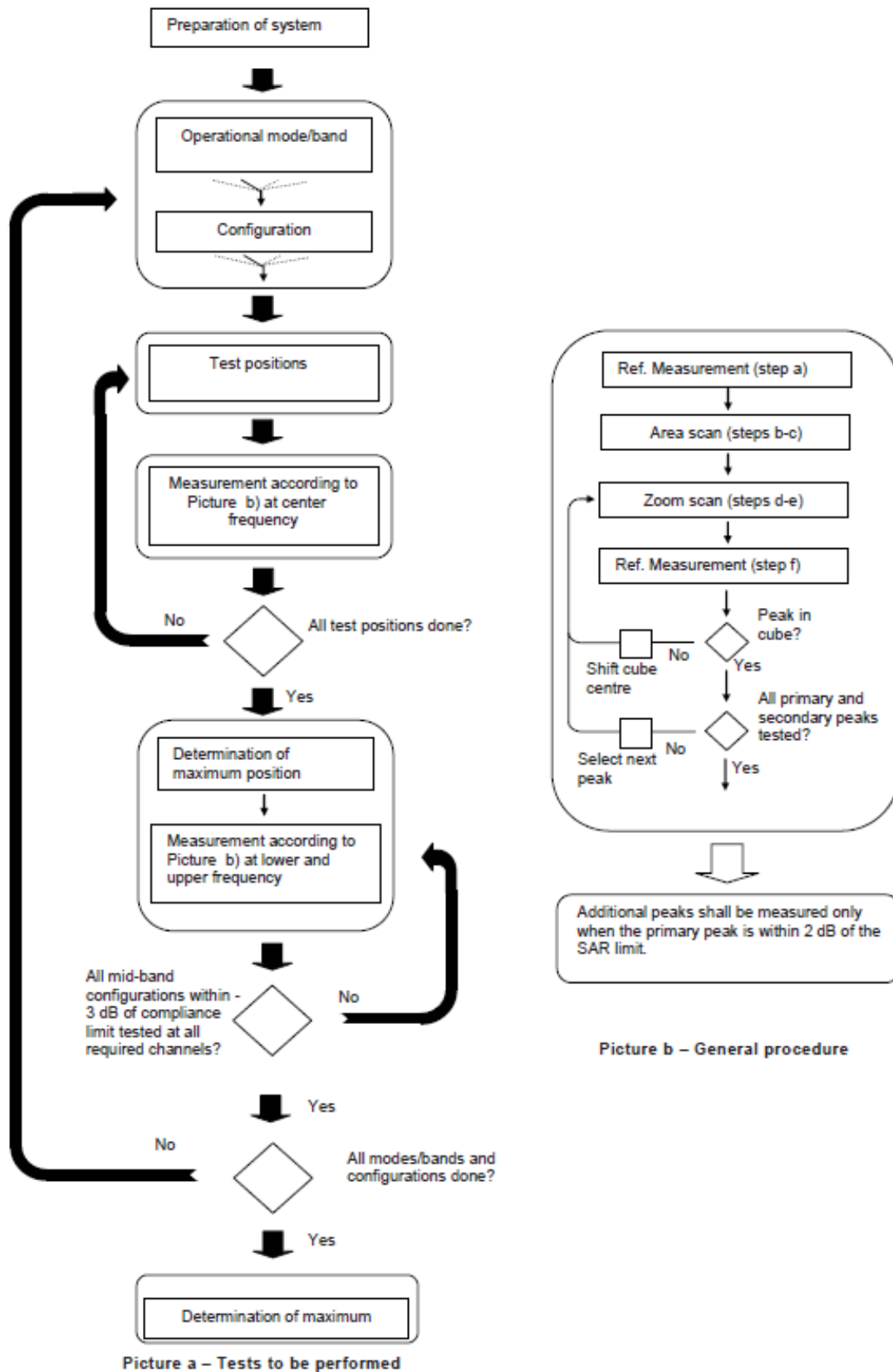
Step 1: The tests described in 9.2 shall be performed at the channel that is closest to the centre of the transmit frequency band (f_c) for:

- a) all device positions (cheek and tilt, for both left and right sides of the SAM phantom, as described in annex D),
- b) all configurations for each device position in a), e.g., antenna extended and retracted, and
- c) all operational modes, e.g., analogue and digital, for each device position in a) and configuration in b) in each frequency band.

If more than three frequencies need to be tested according to 11.1 (i.e., $N_c > 3$), then all frequencies, configurations and modes shall be tested for all of the above test conditions.

Step 2: For the condition providing highest peak spatial-average SAR determined in Step 1, perform all tests described in 9.2 at all other test frequencies, i.e., lowest and highest frequencies. In addition, for all other conditions (device position, configuration and operational mode) where the peak spatial-average SAR value determined in Step 1 is within 3 dB of the applicable SAR limit, it is recommended that all other test frequencies shall be tested as well.

Step 3: Examine all data to determine the highest value of the peak spatial-average SAR found in Steps 1 to 2.



Picture 9.1Block diagram of the tests to be performed

9.2 General Measurement Procedure

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements and fully documented in SAR reports to qualify for TCB approval. Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2003. The results should be documented as part of the system validation records and may be requested to support test results when all the measurement parameters in the following table are not satisfied.

| | | | ≤ 3 GHz | > 3 GHz |
|--|------------------------------------|--|--|---|
| Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface | | | 5 ± 1 mm | $\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm |
| Maximum probe angle from probe axis to phantom surface normal at the measurement location | | | $30^\circ \pm 1^\circ$ | $20^\circ \pm 1^\circ$ |
| Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area} | | | ≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm | 3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm |
| | | | When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be \leq the corresponding x or y dimension of the test device with at least one measurement point on the test device. | |
| Maximum zoom scan spatial resolution: Δx_{Zoom} , Δy_{Zoom} | | | ≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm* | 3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm* |
| Maximum zoom scan spatial resolution, normal to phantom surface | uniform grid: $\Delta z_{Zoom}(n)$ | | ≤ 5 mm | 3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm |
| | graded grid | $\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface | ≤ 4 mm | 3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm |
| | | $\Delta z_{Zoom}(n>1)$: between subsequent points | $\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$ | |
| Minimum zoom scan volume | x, y, z | | ≥ 30 mm | 3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm |
| Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. | | | | |
| * When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz. | | | | |

9.3 Bluetooth & Wi-Fi Measurement Procedures for SAR

Normal network operating configurations are not suitable for measuring the SAR of 802.11 transmitters in general. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure that the results are consistent and reliable.

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in a test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

9.4 Power Drift

To control the output power stability during the SAR test, DASY4 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in section 14 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

10 Area Scan Based 1-g SAR

10.1 Requirement of KDB

According to the KDB447498 D01 v06, when the implementation is based the specific polynomial fit algorithm as presented at the 29th Bioelectromagnetics Society meeting (2007) and the estimated 1-gSAR is ≤ 1.2 W/kg, a zoom scan measurement is not required provided it is also not needed for any other purpose; for example, if the peak SAR location required for simultaneous transmission SAR test exclusion can be determined accurately by the SAR system or manually to discriminate between distinctive peaks and scattered noisy SAR distributions from area scans.

There must not be any warning or alert messages due to various measurement concerns identified by the SAR system; for example, noise in measurements, peaks too close to scan boundary, peaks are too sharp, spatial resolution and uncertainty issues etc. The SAR system verification must also demonstrate that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR (See Annex B). When all the SAR results for each exposure condition in a frequency band and wireless mode are based on estimated 1-g SAR, the 1-g SAR for the highest SAR configuration must be determined by a zoom scan.

10.2 Fast SAR Algorithms

The approach is based on the area scan measurement applying a frequency dependent attenuation parameter. This attenuation parameter was empirically determined by analyzing a large number of phones. The MOTOROLA FAST SAR was developed and validated by the MOTOROLA Research Group in Ft. Lauderdale.

In the initial study, an approximation algorithm based on Linear fit was developed. The accuracy of the algorithm has been demonstrated across a broad frequency range (136-2450 MHz) and for both 1- and 10-g averaged SAR using a sample of 264 SAR measurements from 55 wireless handsets. For the sample size studied, the root-mean-squared errors of the algorithm are 1.2% and 5.8% for 1- and 10-g averaged SAR, respectively. The paper describing the algorithm in detail is expected to be published in August 2004 within the Special Issue of Transactions on MTT.

In the second step, the same research group optimized the fitting algorithm to an Polynomial fit whereby the frequency validity was extended to cover the range 30-6000MHz. Details of this study can be found in the BEMS 2007 Proceedings.

Both algorithms are implemented in DASY software.

11 Conducted Output Power

11.4 Wi-Fi and BT Measurement result

The maximum output power of BT antenna is 10.4dBm.

The maximum tune up of BT antenna is 10.5dBm.

Main Antenna WIFI 2.4G conducted power:

| | | | | | | | | | |
|----------------|--------------|-------|-------|---------|--------|--------|--------|--------|--------|
| 802.11b | Channel\data | 1Mbps | 2Mbps | 5.5Mbps | 11Mbps | | | | |
| WLAN2450 | 11(2462MHz) | 16.98 | | | | | | | |
| | 6(2437MHz) | 16.97 | | | | | | | |
| | 1(2412MHz) | 16.95 | 16.88 | 16.52 | 16.06 | | | | |
| | Tune up | 17.00 | 17.00 | 17.00 | 17.00 | | | | |
| 802.11g | Channel\data | 6Mbps | 9Mbps | 12Mbps | 18Mbps | 24Mbps | 36Mbps | 48Mbps | 54Mbps |
| WLAN2450 | 11(2462MHz) | 14.61 | | | | | | | |
| | Tune up | 16.00 | | | | | | | |
| | 6(2437MHz) | 16.35 | 16.10 | 16.22 | 15.89 | 15.60 | 14.93 | 14.35 | 14.22 |
| | Tune up | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 16.00 | 16.00 | 16.00 |
| | 1(2412MHz) | 14.63 | | | | | | | |
| | Tune up | 16.00 | | | | | | | |
| 802.11n-20MHz | Channel\data | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| WLAN2450 | 11(2462MHz) | 14.91 | | 15.08 | | | | | |
| | Tune up | 16.00 | | 17.00 | | | | | |
| | 6(2437MHz) | 16.70 | 16.95 | 16.98 | 16.93 | 16.93 | 16.88 | 16.83 | 16.87 |
| | Tune up | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 |
| | 1(2412MHz) | 14.87 | | 15.12 | | | | | |
| | Tune up | 16.00 | | 17.00 | | | | | |
| 802.11n-40MHz | Channel\data | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| WLAN2450 | 9(2452MHz) | 13.20 | | | | | | | |
| | Tune up | 15.00 | | | | | | | |
| | 6(2437MHz) | 16.97 | 16.92 | 16.82 | 16.81 | 16.75 | 16.61 | 16.59 | 16.54 |
| | Tune up | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 |
| | 3(2422MHz) | 13.20 | | | | | | | |
| | Tune up | 15.00 | | | | | | | |
| 802.11ax-20MHz | Channel\data | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| WLAN2450 | 11(2462MHz) | 14.81 | | | 15.01 | | | | |
| | Tune up | 16.00 | | | 16.00 | | | | |
| | 6(2437MHz) | 16.64 | 16.94 | 16.97 | 16.98 | 16.89 | 16.84 | 16.82 | 16.80 |
| | Tune up | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 |
| | 1(2412MHz) | 14.85 | | | 15.05 | | | | |
| | Tune up | 16.00 | | | 17.00 | | | | |
| 802.11ax-40MHz | Channel\data | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| WLAN2450 | 9(2452MHz) | 13.01 | | | | | | | |
| | Tune up | 15.00 | | | | | | | |
| | 6(2437MHz) | 16.73 | 16.61 | 16.58 | 16.68 | 16.60 | 16.54 | 16.48 | 16.44 |
| | Tune up | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 |
| | 3(2422MHz) | 13.12 | | | | | | | |
| | Tune up | 15.00 | | | | | | | |

Aux. Antenna WIFI 2.4G conducted power:

| 802.11b | Channel\data | 1Mbps | 2Mbps | 5.5Mbps | 11Mbps | | | | |
|----------------|--------------|-------|-------|---------|--------|--------|--------|--------|--------|
| WLAN2450 | 11(2462MHz) | 15.98 | | | | | | | |
| | tune up | 17.00 | | | | | | | |
| | 6(2437(MHz) | 15.86 | | | | | | | |
| | tune up | 17.00 | | | | | | | |
| | 1(2412MHz) | 16.09 | 15.92 | 15.64 | 15.16 | | | | |
| 802.11g | Channel\data | 6Mbps | 9Mbps | 12Mbps | 18Mbps | 24Mbps | 36Mbps | 48Mbps | 54Mbps |
| | 11(2462MHz) | 14.55 | | | | | | | |
| | tune up | 16.00 | | | | | | | |
| | 6(2437(MHz) | 16.31 | 16.08 | 16.06 | 15.76 | 15.47 | 14.82 | 14.26 | 14.08 |
| | tune up | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 16.00 | 16.00 | 16.00 |
| WLAN2450 | 1(2412MHz) | 14.71 | | | | | | | |
| | tune up | 16.00 | | | | | | | |
| 802.11n-20MHz | Channel\data | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| | 11(2462MHz) | 14.92 | | | | | | | |
| | tune up | 16.00 | | | | | | | |
| | 6(2437(MHz) | 16.61 | 16.95 | 16.92 | 16.97 | 16.84 | 16.75 | 16.81 | 16.74 |
| | tune up | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 |
| WLAN2450 | 1(2412MHz) | 14.96 | | | | | | | |
| | tune up | 16.00 | | | | | | | |
| 802.11n-40MHz | Channel\data | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| | 9(2452MHz) | 13.34 | | | | | | | |
| | tune up | 15.00 | | | | | | | |
| | 6(2437MHz) | 16.83 | 16.74 | 16.72 | 16.71 | 16.64 | 16.49 | 16.47 | 16.45 |
| | tune up | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 |
| WLAN2450 | 3(2422MHz) | 13.37 | | | | | | | |
| | tune up | 15.00 | | | | | | | |
| 802.11ax-20MHz | Channel\data | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| | 11(2462MHz) | 14.46 | | 14.52 | | | | | |
| | tune up | 16.00 | | 16.00 | | | | | |
| | 6(2437(MHz) | 16.26 | 16.78 | 16.89 | 16.79 | 16.74 | 16.70 | 16.68 | 16.67 |
| | tune up | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 |
| WLAN2450 | 1(2412MHz) | 14.54 | | 15.01 | | | | | |
| | tune up | 16.00 | | 17.00 | | | | | |
| 802.11ax-40MHz | Channel\data | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| | 9(2452MHz) | 13.14 | | | | | | | |
| | tune up | 15.00 | | | | | | | |
| | 6(2437MHz) | 16.64 | 16.58 | 16.50 | 16.60 | 16.55 | 16.47 | 16.46 | 16.37 |
| | tune up | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 | 17.00 |
| WLAN2450 | 3(2422MHz) | 13.19 | | | | | | | |
| | tune up | 15.00 | | | | | | | |

MIMO WIFI2.4G conducted power:

| 802.11g | Channel\data | 6Mbps | 9Mbps | 12Mbps | 18Mbps | 24Mbps | 36Mbps | 48Mbps | 54Mbps |
|----------------|--------------|-------|-------|--------|--------|--------|--------|--------|--------|
| WLAN2450 | 11(2462MHz) | 16.72 | | | | | | | |
| | tune up | 17.50 | | | | | | | |
| | 6(2437(MHz) | 16.68 | | | | | | | |
| | tune up | 17.50 | | | | | | | |
| | 1(2412MHz) | 16.75 | 16.52 | 16.58 | 16.29 | 15.96 | 15.29 | 14.76 | 14.58 |
| 802.11n-20MHz | Channel\data | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| | 11(2462MHz) | 17.05 | | | 17.28 | | | | |
| | tune up | 17.50 | | | 17.50 | | | | |
| | 6(2437(MHz) | 16.97 | | | 17.26 | | | | |
| | tune up | 17.50 | | | 17.50 | | | | |
| WLAN2450 | 1(2412MHz) | 17.13 | 17.31 | 17.33 | 17.37 | 17.24 | 17.20 | 17.18 | 17.16 |
| | tune up | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 |
| 802.11n-40MHz | Channel\data | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| | 9(2452MHz) | 17.34 | | | | | | | |
| | tune up | 17.50 | | | | | | | |
| | 6(2437MHz) | 17.22 | | | | | | | |
| | tune up | 17.50 | | | | | | | |
| WLAN2450 | 3(2422MHz) | 17.38 | 17.37 | 17.28 | 17.22 | 17.14 | 17.06 | 17.02 | 16.98 |
| | tune up | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 |
| 802.11ax-20MHz | Channel\data | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| | 11(2462MHz) | 16.89 | | 17.09 | | | | | |
| | tune up | 17.50 | | 17.50 | | | | | |
| | 6(2437(MHz) | 16.81 | | 17.05 | | | | | |
| | tune up | 17.50 | | 17.50 | | | | | |
| WLAN2450 | 1(2412MHz) | 16.88 | 17.15 | 17.17 | 17.10 | 16.93 | 16.82 | 16.80 | 16.78 |
| | tune up | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 |
| 802.11ax-40MHz | Channel\data | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 |
| | 9(2452MHz) | 17.03 | | | | | | | |
| | tune up | 17.50 | | | | | | | |
| | 6(2437MHz) | 16.98 | | | | | | | |
| | tune up | 17.50 | | | | | | | |
| WLAN2450 | 3(2422MHz) | 17.11 | 16.96 | 16.88 | 16.87 | 16.74 | 16.60 | 16.54 | 16.46 |
| | tune up | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 |

Main Antenna WIFI 5G conducted power:

| 802.11ac(dBm)-160MHz | | | | | | | | | | |
|----------------------|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Channel\data rate | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 | MCS8 | MCS9 |
| 50(5250 MHz) | 13.17 | 12.82 | 12.66 | 12.51 | 12.27 | 12.01 | 11.87 | 11.73 | 11.51 | 11.36 |
| Tune up | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 13.00 | 13.00 | 13.00 | 13.00 |
| 114(5570 MHz) | 13.66 | 13.29 | 13.12 | 12.92 | 12.65 | 12.43 | 12.32 | 12.20 | 11.98 | 11.80 |
| Tune up | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 13.00 | 13.00 | 13.00 | 13.00 |

Aux. Antenna WIFI 5G conducted power:

| 802.11ac(dBm)-160MHz | | | | | | | | | | |
|----------------------|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Channel\data rate | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 | MCS8 | MCS9 |
| 50(5250 MHz) | 12.97 | 12.62 | 12.45 | 12.32 | 11.98 | 11.79 | 11.61 | 11.54 | 11.31 | 11.17 |
| Tune up | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 13.00 | 13.00 | 13.00 | 13.00 |
| 114(5570 MHz) | 13.83 | 13.50 | 13.31 | 13.20 | 12.86 | 12.63 | 12.49 | 12.40 | 12.19 | 12.04 |
| Tune up | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 13.00 | 13.00 | 13.00 | 13.00 |

MIMO WIFI5G conducted power:

| 802.11ac(dBm)-160MHz MIMO | | | | | | | | | | |
|---------------------------|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Channel\data rate | MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 | MCS8 | MCS9 |
| 50(5250 MHz) | 13.29 | 12.89 | 12.63 | 12.42 | 12.00 | 11.69 | 11.56 | 11.47 | 11.28 | 11.07 |
| Tune up | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 13.00 | 13.00 | 13.00 | 13.00 | 13.00 |
| 114(5570 MHz) | 13.89 | 13.49 | 13.22 | 12.95 | 12.60 | 12.35 | 12.16 | 12.07 | 11.78 | 11.61 |
| Tune up | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 14.00 | 13.00 | 13.00 | 13.00 | 13.00 |

12 Simultaneous TX SAR Considerations

12.1 Introduction

The following procedures adopted from “FCC SAR Considerations for Cell Phones with Multiple Transmitters” are applicable to handsets with built-in unlicensed transmitters such as 802.11 a/b/g and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

For this device, the BT and Wi-Fi can transmit simultaneous with other transmitters.

12.2 Transmit Antenna Separation Distances

Please refer to the picture of antenna locations in the document: “The Photos of SAR test-I21Z70032”

12.3 SAR Measurement Positions

According to the KDB616217 D04, the edges with less than 2.5 cm distance to the antennas need to be tested for SAR.

| SAR measurement positions | | | | | | |
|---------------------------|-------|------|-----------|------------|----------|-------------|
| Mode | Front | Rear | Left edge | Right edge | Top edge | Bottom edge |
| WLAN | No | Yes | No | No | No | No |

12.4 Standalone SAR Test Exclusion Considerations

Standalone 1-g head or body SAR evaluation by measurement or numerical simulation is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied. The 1-g SAR test exclusion threshold for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$\left[\frac{(\text{max. power of channel, including tune-up tolerance, mW})}{(\text{min. test separation distance, mm})} \right] \cdot \sqrt{f(\text{GHz})} \leq 3.0 \text{ for 1-g SAR, where}$$

- $f(\text{GHz})$ 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

Table 12.1: Standalone SAR test exclusion considerations

| Band/Mode | F(GHz) | Position | SAR test exclusion threshold(mW) | RF output power | | SAR test exclusion |
|-------------|--------|----------|----------------------------------|-----------------|-------|--------------------|
| | | | | dBm | mW | |
| Bluetooth | 2.441 | Body | 19.20 | 10.5 | 11.22 | Yes |
| 2.4GHz WLAN | 2.45 | Body | 19.17 | 17.5 | 56.23 | No |
| 5GHz WLAN | 5.2 | Body | 13.16 | 14 | 25.12 | No |
| | 5.3 | Body | 13.03 | 14 | 25.12 | No |
| | 5.6 | Body | 13.03 | 14 | 25.12 | No |
| | 5.8 | Body | 13.03 | 14 | 25.12 | No |

13 Evaluation of Simultaneous

Table 13.1: The sum of reported SAR values for WIFI2.4GHz (Aux Antenna) and BT

| | Position | WIFI2.4GHz | BT | Sum |
|-------------------------------------|----------|------------|------|------|
| Maximum reported SAR value for Body | Rear 0mm | 1.37 | 0.04 | 1.41 |

Table 13.2: The sum of reported SAR values for WIFI5GHz (Aux Antenna) and BT

| | Position | WIFI5GHz | BT | Sum |
|-------------------------------------|----------|----------|------|------|
| Maximum reported SAR value for Body | Rear 0mm | 1.24 | 0.04 | 1.28 |

Table 13.3: The sum of reported SAR values for WIFI5GHz (MIMO Antenna) and BT

| | Position | WIFI5GHz | BT | Sum |
|-------------------------------------|----------|----------|------|------|
| Maximum reported SAR value for Body | Rear 0mm | 0.57 | 0.04 | 0.61 |

Conclusion:

According to the above tables, the sum of reported SAR values is $<1.6\text{W/kg}$. So the simultaneous transmission SAR with volume scans is not required.

14 SAR Test Result

It is determined by user manual for the distance between the EUT and the phantom bottom.
The distance are 0mm, and just applied to the condition of body worn accessory.

It is performed for all SAR measurements with area scan based 1-g SAR estimation (Fast SAR). A zoom scan measurement is added when the estimated 1-gSAR is the highest measured SAR in each exposure configuration, wireless mode and frequency band combination or more than 1.2W/kg.

The calculated SAR is obtained by the following formula:

$$\text{Reported SAR} = \text{Measured SAR} \times 10^{(P_{\text{Target}} - P_{\text{Measured}})/10}$$

Where P_{Target} is the power of manufacturing upper limit;

P_{Measured} is the measured power in chapter 11.

14.1 WLAN Evaluation for 2.4G

Note: SKU1,SKU2,SKU3,SKU4 and SKU5 are different SKUs with different configurations or different suppliers; SKU1 is the highest configuration, and it is used for full testing, and others do the spot check in the highest value point of SKU1.

Main antenna:

Table 14.1-1: SAR Values (WiFi 802.11b – Body)

| Ambient Temperature: 22.9°C | | | | | Liquid Temperature: 22.5°C | | | | | |
|-----------------------------|-----|---------------|------------------|-----------------------|----------------------------|--------------------------|--------------------------|-------------------------|-------------------------|------------------|
| Frequency | | Test Position | Figure No./ Note | Conducted Power (dBm) | Max. tune-up Power (dBm) | Measured SAR(10g) (W/kg) | Reported SAR(10g) (W/kg) | Measured SAR(1g) (W/kg) | Reported SAR(1g)(W/kg) | Power Drift (dB) |
| MHz | Ch. | | | | | | | | | |
| 2462 | 11 | Rear | Fig.1 | 16.98 | 17.00 | 0.377 | 0.38 | 0.998 | 1.00 | 0.08 |
| 2437 | 6 | Rear | / | 16.97 | 17.00 | 0.374 | 0.38 | 0.879 | 0.89 | 0.06 |
| 2412 | 1 | Rear | / | 16.95 | 17.00 | 0.342 | 0.35 | 0.820 | 0.83 | -0.17 |

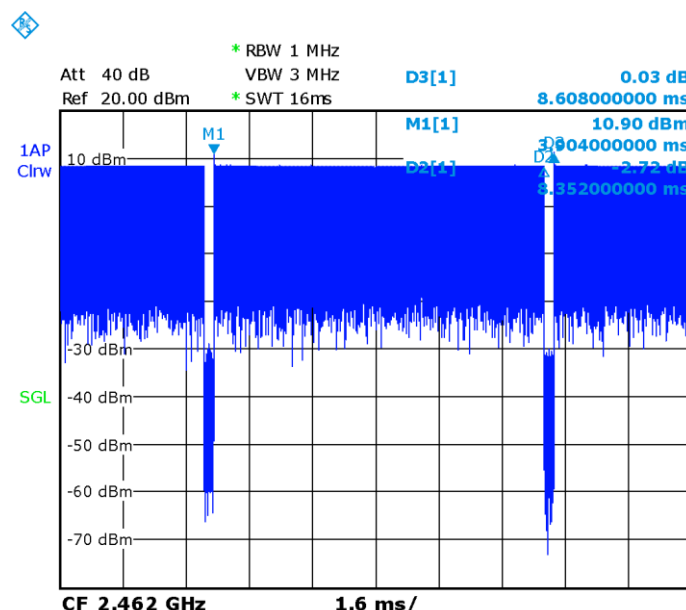
Note: The distance between the EUT and the phantom bottom is 0mm.

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Table 14.1-2: SAR Values (WLAN - Body) – 802.11b (Scaled Reported SAR)

| Ambient Temperature: 22.9 °C | | | | Liquid Temperature: 22.5 °C | | |
|------------------------------|-----|------------------|-----------------------|-----------------------------|----------------------------|-----------------------------------|
| Frequency | | Test Position | Actual duty factor | maximum duty factor | Reported SAR (1g)(W/kg) | Scaled reported SAR (1g)(W/kg) |
| MHz | Ch. | | | | | |
| 2462 | 11 | Rear | 97.03% | 100% | 1.00 | 1.03 |

SAR is not required for OFDM because the 802.11b adjusted SAR ≤ 1.2 W/kg.



Picture 14.1 Duty factor plot for 2.4G

Aux. antenna:

Table 14.1-3: SAR Values (WiFi 802.11b – Body)

| Ambient Temperature: 22.9 °C | | | | | | Liquid Temperature: 22.5°C | | | | |
|------------------------------|-----|---------------|------------------|-----------------------|--------------------------|----------------------------|-------------------|------------------|-------------------|------------------|
| Frequency | | Test Position | Figure No./ Note | Conducted Power (dBm) | Max. tune-up Power (dBm) | Measured SAR(10g) | Reported SAR(10g) | Measured SAR(1g) | Reported SAR(1g)(| Power Drift (dB) |
| MHz | Ch. | | | | | (W/kg) | (W/kg) | (W/kg) | W/kg) | |
| 2462 | 11 | Rear | / | 15.98 | 17.00 | 0.351 | 0.44 | 0.992 | 1.25 | 0.02 |
| 2437 | 6 | Rear | Fig.2 | 15.86 | 17.00 | 0.359 | 0.47 | 1.020 | 1.33 | 0.04 |
| 2412 | 1 | Rear | / | 16.09 | 17.00 | 0.370 | 0.46 | 1.040 | 1.28 | 0.03 |
| 2437 | 6 | Rear | SKU2 | 15.86 | 17.00 | 0.258 | 0.34 | 0.725 | 0.94 | 0.18 |
| 2437 | 6 | Rear | SKU3 | 15.86 | 17.00 | 0.198 | 0.26 | 0.519 | 0.67 | -0.04 |
| 2437 | 6 | Rear | SKU4 | 15.86 | 17.00 | 0.091 | 0.12 | 0.263 | 0.34 | 0.13 |
| 2437 | 6 | Rear | SKU5 | 15.86 | 17.00 | 0.317 | 0.41 | 0.876 | 1.14 | -0.13 |

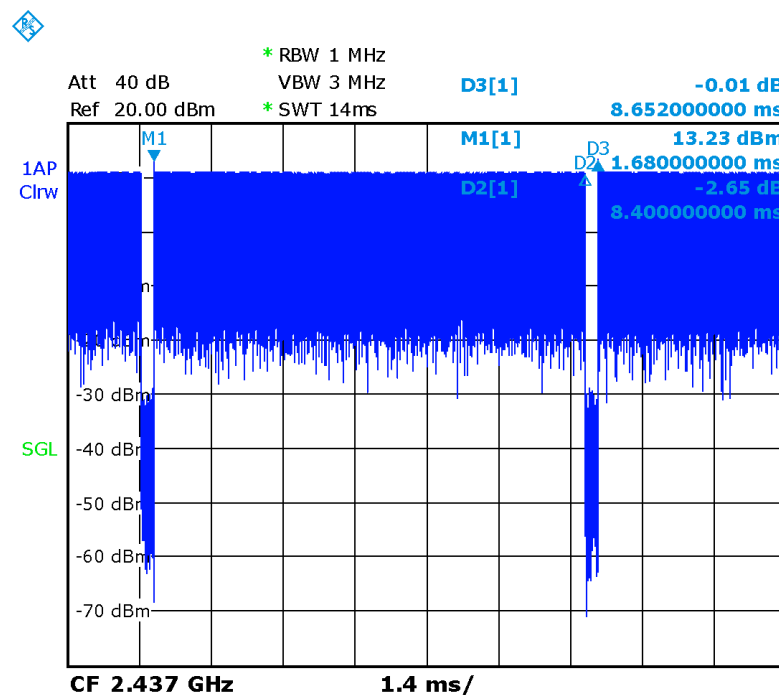
Note: The distance between the EUT and the phantom bottom is 0mm.

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Table 14.1-4: SAR Values (WLAN - Body) – 802.11b (Scaled Reported SAR)

| Ambient Temperature: 22.9 °C | | | | | | Liquid Temperature: 22.5°C | |
|------------------------------|-----|---------------|--------------------|---------------------|-------------------------|--------------------------------|--|
| Frequency | | Test Position | Actual duty factor | maximum duty factor | Reported SAR (1g)(W/kg) | Scaled reported SAR (1g)(W/kg) | |
| MHz | Ch. | | | | | | |
| 2437 | 6 | Rear | 97.09% | 100% | 1.33 | 1.37 | |

SAR is not required for OFDM because the 802.11b adjusted SAR \leq 1.2 W/kg.



Picture 14.2 Duty factor plot for 2.4G

MIMO

Table 14.1-5: SAR Values (WiFi 802.11n-40M – Body)

| Ambient Temperature: 22.9 °C | | | | | | Liquid Temperature: 22.5°C | | | | |
|------------------------------|-----|---------------|------------------|-----------------------|--------------------------|----------------------------|-------------------|------------------|-------------------|------------------|
| Frequency | | Test Position | Figure No./ Note | Conducted Power (dBm) | Max. tune-up Power (dBm) | Measured SAR(10g) | Reported SAR(10g) | Measured SAR(1g) | Reported SAR(1g)(| Power Drift (dB) |
| MHz | Ch. | | | | | (W/kg) | (W/kg) | (W/kg) | W/kg) | |
| 2452 | 9 | Rear | / | 17.34 | 17.50 | 0.199 | 0.21 | 0.518 | 0.54 | 0.08 |
| 2437 | 6 | Rear | / | 17.22 | 17.50 | 0.193 | 0.21 | 0.507 | 0.54 | 0.13 |
| 2422 | 3 | Rear | Fig.3 | 17.38 | 17.50 | 0.222 | 0.23 | 0.596 | 0.61 | -0.12 |

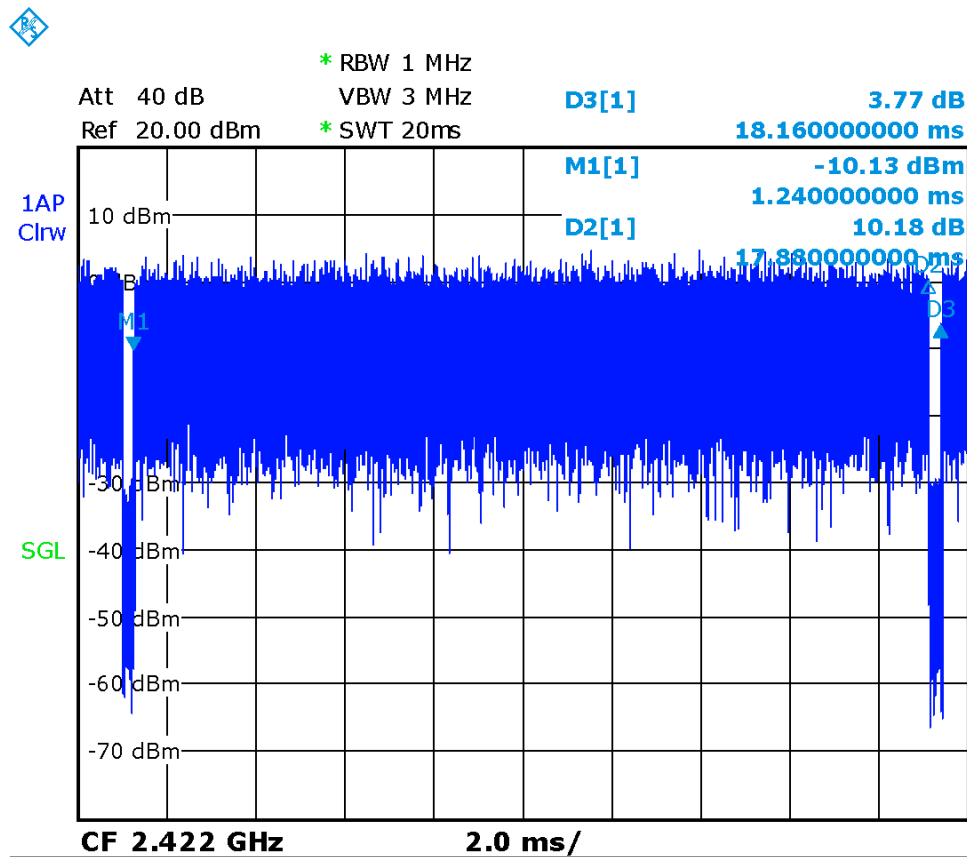
Note: The distance between the EUT and the phantom bottom is 0mm.

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Table 14.1-6: SAR Values (WLAN - Body) – 802.11b (Scaled Reported SAR)

| Ambient Temperature: 22.9 °C | | | | | | Liquid Temperature: 22.5°C | |
|------------------------------|-----|---------------|--------------------|---------------------|-------------------------|--------------------------------|--|
| Frequency | | Test Position | Actual duty factor | maximum duty factor | Reported SAR (1g)(W/kg) | Scaled reported SAR (1g)(W/kg) | |
| MHz | Ch. | | | | | | |
| 2422 | 3 | Rear | 98.46% | 100% | 0.61 | 0.62 | |

SAR is not required for OFDM because the 802.11b adjusted SAR \leq 1.2 W/kg.



Picture 14.3 Duty factor plot for 2.4G

14.2 WLAN Evaluation For 5G

Table 14.2-1: OFDM mode specified maximum output power of WLAN Main/Aux antenna

| 802.11 mode | a | g | n | | ac | | | | ax | | | |
|--------------------|----|----|----|----|----|----|----|-----|----|----|----|-----|
| Ch. BW(MHz) | 20 | 20 | 20 | 40 | 20 | 40 | 80 | 160 | 20 | 40 | 80 | 160 |
| U-NII-1 | X | | X | X | X | X | X | | X | X | X | |
| U-NII-2A | X | | X | X | X | X | X | X | X | X | X | X |
| U-NII-2C | X | | X | X | X | X | X | X | X | X | X | X |
| U-NII-3 | X | | X | X | X | X | X | | X | X | X | |
| § 15.247 (5.8 GHz) | | | | | | | | | | | | |

X: maximum(conducted) output power(mW), including tolerance, specified for production units

Table 14.2-1: OFDM mode specified maximum output power of WLAN MIMO antenna

| 802.11 mode | a | g | n | | ac | | | | ax | | | |
|--------------------|----|----|----|----|----|----|----|-----|----|----|----|-----|
| Ch. BW(MHz) | 20 | 20 | 20 | 40 | 20 | 40 | 80 | 160 | 20 | 40 | 80 | 160 |
| U-NII-1 | | | X | X | X | X | X | | X | X | X | |
| U-NII-2A | | | X | X | X | X | X | X | X | X | X | X |
| U-NII-2C | | | X | X | X | X | X | X | X | X | X | X |
| U-NII-3 | | | X | X | X | X | X | | X | X | X | |
| § 15.247 (5.8 GHz) | | | | | | | | | | | | |

X: maximum(conducted) output power(mW), including tolerance, specified for production units

Table 14.2-3: Maximum output power specified of WLAN Main/Aux antenna

| 802.11 mode | a | g | n | | ac | | | | ax | | | |
|--------------------|----|----|----|----|----|----|----|-----|----|----|----|-----|
| Ch. BW(MHz) | 20 | 20 | 20 | 20 | 20 | 40 | 80 | 160 | 20 | 40 | 80 | 160 |
| U-NII-1 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | | 25 | 25 | 25 | |
| U-NII-2A | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| U-NII-2C | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| U-NII-3 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | | 25 | 25 | 25 | |
| § 15.247 (5.8 GHz) | | | | | | | | | | | | |

- The maximum output power specified for production units is the same for all channels, modulations and data rates in each channel bandwidth configuration of the 802.11a/g/n/ac modes.
- The blue highlighted cells represent highest output configurations in each standalone or aggregated frequency band, with tune-up tolerance included.

Table 14.2-4: Maximum output power specified of WLAN MIMO antenna

| 802.11 mode | a | g | n | | ac | | | | ax | | | |
|--------------------|----|----|----|----|----|----|----|-----|----|----|----|-----|
| Ch. BW(MHz) | 20 | 20 | 20 | 20 | 20 | 40 | 80 | 160 | 20 | 40 | 80 | 160 |
| U-NII-1 | | 25 | 25 | 25 | 25 | 25 | 25 | | 25 | 25 | 25 | |
| U-NII-2A | | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| U-NII-2C | | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| U-NII-3 | | 25 | 25 | 25 | 25 | 25 | 25 | | 25 | 25 | 25 | |
| § 15.247 (5.8 GHz) | | | | | | | | | | | | |

- The maximum output power specified for production units is the same for all channels, modulations and data rates in each channel bandwidth configuration of the 802.11a/g/n/ac modes.
- The **blue highlighted** cells represent highest output configurations in each standalone or aggregated frequency band, with tune-up tolerance included.

Table 14.2-5: Maximum output power measured of WLAN antenna, for the applicable OFDM configurations according to the default power measurement procedures for selection initial test configurations – Main antenna

| 802.11 mode | a | n | | ac | | | | ax | | | |
|-------------|--|--|---|--|--|--------------------|-----------|--|--|--------------------|--------------------|
| BW(M Hz) | 20 | 20 | 40 | 20 | 40 | 80 | 160 | 20 | 40 | 80 | 160 |
| U-NII-1 | 36/40/44/48 Lower power | 36/40/44/48 Lower power | 38/46 Lower power | 36/40/44/48 Lower power | 38/46 Lower power | 42 Lower power | / | 36/40/44/48 Lower power | 38/46 Lower power | 42 Lower power | / |
| U-NII-2A | 52/56/60/64 Lower power | 52/56/60/64 Lower power | 54/62 Lower power | 52/56/60/64 Lower power | 54/62 Lower power | 58 Lower power | 50 21 | 52/56/60/64 Lower power | 54/62 Lower power | 58 Lower power | 50 Lower power |
| U-NII-2C | 100/104/108/112/116/120/124/128/132/136/140/144 Lower power | 100/104/108/112/116/132/136/140/144 Lower power | 102/110/114/116/118/120/122/124/126/128/130/132/134/136/138/140/142/144/146/148/150/152/154/156/158/160 Lower power | 100/104/108/112/116/132/136/140/144 Lower power | 102/110/114/116/118/120/122/124/126/128/130/132/134/136/138/140/142/144/146/148/150/152/154/156/158/160 Lower power | 106 Lower power | 114 23 | 100/104/108/112/116/132/136/140/144 Lower power | 102/110/114/116/118/120/122/124/126/128/130/132/134/136/138/140/142/144/146/148/150/152/154/156/158/160 Lower power | 106 Lower power | 114 Lower power |
| U-NII-3 | 149/153/157/161/165 Lower power | 149/153/157/161/165 Lower power | 151/155/159/163/167/171/175/179/183/187/191/195/199/203/207/211/215/219/223/227/231/235/239/243/247/251/255/259/263/267/271/275/279/283/287/291/295/299/303/307/311/315/319/323/327/331/335/339/343/347/351/355/359/363/367/371/375/379/383/387/391/395/399/403/407/411/415/419/423/427/431/435/439/443/447/451/455/459/463/467/471/475/479/483/487/491/495/499/503/507/511/515/519/523/527/531/535/539/543/547/551/555/559/563/567/571/575/579/583/587/591/595/599/603/607/611/615/619/623/627/631/635/639/643/647/651/655/659/663/667/671/675/679/683/687/691/695/699/703/707/711/715/719/723/727/731/735/739/743/747/751/755/759/763/767/771/775/779/783/787/791/795/799/803/807/811/815/819/823/827/831/835/839/843/847/851/855/859/863/867/871/875/879/883/887/891/895/899/903/907/911/915/919/923/927/931/935/939/943/947/951/955/959/963/967/971/975/979/983/987/991/995/999/1003/1007/1011/1015/1019/1023/1027/1031/1035/1039/1043/1047/1051/1055/1059/1063/1067/1071/1075/1079/1083/1087/1091/1095/1099/1103/1107/1111/1115/1119/1123/1127/1131/1135/1139/1143/1147/1151/1155/1159/1163/1167/1171/1175/1179/1183/1187/1191/1195/1199/1203/1207/1211/1215/1219/1223/1227/1231/1235/1239/1243/1247/1251/1255/1259/1263/1267/1271/1275/1279/1283/1287/1291/1295/1299/1303/1307/1311/1315/1319/1323/1327/1331/1335/1339/1343/1347/1351/1355/1359/1363/1367/1371/1375/1379/1383/1387/1391/1395/1399/1403/1407/1411/1415/1419/1423/1427/1431/1435/1439/1443/1447/1451/1455/1459/1463/1467/1471/1475/1479/1483/1487/1491/1495/1499/1503/1507/1511/1515/1519/1523/1527/1531/1535/1539/1543/1547/1551/1555/1559/1563/1567/1571/1575/1579/1583/1587/1591/1595/1599/1603/1607/1611/1615/1619/1623/1627/1631/1635/1639/1643/1647/1651/1655/1659/1663/1667/1671/1675/1679/1683/1687/1691/1695/1699/1703/1707/1711/1715/1719/1723/1727/1731/1735/1739/1743/1747/1751/1755/1759/1763/1767/1771/1775/1779/1783/1787/1791/1795/1799/1803/1807/1811/1815/1819/1823/1827/1831/1835/1839/1843/1847/1851/1855/1859/1863/1867/1871/1875/1879/1883/1887/1891/1895/1899/1903/1907/1911/1915/1919/1923/1927/1931/1935/1939/1943/1947/1951/1955/1959/1963/1967/1971/1975/1979/1983/1987/1991/1995/1999/2003/2007/2011/2015/2019/2023/2027/2031/2035/2039/2043/2047/2051/2055/2059/2063/2067/2071/2075/2079/2083/2087/2091/2095/2099/2103/2107/2111/2115/2119/2123/2127/2131/2135/2139/2143/2147/2151/2155/2159/2163/2167/2171/2175/2179/2183/2187/2191/2195/2199/2203/2207/2211/2215/2219/2223/2227/2231/2235/2239/2243/2247/2251/2255/2259/2263/2267/2271/2275/2279/2283/2287/2291/2295/2299/2303/2307/2311/2315/2319/2323/2327/2331/2335/2339/2343/2347/2351/2355/2359/2363/2367/2371/2375/2379/2383/2387/2391/2395/2399/2403/2407/2411/2415/2419/2423/2427/2431/2435/2439/2443/2447/2451/2455/2459/2463/2467/2471/2475/2479/2483/2487/2491/2495/2499/2503/2507/2511/2515/2519/2523/2527/2531/2535/2539/2543/2547/2551/2555/2559/2563/2567/2571/2575/2579/2583/2587/2591/2595/2599/2603/2607/2611/2615/2619/2623/2627/2631/2635/2639/2643/2647/2651/2655/2659/2663/2667/2671/2675/2679/2683/2687/2691/2695/2699/2703/2707/2711/2715/2719/2723/2727/2731/2735/2739/2743/2747/2751/2755/2759/2763/2767/2771/2775/2779/2783/2787/2791/2795/2799/2803/2807/2811/2815/2819/2823/2827/2831/2835/2839/2843/2847/2851/2855/2859/2863/2867/2871/2875/2879/2883/2887/2891/2895/2899/2903/2907/2911/2915/2919/2923/2927/2931/2935/2939/2943/2947/2951/2955/2959/2963/2967/2971/2975/2979/2983/2987/2991/2995/2999/3003/3007/3011/3015/3019/3023/3027/3031/3035/3039/3043/3047/3051/3055/3059/3063/3067/3071/3075/3079/3083/3087/3091/3095/3099/3103/3107/3111/3115/3119/3123/3127/3131/3135/3139/3143/3147/3151/3155/3159/3163/3167/3171/3175/3179/3183/3187/3191/3195/3199/3203/3207/3211/3215/3219/3223/3227/3231/3235/3239/3243/3247/3251/3255/3259/3263/3267/3271/3275/3279/3283/3287/3291/3295/3299/3303/3307/3311/3315/3319/3323/3327/3331/3335/3339/3343/3347/3351/3355/3359/3363/3367/3371/3375/3379/3383/3387/3391/3395/3399/3403/3407/3411/3415/3419/3423/3427/3431/3435/3439/3443/3447/3451/3455/3459/3463/3467/3471/3475/3479/3483/3487/3491/3495/3499/3503/3507/3511/3515/3519/3523/3527/3531/3535/3539/3543/3547/3551/3555/3559/3563/3567/3571/3575/3579/3583/3587/3591/3595/3599/3603/3607/3611/3615/3619/3623/3627/3631/3635/3639/3643/3647/3651/3655/3659/3663/3667/3671/3675/3679/3683/3687/3691/3695/3699/3703/3707/3711/3715/3719/3723/3727/3731/3735/3739/3743/3747/3751/3755/3759/3763/3767/3771/3775/3779/3783/3787/3791/3795/3799/3803/3807/3811/3815/3819/3823/3827/3831/3835/3839/3843/3847/3851/3855/3859/3863/3867/3871/3875/3879/3883/3887/3891/3895/3899/3903/3907/3911/3915/3919/3923/3927/3931/3935/3939/3943/3947/3951/3955/3959/3963/3967/3971/3975/3979/3983/3987/3991/3995/3999/4003/4007/4011/4015/4019/4023/4027/4031/4035/4039/4043/4047/4051/4055/4059/4063/4067/4071/4075/4079/4083/4087/4091/4095/4099/4103/4107/4111/4115/4119/4123/4127/4131/4135/4139/4143/4147/4151/4155/4159/4163/4167/4171/4175/4179/4183/4187/4191/4195/4199/4203/4207/4211/4215/4219/4223/4227/4231/4235/4239/4243/4247/4251/4255/4259/4263/4267/4271/4275/4279/4283/4287/4291/4295/4299/4303/4307/4311/4315/4319/4323/4327/4331/4335/4339/4343/4347/4351/4355/4359/4363/4367/4371/4375/4379/4383/4387/4391/4395/4399/4403/4407/4411/4415/4419/4423/4427/4431/4435/4439/4443/4447/4451/4455/4459/4463/4467/4471/4475/4479/4483/4487/4491/4495/4499/4503/4507/4511/4515/4519/4523/4527/4531/4535/4539/4543/4547/4551/4555/4559/4563/4567/4571/4575/4579/4583/4587/4591/4595/4599/4603/4607/4611/4615/4619/4623/4627/4631/4635/4639/4643/4647/4651/4655/4659/4663/4667/4671/4675/4679/4683/4687/4691/4695/4699/4703/4707/4711/4715/4719/4723/4727/4731/4735/4739/4743/4747/4751/4755/4759/4763/4767/4771/4775/4779/4783/4787/4791/4795/4799/4803/4807/4811/4815/4819/4823/4827/4831/4835/4839/4843/4847/4851/4855/4859/4863/4867/4871/4875/4879/4883/4887/4891/4895/4899/4903/4907/4911/4915/4919/4923/4927/4931/4935/4939/4943/4947/4951/4955/4959/4963/4967/4971/4975/4979/4983/4987/4991/4995/4999/5003/5007/5011/5015/5019/5023/5027/5031/5035/5039/5043/5047/5051/5055/5059/5063/5067/5071/5075/5079/5083/5087/5091/5095/5099/5103/5107/5111/5115/5119/5123/5127/5131/5135/5139/5143/5147/5151/5155/5159/5163/5167/5171/5175/5179/5183/5187/5191/5195/5199/5203/5207/5211/5215/5219/5223/5227/5231/5235/5239/5243/5247/5251/5255/5259/5263/5267/5271/5275/5279/5283/5287/5291/5295/5299/5303/5307/5311/5315/5319/5323/5327/5331/5335/5339/5343/5347/5351/5355/5359/5363/5367/5371/5375/5379/5383/5387/5391/5395/5399/5403/5407/5411/5415/5419/5423/5427/5431/5435/5439/5443/5447/5451/5455/5459/5463/5467/5471/5475/5479/5483/5487/5491/5495/5499/5503/5507/5511/5515/5519/5523/5527/5531/5535/5539/5543/5547/5551/5555/5559/5563/5567/5571/5575/5579/5583/5587/5591/5595/5599/5603/5607/5611/5615/5619/5623/5627/5631/5635/5639/5643/5647/5651/5655/5659/5663/5667/5671/5675/5679/5683/5687/5691/5695/5699/5703/5707/5711/5715/5719/5723/5727/5731/5735/5739/5743/5747/5751/5755/5759/5763/5767/5771/5775/5779/5783/5787/5791/5795/5799/5803/5807/5811/5815/5819/5823/5827/5831/5835/5839/5843/5847/5851/5855/5859/5863/5867/5871/5875/5879/5883/5887/5891/5895/5899/5903/5907/5911/5915/5919/5923/5927/5931/5935/5939/5943/5947/5951/5955/5959/5963/5967/5971/5975/5979/5983/5987/5991/5995/5999/6003/6007/6011/6015/6019/6023/6027/6031/6035/6039/6043/6047/6051/6055/6059/6063/6067/6071/6075/6079/6083/6087/6091/6095/6099/6103/6107/6111/6115/6119/6123/6127/6131/6135/6139/6143/6147/6151/6155/6159/6163/6167/6171/6175/6179/6183/6187/6191/6195/6199/6203/6207/6211/6215/6219/6223/6227/6231/6235/6239/6243/6247/6251/6255/6259/6263/6267/6271/6275/6279/6283/6287/6291/6295/6299/6303/6307/6311/6315/6319/6323/6327/6331/6335/6339/6343/6347/6351/6355/6359/6363/6367/6371/6375/6379/6383/6387/6391/6395/6399/6403/6407/6411/6415/6419/6423/6427/6431/6435/6439/6443/6447/6451/6455/6459/6463/6467/6471/6475/6479/6483/6487/6491/6495/6499/6503/6507/6511/6515/6519/6523/6527/6531/6535/6539/6543/6547/6551/6555/6559/6563/6567/6571/6575/6579/6583/6587/6591/6595/6599/6603/6607/6611/6615/6619/6623/6627/6631/6635/6639/6643/6647/6651/6655/6659/6663/6667/6671/6675/6679/6683/6687/6691/6695/6699/6703/6707/6711/6715/6719/6723/6727/6731/6735/6739/6743/6747/6751/6755/6759/6763/6767/6771/6775/6779/6783/6787/6791/6795/6799/6803/6807/6811/6815/6819/6823/6827/6831/6835/6839/6843/6847/6851/6855/6859/6863/6867/6871/6875/6879/6883/6887/6891/6895/6899/6903/6907/6911/6915/6919/6923/6927/6931/6935/6939/6943/6947/6951/6955/6959/6963/6967/6971/6975/6979/6983/6987/6991/6995/6999/7003/7007/7011/7015/7019/7023/7027/7031/7035/7039/7043/7047/7051/7055/7059/7063/7067/7071/7075/7079/7083/7087/7091/7095/7099/7103/7107/7111/7115/7119/7123/7127/7131/7135/7139/7143/7147/7151/7155/7159/7163/7167/7171/7175/7179/7183/7187/7191/7195/7199/7203/7207/7211/7215/7219/7223/7227/7231/7235/7239/7243/7247/7251/7255/7259/7263/7267/7271/7275/7279/7283/7287/7291/7295/7299/7303/7307/7311/7315/7319/7323/7327/7331/7335/7339/7343/7347/7351/7355/7359/7363/7367/7371/7375/7379/7383/7387/7391/7395/7399/7403/7407/7411/7415/7419/7423/7427/7431/7435/7439/7443/7447/7451/7455/7459/7463/7467/7471/7475/7479/7483/7487/7491/7495/7499/7503/7507/7511/7515/7519/7523/7527/7531/7535/7539/7543/7547/7551/7555/7559/7563/7567/7571/7575/7579/7583/7587/7591/7595/7599/7603/7607/7611/7615/7619/7623/7627/7631/7635/7639/7643/7647/7651/7655/7659/7663/7667/7671/7675/7679/7683/7687/7691/7695/7699/7703/7707/7711/7715/7719/7723/7727/7731/7735/7739/7743/7747/7751/7755/7759/7763/7767/7771/7775/7779/7783/7787/7791/7795/7799/7803/7807/7811/7815/7819/7823/7827/7831/7835/7839/7843/7847/7851/7855/7859/7863/7867/7871/7875/7879/7883/7887/7891/7895/7899/7903/7907/7911/7915/7919/7923/7927/7931/7935/7939/7943/7947/7951/7955/7959/7963/7967/7971/7975/7979/7983/7987/7991/7995/7999/8003/8007/8011/8015/8019/8023/8027/8031/8035/8039/8043/8047/8051/8055/8059/8063/8067/8071/8075/8079/8083/8087/8091/8095/8099/8103/8107/8111/8115/8119/8123/8127/8131/8135/8139/8143/8147/8151/8155/8159/8163/8167/8171/8175/8179/8183/8187/8191/8195/8199/8203/8207/8211/8215/8219/8223/8227/8231/8235/8239/8243/8247/8251/8255/8259/8263/8267/8271/8275/8279/8283/8287/8291/8295/8299/8303/8307/8311/8315/8319/8323/8327/8331/8335/8339/8343/8347/8351/8355/8359/8363/8367/8371/8375/8379/8383/8387/8391/8395/8399/8403/8407/8411/8415/8419/8423/8427/8431/8435/8439/8443/8447/8451/8455/8459/8463/8467/8471/8475/8479/8483/8487/8491/8495/8499/8503/8507/8511/8515/8519/8523/8527/8531/8535/8539/8543/8547/8551/8555/8559/8563/8567/8571/8575/8579/8583/8587/8591/8595/8599/8603/8607/8611/8615/8619/8623/8627/8631/8635/8639/8643/8647/8651/8655/8659/8663/8667/8671/8675/8679/8683/8687/8691/8695/8699/8703/8707/8711/8715/8719/8723/8727/8731/8735/8739/8743/8747/8751/8755/8759/8763/8767/8771/8775/8779/8783/8787/8791/8795/8799/8803/ | | | | | | | | |

| | | | | | | | | | | | |
|---|--|-------|--|--|--|--|--|--|--|--|--|
| | | power | | | | | | | | | |
| <ul style="list-style-type: none"> The bold numbers is the maximum output measured power (mW). Channels with measured maximum power within 0.25dB are considered to have the same measured output. Channels selected for initial test configuration are highlighted in yellow. | | | | | | | | | | | |

Table 14.2-6: Maximum output power measured of WLAN antenna, for the applicable OFDM configurations according to the default power measurement procedures for selection initial test configurations –Aux antenna

| 802.11 mode | a | n | | ac | | | | ax | | | |
|-----------------|--|--|--------------------------------|--|--------------------------------|--------------------|-------------------------|--|--------------------------------|--------------------|--------------------|
| BW(M Hz) | 20 | 20 | 40 | 20 | 40 | 80 | 160 | 20 | 40 | 80 | 160 |
| U-NII-1 | 36/40/44/48 Lower power | 36/40/44/48 Lower power | 38/46 Lower power | 36/40/44/48 Lower power | 38/46 Lower power | 42 Lower power | / | 36/40/44/48 Lower power | 38/46 Lower power | 42 Lower power | / |
| U-NII-2A | 52/56/60/64 Lower power | 52/56/60/64 Lower power | 54/62 Lower power | 52/56/60/64 Lower power | 54/62 Lower power | 58 Lower power | 50 20 | 52/56/60/64 Lower power | 54/62 Lower power | 58 Lower power | 50 Lower power |
| U-NII-2C | 100/104/108/112/116/120/124/128/132/136/140/144 Lower power | 100/104/108/112/116/132/136/140/144 Lower power | 102/110/113/114 Lower power | 100/104/108/112/116/132/136/140/144 Lower power | 102/110/113/114 Lower power | 106 Lower power | 114 24 | 100/104/108/112/116/132/136/140/144 Lower power | 102/110/113/114 Lower power | 106 Lower power | 114 Lower power |
| U-NII-3 | 149/153/157/161/165 Lower power | 149/153/157/161/165 Lower power | 151/159 Lower power | 149/153/157/161/165 Lower power | 151/159 Lower power | 155 Lower power | / | 149/153/157/161/165 Lower power | 151/159 Lower power | 155 Lower power | / |

| | | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|--|--|
| <ul style="list-style-type: none"> The bold numbers is the maximum output measured power (mW). Channels with measured maximum power within 0.25dB are considered to have the same measured output. Channels selected for initial test configuration are highlighted in yellow. | | | | | | | | | | | |
|---|--|--|--|--|--|--|--|--|--|--|--|

Table 14.2-7: Reported SAR of initial test configuration for Body

| 802.11 mode | a | n | | ac | | | | ax | | | |
|-------------|----|--|--------------------------------|--|--------------------------------|--------------------|-----------|--|--------------------------------|--------------------|--------------------|
| BW(M Hz) | 20 | 20 | 40 | 20 | 40 | 80 | 160 | 20 | 40 | 80 | 160 |
| U-NII-1 | / | 36/40/44/48 Lower power | 38/46 Lower power | 36/40/44/48 Lower power | 38/46 Lower power | 42 Lower power | / | 36/40/44/48 Lower power | 38/46 Lower power | 42 Lower power | / |
| U-NII-2A | / | 52/56/60/64 Lower power | 54/62 Lower power | 52/56/60/64 Lower power | 54/62 Lower power | 58 Lower power | 50 21 | 52/56/60/64 Lower power | 54/62 Lower power | 58 Lower power | 50 Lower power |
| U-NII-2C | / | 100/104/108/112/116/132/136/140 Lower power | 102/110/113/114 Lower power | 100/104/108/112/116/132/136/140 Lower power | 102/110/113/114 Lower power | 106 Lower power | 114 24 | 100/104/108/112/116/132/136/140 Lower power | 102/110/113/114 Lower power | 106 Lower power | 114 Lower power |
| U-NII-3 | / | 149/153/157/161/165 Lower power | 151/159 Lower power | 149/153/157/161/165 Lower power | 151/159 Lower power | 155 Lower power | / | 149/153/157/161/165 Lower power | 151/159 Lower power | 155 Lower power | / |

- The **bold numbers** is the maximum output measured power (mW).
- Channels with measured maximum power within 0.25dB are considered to have the same measured output.
- Channels selected for initial test configuration are highlighted in yellow.

Table 14.2-8: SAR Values (WLAN - Body) – Main antenna

| Frequency | | Test Position | Figure No. | Conducted Power (dBm) | Max. tune-up Power (dBm) | Measured SAR(10g) (W/kg) | Reported SAR(10g) (W/kg) | Measured SAR(1g) (W/kg) | Reported SAR(1g) (W/kg) | Power Drift (dB) |
|-----------|------|---------------|------------|-----------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|------------------|
| Ch. | MHz | | | | | | | | | |
| 50 | 5250 | Rear | Fig.4 | 13.17 | 14.00 | 0.210 | 0.25 | 0.788 | 0.95 | 0.09 |
| 114 | 5570 | Rear | / | 13.66 | 14.00 | 0.170 | 0.18 | 0.648 | 0.70 | -0.10 |

Note1: The distance between the EUT and the phantom bottom is 0mm.

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Table 14.2-9: SAR Values (WLAN - Body) – 802.11a (Scaled Reported SAR)

| Frequency | | Test Position | D (mm) | Actual duty factor | maximum duty factor | Reported SAR (1g) (W/kg) | Scaled reported SAR (1g) (W/kg) |
|-----------|------|---------------|--------|--------------------|---------------------|--------------------------|---------------------------------|
| Ch. | MHz | | | | | | |
| 50 | 5250 | Rear | 0 | 95.83% | 100% | 0.95 | 1.00 |

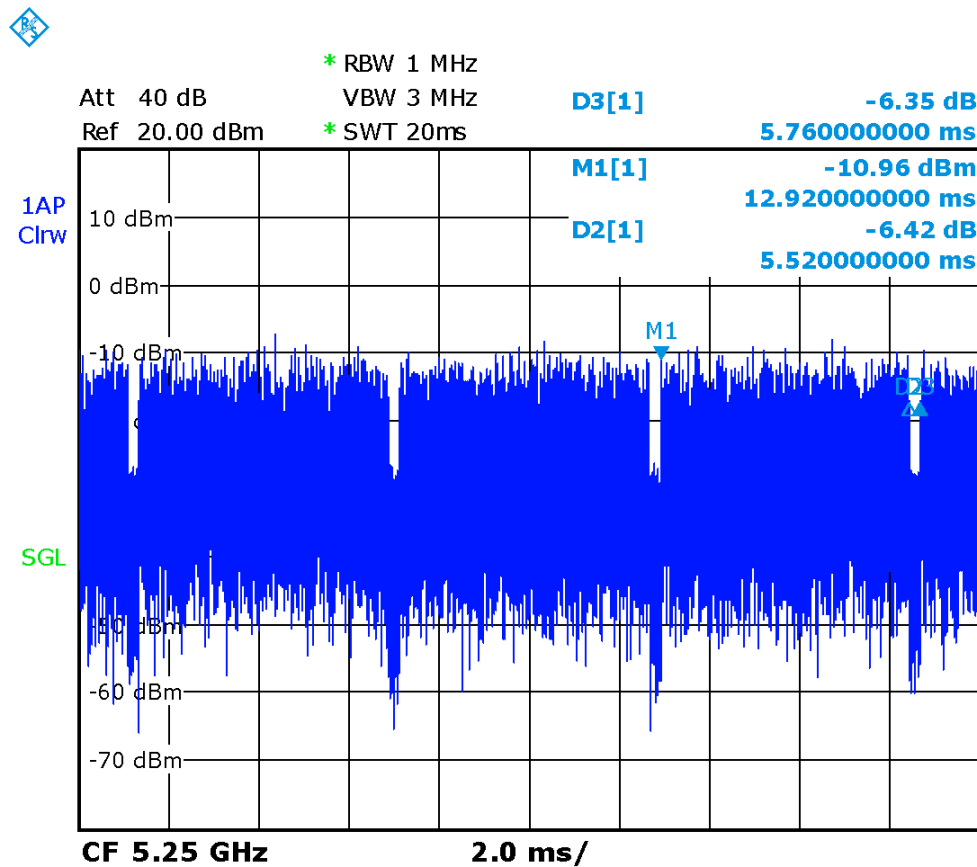

Picture 14.4 Duty factor plot for 5G

Table 14.2-10: SAR Values (WLAN - Body) – Aux antenna

| Frequency | | Test Position | Figure No. | Conducted Power (dBm) | Max. tune-up Power (dBm) | Measured SAR(10g) (W/kg) | Reported SAR(10g) (W/kg) | Measured SAR(1g) (W/kg) | Reported SAR(1g) (W/kg) | Power Drift (dB) |
|-----------|------|---------------|------------|-----------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|------------------|
| Ch. | MHz | | | | | | | | | |
| 50 | 5250 | Rear | Fig.5 | 12.97 | 14.00 | 0.257 | 0.33 | 0.936 | 1.19 | 0.02 |
| 114 | 5570 | Rear | / | 13.83 | 14.00 | 0.196 | 0.20 | 0.724 | 0.75 | 0.01 |

Note1: The distance between the EUT and the phantom bottom is 0mm.

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Table 14.2-11: SAR Values (WLAN - Body) – 802.11a (Scaled Reported SAR)

| Frequency | | Test Position | D (mm) | Actual duty factor | maximum duty factor | Reported SAR (1g) (W/kg) | Scaled reported SAR (1g) (W/kg) |
|-----------|------|---------------|--------|--------------------|---------------------|--------------------------|---------------------------------|
| Ch. | MHz | | | | | | |
| 50 | 5250 | Rear | 0 | 95.58% | 100% | 1.19 | 1.24 |

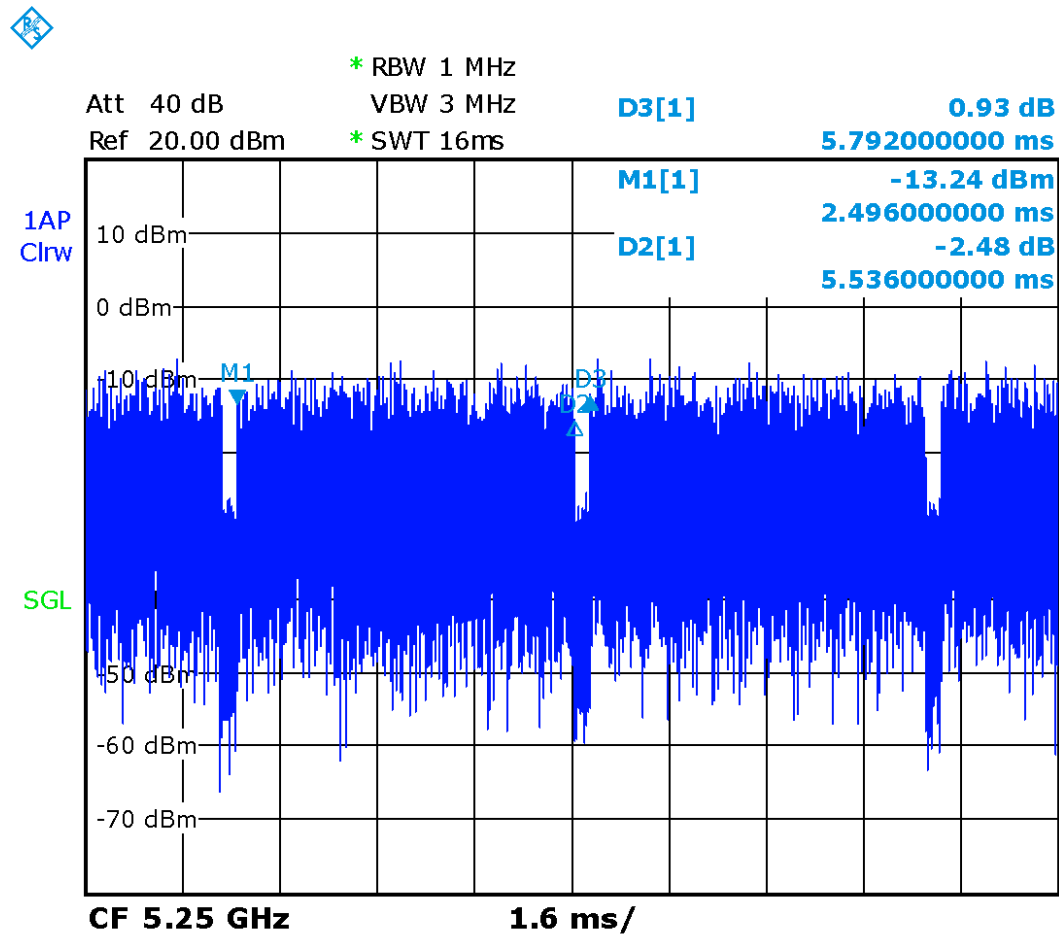

Picture 14.5 Duty factor plot for 5G

Table 14.2-12: SAR Values (WLAN - Body) – MIMO antenna

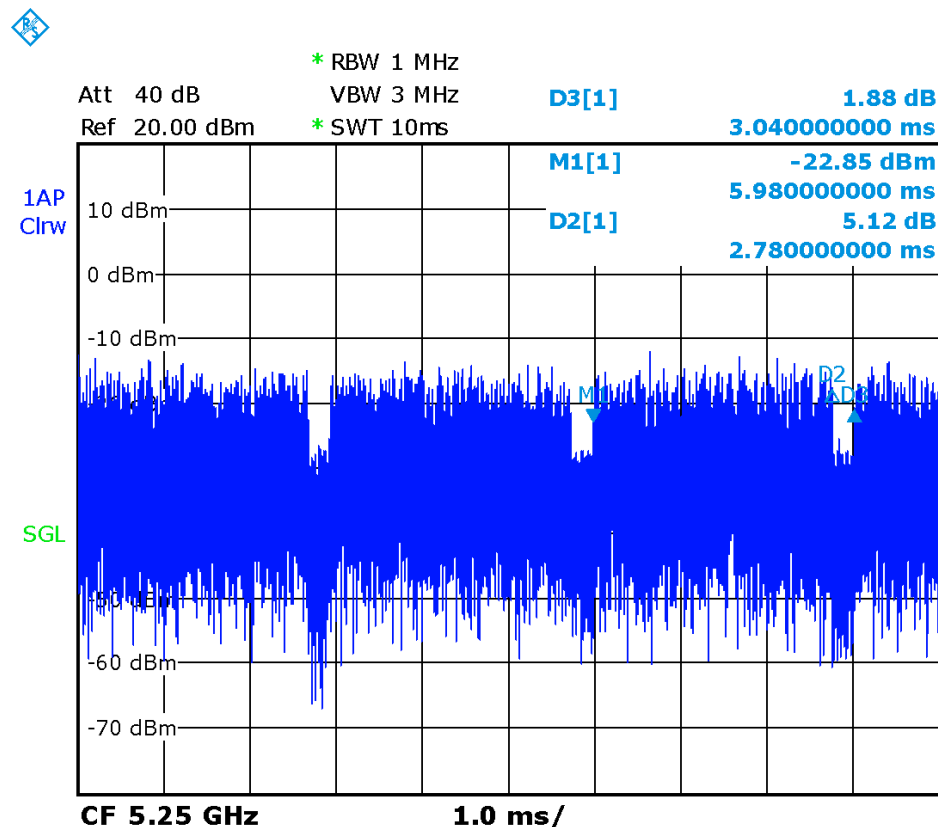
| Frequency | | Test Position | Figure No. | Conducted Power (dBm) | Max. tune-up Power (dBm) | Measured SAR(10g) (W/kg) | Reported SAR(10g) (W/kg) | Measured SAR(1g) (W/kg) | Reported SAR(1g) (W/kg) | Power Drift (dB) |
|-----------|------|---------------|------------|-----------------------|--------------------------|--------------------------|--------------------------|-------------------------|-------------------------|------------------|
| Ch. | MHz | | | | | | | | | |
| 50 | 5250 | Rear | Fig.6 | 13.17 | 14.00 | 0.113 | 0.14 | 0.429 | 0.52 | 0.04 |
| 114 | 5570 | Rear | / | 13.66 | 14.00 | 0.115 | 0.12 | 0.437 | 0.47 | -0.19 |

Note1: The distance between the EUT and the phantom bottom is 0mm.

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Table 14.2-13: SAR Values (WLAN - Body) – 802.11a (Scaled Reported SAR)

| Frequency | | Test Position | D (mm) | Actual duty factor | maximum duty factor | Reported SAR (1g) (W/kg) | Scaled reported SAR (1g) (W/kg) |
|-----------|------|---------------|--------|--------------------|---------------------|--------------------------|---------------------------------|
| Ch. | MHz | | | | | | |
| 50 | 5250 | Rear | 0 | 95.45% | 100% | 0.52 | 0.57 |


Picture 14.6 Duty factor plot for 5G

15 SAR Measurement Variability

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. 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.

The following procedures are applied to determine if repeated measurements are required.

- 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 ($\sim 10\%$ 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 .

Table 15.1: SAR Measurement Variability for Body WIFI2450 (1g)

| Frequency | | Test Position | Spacing (mm) | Original SAR (W/kg) | First Repeated SAR (W/kg) | The Ratio | Second Repeated SAR (W/kg) |
|-----------|------|---------------|--------------|---------------------|---------------------------|-----------|----------------------------|
| Ch. | MHz | | | | | | |
| 11 | 2462 | Rear | 0 | 0.998 | 0.951 | 1.05 | / |

Table 15.2: SAR Measurement Variability for Body WIFI2450 (1g)

| Frequency | | Test Position | Spacing (mm) | Original SAR (W/kg) | First Repeated SAR (W/kg) | The Ratio | Second Repeated SAR (W/kg) |
|-----------|------|---------------|--------------|---------------------|---------------------------|-----------|----------------------------|
| Ch. | MHz | | | | | | |
| 6 | 2437 | Rear | 0 | 1.02 | 0.973 | 1.05 | / |

Table 15.3: SAR Measurement Variability for Body WIFI5G (1g)

| Frequency | | Test Position | Spacing (mm) | Original SAR (W/kg) | First Repeated SAR (W/kg) | The Ratio | Second Repeated SAR (W/kg) |
|-----------|------|---------------|--------------|---------------------|---------------------------|-----------|----------------------------|
| Ch. | MHz | | | | | | |
| 50 | 5250 | Rear | 0 | 0.936 | 0.907 | 1.03 | / |

16 Measurement Uncertainty

16.1 Measurement Uncertainty for Normal SAR Tests (300MHz~3GHz)

| No. | Error Description | Type | Uncertainty value | Probably Distribution | Div. | (Ci) 1g | (Ci) 10g | Std. Unc. (1g) | Std. Unc. (10g) | Degree of freedom |
|----------------------------|---|------|-------------------|-----------------------|------------|---------|----------|----------------|-----------------|-------------------|
| Measurement system | | | | | | | | | | |
| 1 | Probe calibration | B | 6.0 | N | 1 | 1 | 1 | 6.0 | 6.0 | ∞ |
| 2 | Isotropy | B | 4.7 | R | $\sqrt{3}$ | 0.7 | 0.7 | 1.9 | 1.9 | ∞ |
| 3 | Boundary effect | B | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.6 | 0.6 | ∞ |
| 4 | Linearity | B | 4.7 | R | $\sqrt{3}$ | 1 | 1 | 2.7 | 2.7 | ∞ |
| 5 | Detection limit | B | 1.0 | N | 1 | 1 | 1 | 0.6 | 0.6 | ∞ |
| 6 | Readout electronics | B | 0.3 | R | $\sqrt{3}$ | 1 | 1 | 0.3 | 0.3 | ∞ |
| 7 | Response time | B | 0.8 | R | $\sqrt{3}$ | 1 | 1 | 0.5 | 0.5 | ∞ |
| 8 | Integration time | B | 2.6 | R | $\sqrt{3}$ | 1 | 1 | 1.5 | 1.5 | ∞ |
| 9 | RF ambient conditions-noise | B | 0 | R | $\sqrt{3}$ | 1 | 1 | 0 | 0 | ∞ |
| 10 | RF ambient conditions-reflection | B | 0 | R | $\sqrt{3}$ | 1 | 1 | 0 | 0 | ∞ |
| 11 | Probe positioned mech. restrictions | B | 0.4 | R | $\sqrt{3}$ | 1 | 1 | 0.2 | 0.2 | ∞ |
| 12 | Probe positioning with respect to phantom shell | B | 2.9 | R | $\sqrt{3}$ | 1 | 1 | 1.7 | 1.7 | ∞ |
| 13 | Post-processing | B | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.6 | 0.6 | ∞ |
| Test sample related | | | | | | | | | | |
| 14 | Test sample positioning | A | 3.3 | N | 1 | 1 | 1 | 3.3 | 3.3 | 71 |
| 15 | Device holder uncertainty | A | 3.4 | N | 1 | 1 | 1 | 3.4 | 3.4 | 5 |
| 16 | Drift of output power | B | 5.0 | R | $\sqrt{3}$ | 1 | 1 | 2.9 | 2.9 | ∞ |
| Phantom and set-up | | | | | | | | | | |
| 17 | Phantom uncertainty | B | 4.0 | R | $\sqrt{3}$ | 1 | 1 | 2.3 | 2.3 | ∞ |
| 18 | Liquid conductivity (target) | B | 5.0 | R | $\sqrt{3}$ | 0.64 | 0.43 | 1.8 | 1.2 | ∞ |
| 19 | Liquid conductivity (meas.) | A | 2.06 | N | 1 | 0.64 | 0.43 | 1.32 | 0.89 | 43 |
| 20 | Liquid permittivity (target) | B | 5.0 | R | $\sqrt{3}$ | 0.6 | 0.49 | 1.7 | 1.4 | ∞ |
| 21 | Liquid permittivity (meas.) | A | 1.6 | N | 1 | 0.6 | 0.49 | 1.0 | 0.8 | 521 |

| | | | | | | | | |
|--|---|--|--|--|--|------|------|-----|
| Combined standard uncertainty | $u_c' = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$ | | | | | 9.55 | 9.43 | 257 |
| Expanded uncertainty (confidence interval of 95 %) | $u_e = 2u_c$ | | | | | 19.1 | 18.9 | |

16.2 Measurement Uncertainty for Normal SAR Tests (3~6GHz)

| No. | Error Description | Type | Uncertainty value | Probably Distribution | Div. | (Ci) 1g | (Ci) 10g | Std. Unc. (1g) | Std. Unc. (10g) | Degree of freedom |
|----------------------------|---|------|-------------------|-----------------------|------------|---------|----------|----------------|-----------------|-------------------|
| Measurement system | | | | | | | | | | |
| 1 | Probe calibration | B | 6.55 | N | 1 | 1 | 1 | 6.55 | 6.55 | ∞ |
| 2 | Isotropy | B | 4.7 | R | $\sqrt{3}$ | 0.7 | 0.7 | 1.9 | 1.9 | ∞ |
| 3 | Boundary effect | B | 2.0 | R | $\sqrt{3}$ | 1 | 1 | 1.2 | 1.2 | ∞ |
| 4 | Linearity | B | 4.7 | R | $\sqrt{3}$ | 1 | 1 | 2.7 | 2.7 | ∞ |
| 5 | Detection limit | B | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.6 | 0.6 | ∞ |
| 6 | Readout electronics | B | 0.3 | R | $\sqrt{3}$ | 1 | 1 | 0.3 | 0.3 | ∞ |
| 7 | Response time | B | 0.8 | R | $\sqrt{3}$ | 1 | 1 | 0.5 | 0.5 | ∞ |
| 8 | Integration time | B | 2.6 | R | $\sqrt{3}$ | 1 | 1 | 1.5 | 1.5 | ∞ |
| 9 | RF ambient conditions-noise | B | 0 | R | $\sqrt{3}$ | 1 | 1 | 0 | 0 | ∞ |
| 10 | RFambient conditions-reflection | B | 0 | R | $\sqrt{3}$ | 1 | 1 | 0 | 0 | ∞ |
| 11 | Probe positioned mech. restrictions | B | 0.8 | R | $\sqrt{3}$ | 1 | 1 | 0.5 | 0.5 | ∞ |
| 12 | Probe positioning with respect to phantom shell | B | 6.7 | R | $\sqrt{3}$ | 1 | 1 | 3.9 | 3.9 | ∞ |
| 13 | Post-processing | B | 4.0 | R | $\sqrt{3}$ | 1 | 1 | 2.3 | 2.3 | ∞ |
| Test sample related | | | | | | | | | | |
| 14 | Test sample positioning | A | 3.3 | N | 1 | 1 | 1 | 3.3 | 3.3 | 71 |
| 15 | Device holder uncertainty | A | 3.4 | N | 1 | 1 | 1 | 3.4 | 3.4 | 5 |
| 16 | Drift of output power | B | 5.0 | R | $\sqrt{3}$ | 1 | 1 | 2.9 | 2.9 | ∞ |
| Phantom and set-up | | | | | | | | | | |
| 17 | Phantom uncertainty | B | 4.0 | R | $\sqrt{3}$ | 1 | 1 | 2.3 | 2.3 | ∞ |
| 18 | Liquid conductivity (target) | B | 5.0 | R | $\sqrt{3}$ | 0.64 | 0.43 | 1.8 | 1.2 | ∞ |
| 19 | Liquid conductivity (meas.) | A | 2.06 | N | 1 | 0.64 | 0.43 | 1.32 | 0.89 | 43 |
| 20 | Liquid permittivity (target) | B | 5.0 | R | $\sqrt{3}$ | 0.6 | 0.49 | 1.7 | 1.4 | ∞ |

| | | | | | | | | | | |
|--|-----------------------------|--|-----|---|---|-----|------|------|------|-----|
| 21 | Liquid permittivity (meas.) | A | 1.6 | N | 1 | 0.6 | 0.49 | 1.0 | 0.8 | 521 |
| Combined standard uncertainty | | $u_c = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$ | | | | | | 10.7 | 10.6 | 257 |
| Expanded uncertainty (confidence interval of 95 %) | | $u_e = 2u_c$ | | | | | | 21.4 | 21.1 | |

16.3 Measurement Uncertainty for Fast SAR Tests (300MHz~3GHz)

| No. | Error Description | Type | Uncertainty value | Probably Distribution | Div. | (Ci) 1g | (Ci) 10g | Std. Unc. (1g) | Std. Unc. (10g) | Degree of freedom |
|----------------------------|---|------|-------------------|-----------------------|------------|---------|----------|----------------|-----------------|-------------------|
| Measurement system | | | | | | | | | | |
| 1 | Probe calibration | B | 6.0 | N | 1 | 1 | 1 | 6.0 | 6.0 | ∞ |
| 2 | Isotropy | B | 4.7 | R | $\sqrt{3}$ | 0.7 | 0.7 | 1.9 | 1.9 | ∞ |
| 3 | Boundary effect | B | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.6 | 0.6 | ∞ |
| 4 | Linearity | B | 4.7 | R | $\sqrt{3}$ | 1 | 1 | 2.7 | 2.7 | ∞ |
| 5 | Detection limit | B | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.6 | 0.6 | ∞ |
| 6 | Readout electronics | B | 0.3 | R | $\sqrt{3}$ | 1 | 1 | 0.3 | 0.3 | ∞ |
| 7 | Response time | B | 0.8 | R | $\sqrt{3}$ | 1 | 1 | 0.5 | 0.5 | ∞ |
| 8 | Integration time | B | 2.6 | R | $\sqrt{3}$ | 1 | 1 | 1.5 | 1.5 | ∞ |
| 9 | RF ambient conditions-noise | B | 0 | R | $\sqrt{3}$ | 1 | 1 | 0 | 0 | ∞ |
| 10 | RF ambient conditions-reflection | B | 0 | R | $\sqrt{3}$ | 1 | 1 | 0 | 0 | ∞ |
| 11 | Probe positioned mech. Restrictions | B | 0.4 | R | $\sqrt{3}$ | 1 | 1 | 0.2 | 0.2 | ∞ |
| 12 | Probe positioning with respect to phantom shell | B | 2.9 | R | $\sqrt{3}$ | 1 | 1 | 1.7 | 1.7 | ∞ |
| 13 | Post-processing | B | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.6 | 0.6 | ∞ |
| 14 | Fast SAR z-Approximation | B | 7.0 | R | $\sqrt{3}$ | 1 | 1 | 4.0 | 4.0 | ∞ |
| Test sample related | | | | | | | | | | |
| 15 | Test sample positioning | A | 3.3 | N | 1 | 1 | 1 | 3.3 | 3.3 | 71 |
| 16 | Device holder uncertainty | A | 3.4 | N | 1 | 1 | 1 | 3.4 | 3.4 | 5 |
| 17 | Drift of output power | B | 5.0 | R | $\sqrt{3}$ | 1 | 1 | 2.9 | 2.9 | ∞ |
| Phantom and set-up | | | | | | | | | | |
| 18 | Phantom uncertainty | B | 4.0 | R | $\sqrt{3}$ | 1 | 1 | 2.3 | 2.3 | ∞ |
| 19 | Liquid conductivity (target) | B | 5.0 | R | $\sqrt{3}$ | 0.64 | 0.43 | 1.8 | 1.2 | ∞ |

| | | | | | | | | | | |
|--|------------------------------|--|------|---|------------|------|------|------|------|----------|
| 20 | Liquid conductivity (meas.) | A | 2.06 | N | 1 | 0.64 | 0.43 | 1.32 | 0.89 | 43 |
| 21 | Liquid permittivity (target) | B | 5.0 | R | $\sqrt{3}$ | 0.6 | 0.49 | 1.7 | 1.4 | ∞ |
| 22 | Liquid permittivity (meas.) | A | 1.6 | N | 1 | 0.6 | 0.49 | 1.0 | 0.8 | 521 |
| Combined standard uncertainty | | $u_c = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$ | | | | | | 10.4 | 10.3 | 257 |
| Expanded uncertainty (confidence interval of 95 %) | | $u_e = 2u_c$ | | | | | | 20.8 | 20.6 | |

16.4 Measurement Uncertainty for Fast SAR Tests (3~6GHz)

| No. | Error Description | Type | Uncertainty value | Probably Distribution | Div. | (Ci) 1g | (Ci) 10g | Std. Unc. (1g) | Std. Unc. (10g) | Degree of freedom |
|----------------------------|---|------|-------------------|-----------------------|------------|---------|----------|----------------|-----------------|-------------------|
| Measurement system | | | | | | | | | | |
| 1 | Probe calibration | B | 6.55 | N | 1 | 1 | 1 | 6.55 | 6.55 | ∞ |
| 2 | Isotropy | B | 4.7 | R | $\sqrt{3}$ | 0.7 | 0.7 | 1.9 | 1.9 | ∞ |
| 3 | Boundary effect | B | 2.0 | R | $\sqrt{3}$ | 1 | 1 | 1.2 | 1.2 | ∞ |
| 4 | Linearity | B | 4.7 | R | $\sqrt{3}$ | 1 | 1 | 2.7 | 2.7 | ∞ |
| 5 | Detection limit | B | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.6 | 0.6 | ∞ |
| 6 | Readout electronics | B | 0.3 | R | $\sqrt{3}$ | 1 | 1 | 0.3 | 0.3 | ∞ |
| 7 | Response time | B | 0.8 | R | $\sqrt{3}$ | 1 | 1 | 0.5 | 0.5 | ∞ |
| 8 | Integration time | B | 2.6 | R | $\sqrt{3}$ | 1 | 1 | 1.5 | 1.5 | ∞ |
| 9 | RF ambient conditions-noise | B | 0 | R | $\sqrt{3}$ | 1 | 1 | 0 | 0 | ∞ |
| 10 | RF ambient conditions-reflection | B | 0 | R | $\sqrt{3}$ | 1 | 1 | 0 | 0 | ∞ |
| 11 | Probe positioned mech. Restrictions | B | 0.8 | R | $\sqrt{3}$ | 1 | 1 | 0.5 | 0.5 | ∞ |
| 12 | Probe positioning with respect to phantom shell | B | 6.7 | R | $\sqrt{3}$ | 1 | 1 | 3.9 | 3.9 | ∞ |
| 13 | Post-processing | B | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.6 | 0.6 | ∞ |
| 14 | Fast SAR z-Approximation | B | 14.0 | R | $\sqrt{3}$ | 1 | 1 | 8.1 | 8.1 | ∞ |
| Test sample related | | | | | | | | | | |
| 15 | Test sample positioning | A | 3.3 | N | 1 | 1 | 1 | 3.3 | 3.3 | 71 |
| 16 | Device holder uncertainty | A | 3.4 | N | 1 | 1 | 1 | 3.4 | 3.4 | 5 |
| 17 | Drift of output power | B | 5.0 | R | $\sqrt{3}$ | 1 | 1 | 2.9 | 2.9 | ∞ |

| Phantom and set-up | | | | | | | | | | |
|--|------------------------------|--|------|---|------------|------|------|------|------|----------|
| 18 | Phantom uncertainty | B | 4.0 | R | $\sqrt{3}$ | 1 | 1 | 2.3 | 2.3 | ∞ |
| 19 | Liquid conductivity (target) | B | 5.0 | R | $\sqrt{3}$ | 0.64 | 0.43 | 1.8 | 1.2 | ∞ |
| 20 | Liquid conductivity (meas.) | A | 2.06 | N | 1 | 0.64 | 0.43 | 1.32 | 0.89 | 43 |
| 21 | Liquid permittivity (target) | B | 5.0 | R | $\sqrt{3}$ | 0.6 | 0.49 | 1.7 | 1.4 | ∞ |
| 22 | Liquid permittivity (meas.) | A | 1.6 | N | 1 | 0.6 | 0.49 | 1.0 | 0.8 | 521 |
| Combined standard uncertainty | | $u_c = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$ | | | | | | 13.5 | 13.4 | 257 |
| Expanded uncertainty (confidence interval of 95 %) | | $u_e = 2u_c$ | | | | | | 27.0 | 26.8 | |

17 MAIN TEST INSTRUMENTS

Table 17.1: List of Main Instruments

| No. | Name | Type | Serial Number | Calibration Date | Valid Period |
|-----|-----------------------|---------------|---------------|--------------------------|--------------|
| 01 | Network analyzer | E5071C | MY46110673 | January 14, 2021 | One year |
| 02 | Power meter | NRP2 | 101919 | May 12, 2020 | One year |
| 03 | Power sensor | NRP-Z91 | 101547 | | |
| 04 | Signal Generator | E4438C | MY49070393 | May 14, 2020 | One Year |
| 05 | Amplifier | 60S1G4 | 0331848 | No Calibration Requested | |
| 06 | BTS | CMW500 | 159890 | January 25 2021 | One year |
| 07 | E-field Probe | SPEAG EX3DV4 | 7307 | May 29, 2020 | One year |
| 08 | DAE | SPEAG DAE4 | 536 | November 6, 2020 | One year |
| 09 | Dipole Validation Kit | SPEAG D2450V2 | 853 | July 21,2020 | One year |
| 10 | Dipole Validation Kit | SPEAG D5GHzV2 | 1060 | July 27,2020 | One year |

END OF REPORT BODY

ANNEX A Graph Results

WLAN2450_CH11 Rear

Date: 3/27/2021

Electronics: DAE4 Sn536

Medium: Head 2450 MHz

Medium parameters used: $f = 2462$; $\sigma = 1.788$ mho/m; $\epsilon_r = 38.53$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: WLAN2450 2462 Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.77,7.77,7.77)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.78 W/kg

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

Reference Value = 2.111 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 2.75 W/kg

SAR(1 g) = 0.998 W/kg; SAR(10 g) = 0.377 W/kg

Maximum value of SAR (measured) = 1.94 W/kg

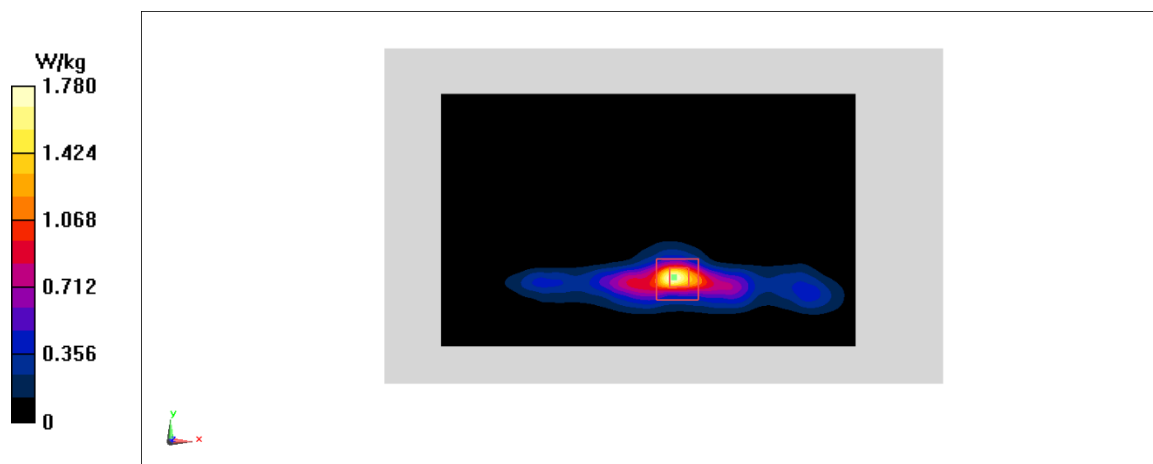


Fig A.1

WLAN2450_CH6 Rear

Date: 3/27/2021

Electronics: DAE4 Sn536

Medium: Head 2450 MHz

Medium parameters used: $f = 2437$; $\sigma = 1.759$ mho/m; $\epsilon_r = 38.57$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: WLAN2450 2437 Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.77,7.77,7.77)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.81 W/kg

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

Reference Value = 3.086 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 3.09 W/kg

SAR(1 g) = 1.02 W/kg; SAR(10 g) = 0.359 W/kg

Maximum value of SAR (measured) = 2.22 W/kg

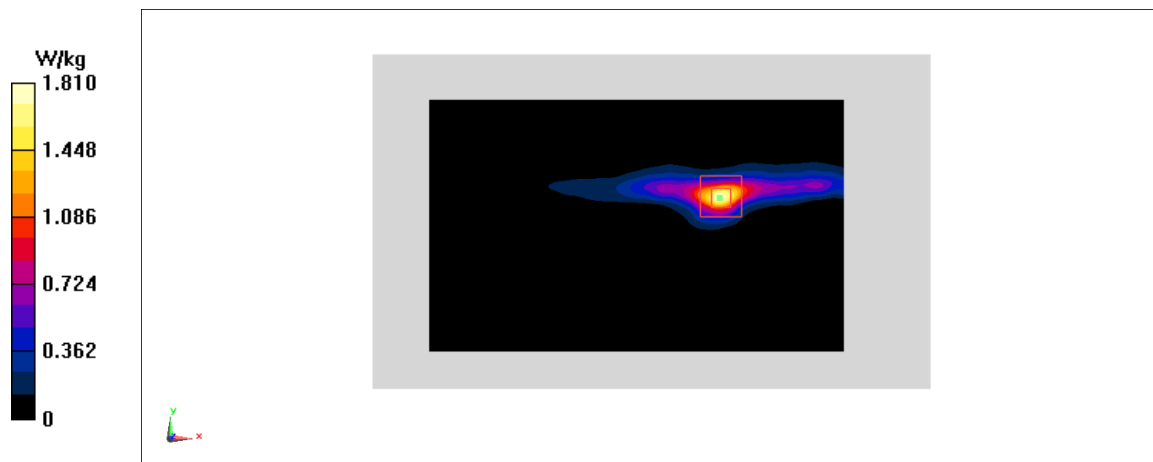


Fig A.2

WLAN2450_CH3 Rear

Date: 3/27/2021

Electronics: DAE4 Sn536

Medium: Head 2450 MHz

Medium parameters used: $f = 2422$; $\sigma = 1.751$ mho/m; $\epsilon_r = 38.72$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: WLAN2450 2422 Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.77,7.77,7.77)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.3 W/kg

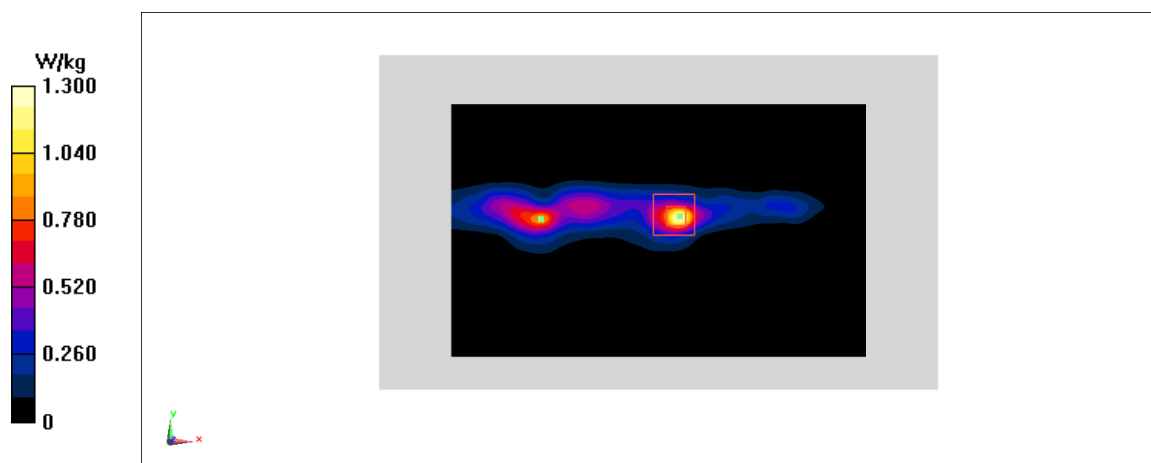
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 15.44 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 1.67 W/kg

SAR(1 g) = 0.596 W/kg; SAR(10 g) = 0.222 W/kg

Maximum value of SAR (measured) = 1.21 W/kg

**Fig A.3**

WLAN5G_CH50 Rear

Date: 3/28/2021

Electronics: DAE4 Sn536

Medium: Head 5250 MHz

Medium parameters used: $f = 5250$; $\sigma = 4.744$ mho/m; $\epsilon_r = 35.95$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: WLAN5G 5250 Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(5.61,5.61,5.61)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.98 W/kg

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

Reference Value = 0 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 3.71 W/kg

SAR(1 g) = 0.788 W/kg; SAR(10 g) = 0.21 W/kg

Maximum value of SAR (measured) = 2.07 W/kg

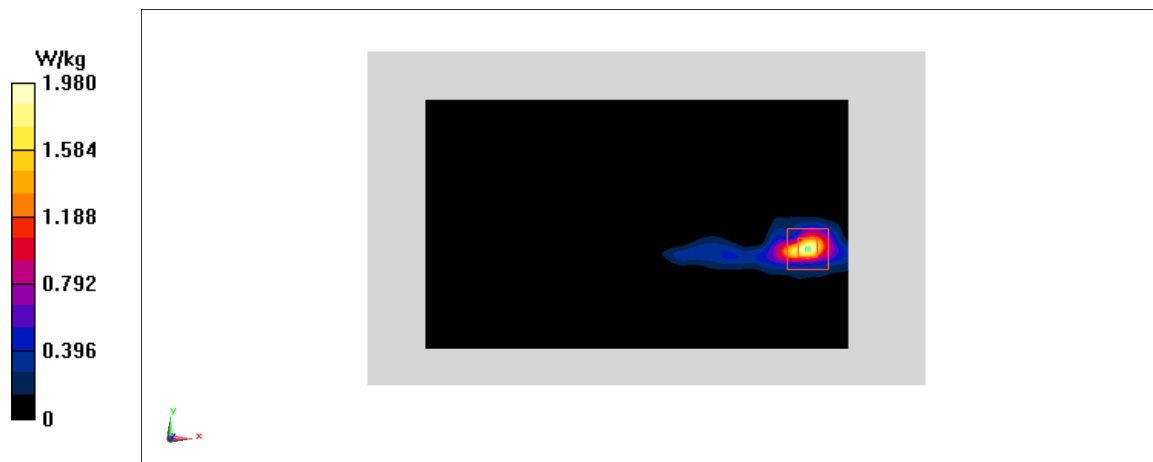


Fig A.4

WLAN5G_CH50 Rear

Date: 3/28/2021

Electronics: DAE4 Sn536

Medium: Head 5250 MHz

Medium parameters used: $f = 5250$; $\sigma = 4.744$ mho/m; $\epsilon_r = 35.95$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: WLAN5G 5250 Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(5.61,5.61,5.61)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.42 W/kg

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

Reference Value = 5.254 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 4.32 W/kg

SAR(1 g) = 0.936 W/kg; SAR(10 g) = 0.257 W/kg

Maximum value of SAR (measured) = 2.37 W/kg

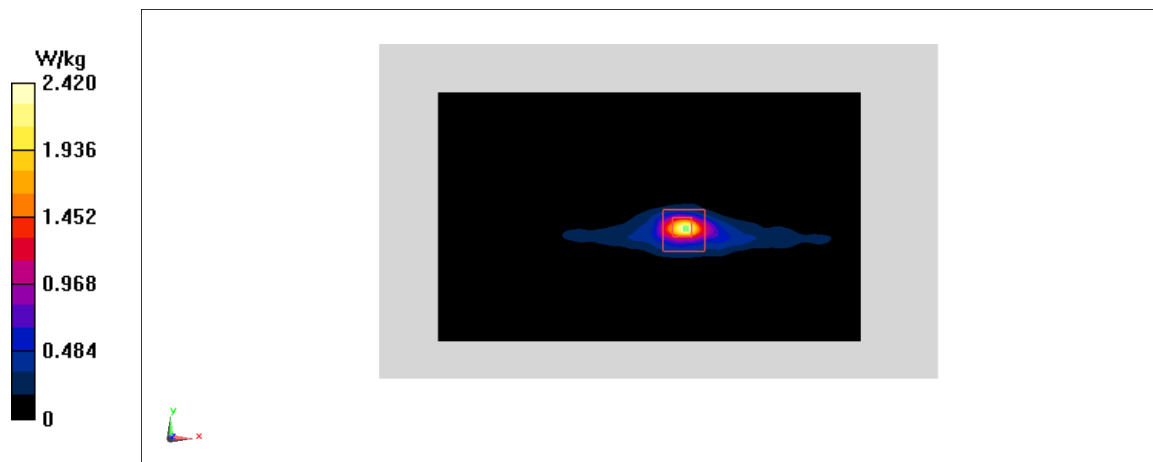


Fig A.5

WLAN5G_CH50 Rear

Date: 3/28/2021

Electronics: DAE4 Sn536

Medium: Head 5250 MHz

Medium parameters used: $f = 5250$; $\sigma = 4.744$ mho/m; $\epsilon_r = 35.95$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: WLAN5G 5250 Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(5.61,5.61,5.61)

Area Scan (71x121x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.18 W/kg

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

Reference Value = 6.942 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 2.19 W/kg

SAR(1 g) = 0.429 W/kg; SAR(10 g) = 0.113 W/kg

Maximum value of SAR (measured) = 1.16 W/kg

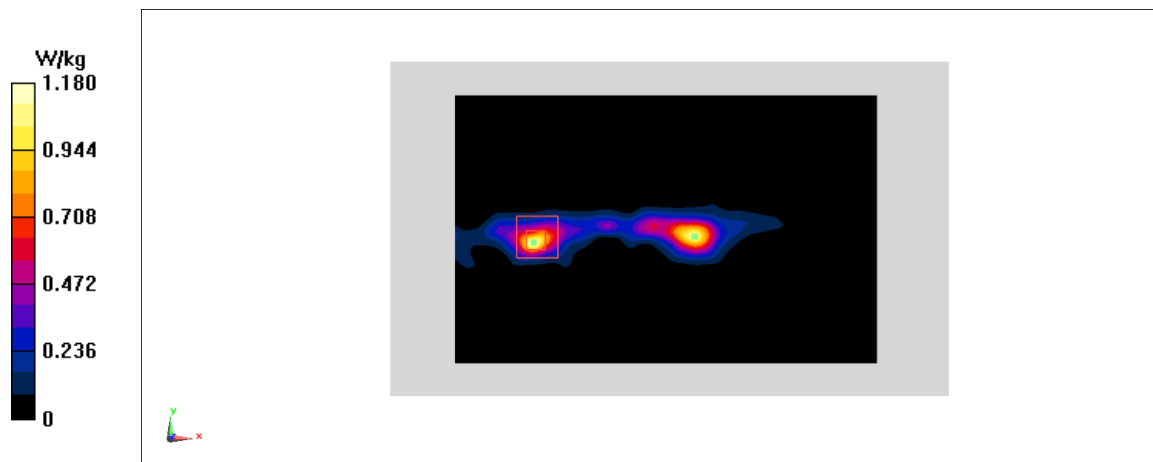


Fig A.6

BT_CH78 Rear

Date: 3/27/2021

Electronics: DAE4 Sn536

Medium: Head 2450 MHz

Medium parameters used: $f = 2480$; $\sigma = 1.796$ mho/m; $\epsilon_r = 38.55$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: WLAN2450 2480 Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.77,7.77,7.77)

Area Scan (181x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.0936 W/kg

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

Reference Value = 0.1030 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.0950 W/kg

SAR(1 g) = 0.031 W/kg; SAR(10 g) = 0.00913 W/kg

Ratio of SAR at M2 to SAR at M1 = 32.9%

Maximum value of SAR (measured) = 0.0599 W/kg

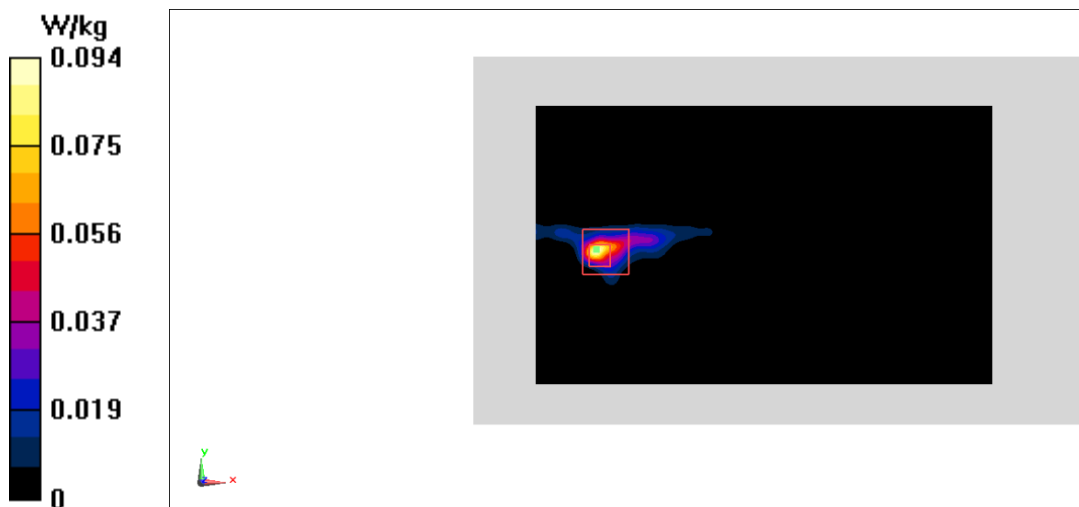


Fig A.7

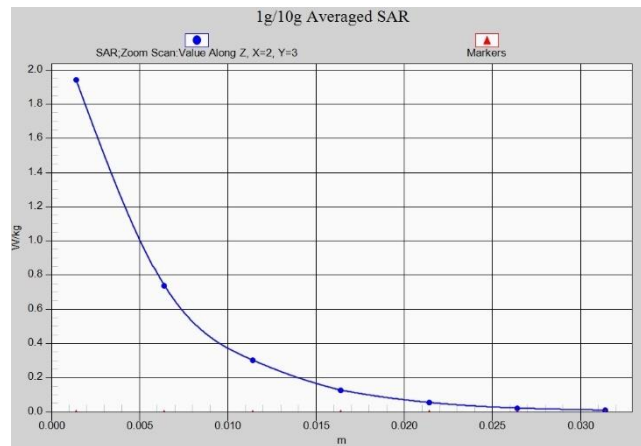


Fig.15-1 Z-Scan at power reference point (WiFi 2.4G)

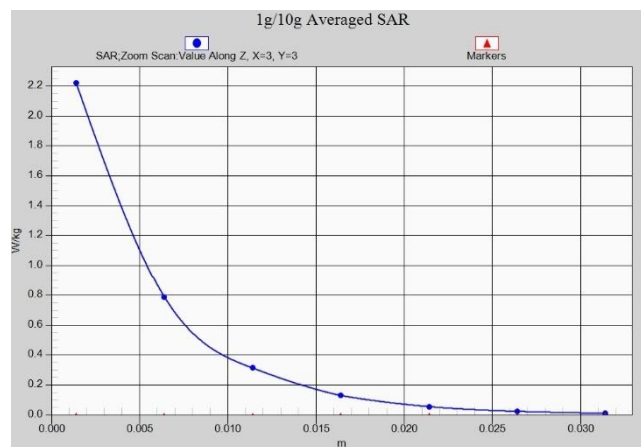


Fig.15-2 Z-Scan at power reference point (WiFi 2.4G)



Fig.15-3 Z-Scan at power reference point (WiFi 2.4G)



Fig.15-4 Z-Scan at power reference point (WiFi 5G)

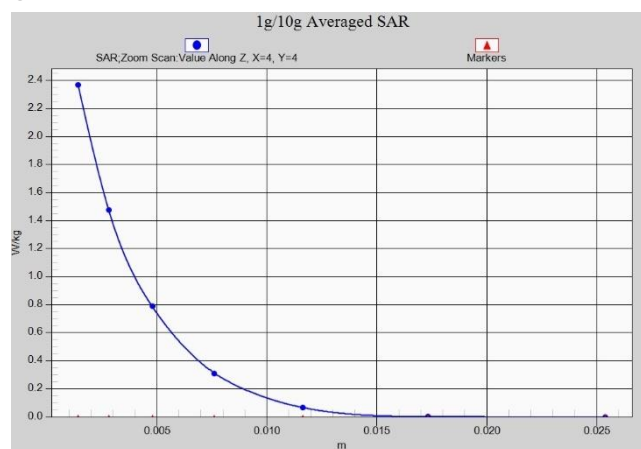


Fig.15-5 Z-Scan at power reference point (WiFi 5G)

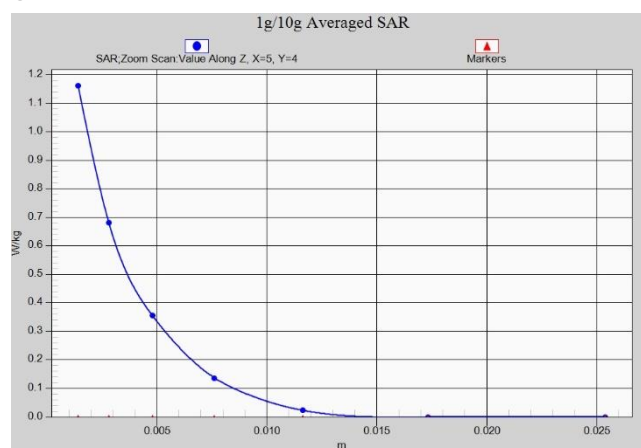


Fig.15-6 Z-Scan at power reference point (WiFi 5G)

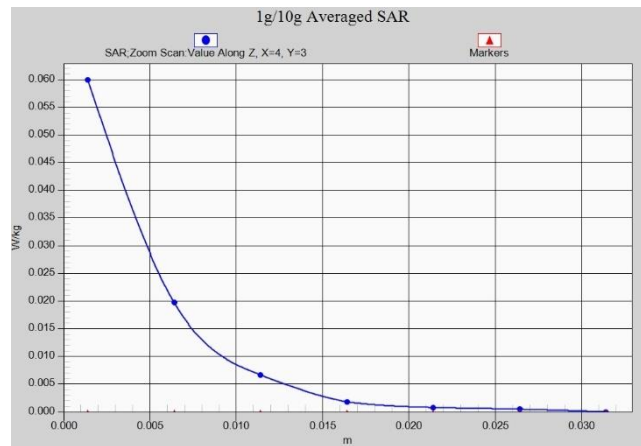


Fig.15-7 Z-Scan at power reference point (BT)

ANNEX B System Verification Results

2450 MHz

Date: 3/27/2021

Electronics: DAE4 Sn536

Medium: Head 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.777$ mho/m; $\epsilon_r = 38.54$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C

Communication System: CW Frequency: 2450 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.77,7.77,7.77)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 120.12 V/m; Power Drift = 0.06

Fast SAR: SAR(1 g) = 13.19 W/kg; SAR(10 g) = 6.11 W/kg

Maximum value of SAR (interpolated) = 22.07 W/kg

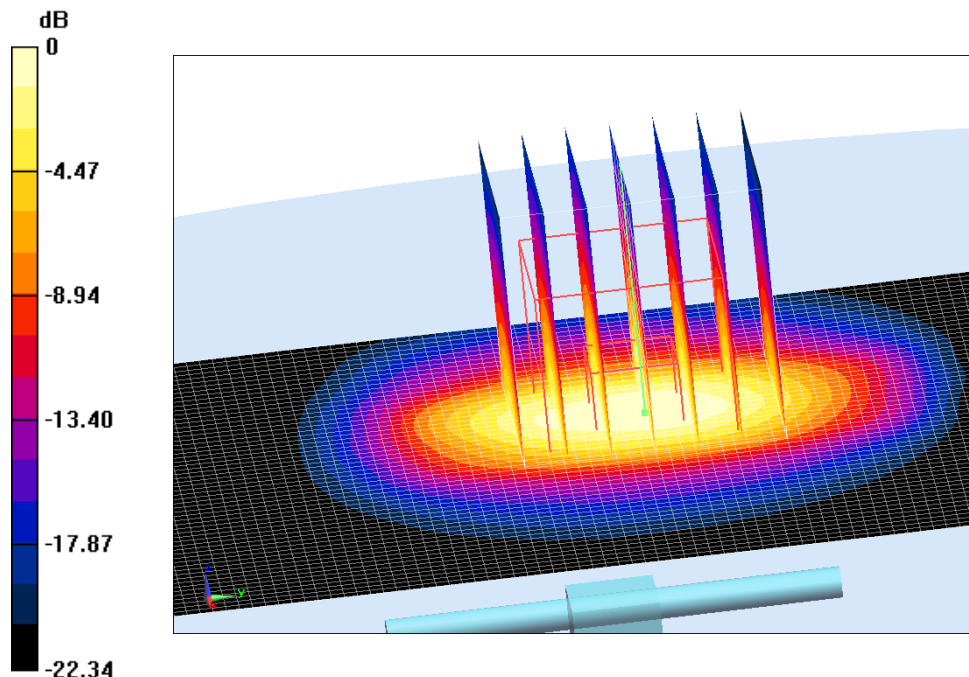
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value =120.12 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 25.98 W/kg

SAR(1 g) = 13.16 W/kg; SAR(10 g) = 6.23 W/kg

Maximum value of SAR (measured) = 21.38 W/kg



0 dB = 21.38 W/kg = 13.3 dB W/kg

Fig.B.1 validation 2450 MHz 250mW

5250 MHz

Date: 3/28/2021

Electronics: DAE4 Sn536

Medium: Head 5250 MHz

Medium parameters used: $f = 5250 \text{ MHz}$; $\sigma = 4.744 \text{ mho/m}$; $\epsilon_r = 35.95$; $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C

Communication System: CW Frequency: 5250 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(5.61,5.61,5.61)

System Validation /Area Scan (81x191x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Maximum value of SAR (interpolated) = 18.59 W/kg

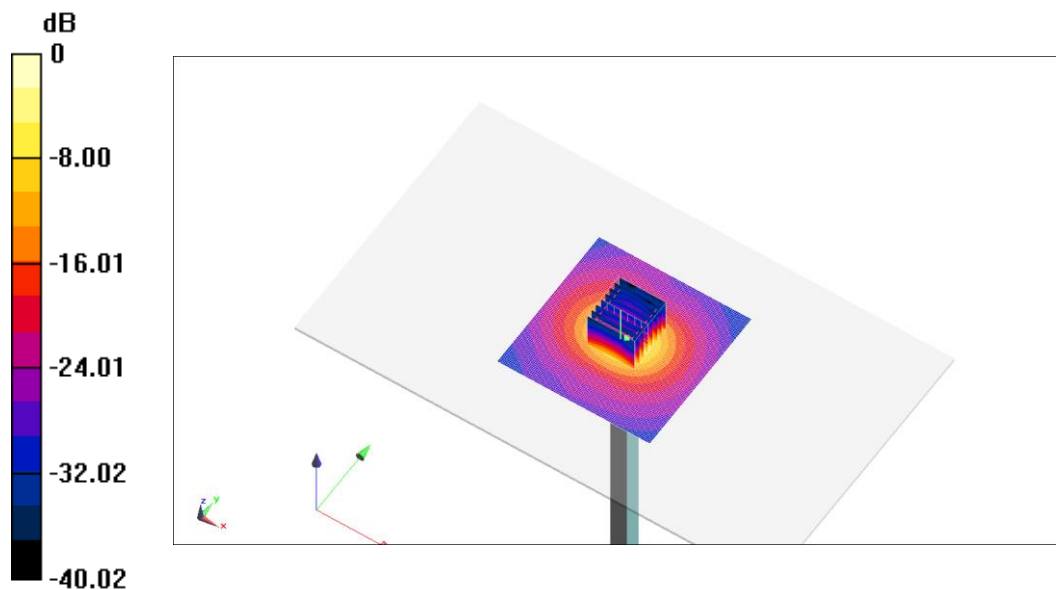
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 78.61 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 27.91 W/kg

SAR(1 g) = 19.85 W/kg; SAR(10 g) = 5.67 W/kg

Maximum value of SAR (measured) = 18.43 W/kg



0 dB = 18.43 W/kg = 12.66 dB W/kg

Fig.B.2 validation 5250 MHz 250mW

5600 MHz

Date: 3/28/2021

Electronics: DAE4 Sn536

Medium: Head 5600 MHz

Medium parameters used: $f = 5600$ MHz; $\sigma = 5.071$ mho/m; $\epsilon_r = 34.97$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C Liquid Temperature: 22.3°C

Communication System: CW Frequency: 5600 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(5.1,5.1,5.1)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 19.73 W/kg

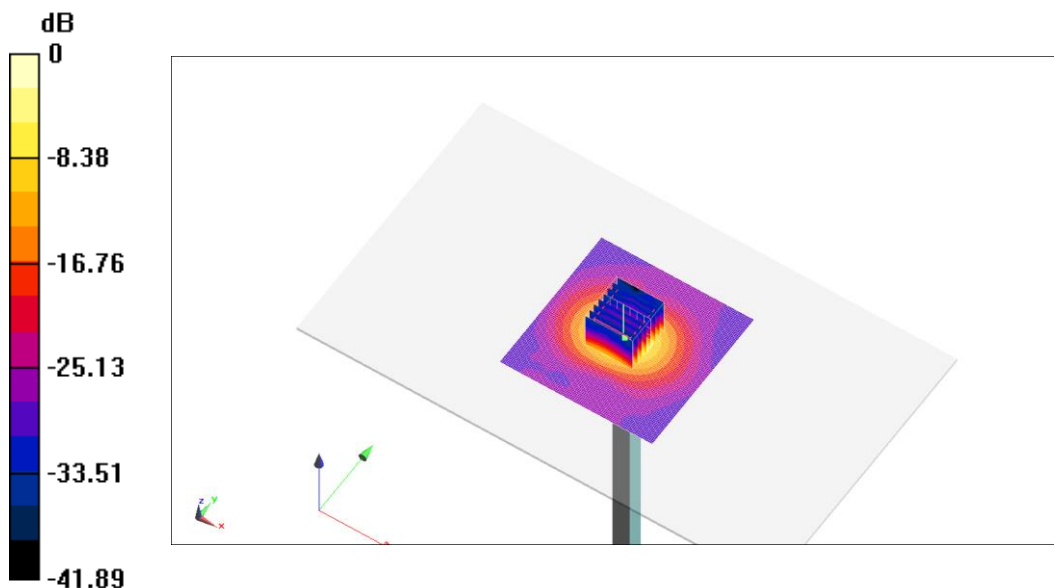
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value =78.76 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 30.99 W/kg

SAR(1 g) = 20.41 W/kg; SAR(10 g) = 5.94 W/kg

Maximum value of SAR (measured) = 20.46 W/kg



0 dB = 20.46 W/kg = 13.11 dB W/kg

Fig.B.3 validation 5600 MHz 250Mw

The SAR system verification must be required that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR.

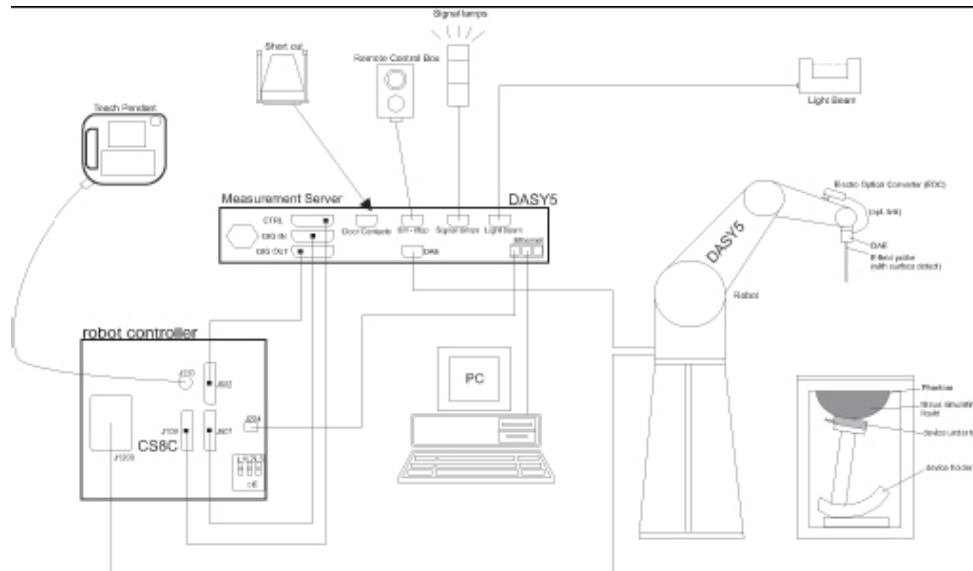
Table B.1 Comparison between area scan and zoom scan for system verification

| Date | Band | Position | Area scan (1g) | Zoom scan (1g) | Drift (%) |
|-----------|------|----------|-------------------|-------------------|-----------|
| 2021-3-27 | 2450 | Head | 13.19 | 13.16 | 0.23 |

ANNEX C SAR Measurement Setup

C.1 Measurement Set-up

The Dasy4 or DASY5 system for performing compliance tests is illustrated above graphically. This system consists of the following items:



Picture C.1 SAR Lab Test Measurement Set-up

- A standard high precision 6-axis robot (Stäubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the DASY4 or DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

C.2 Dasy4 or DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 or DASY5 software reads the reflection during a software approach and looks for the maximum using 2nd order curve fitting. The approach is stopped at reaching the maximum.

Probe Specifications:

| | |
|-----------------------|--|
| Model: | ES3DV3, EX3DV4 |
| Frequency | 10MHz — 6.0GHz(EX3DV4) |
| Range: | 10MHz — 4GHz(ES3DV3) |
| Calibration: | In head and body simulating tissue at Frequencies from 835 up to 5800MHz |
| Linearity: | ± 0.2 dB(30 MHz to 6 GHz) for EX3DV4 ± 0.2 dB(30 MHz to 4 GHz) for ES3DV3 |
| DynamicRange: | 10 mW/kg — 100W/kg |
| Probe Length: | 330 mm |
| Probe Tip | |
| Length: | 20 mm |
| Body Diameter: | 12 mm |
| Tip Diameter: | 2.5 mm (3.9 mm for ES3DV3) |
| Tip-Center: | 1 mm (2.0mm for ES3DV3) |
| Application: | SAR Dosimetry Testing Compliance tests of mobile phones Dosimetry in strong gradient fields |

Picture C.3E-field Probe



Picture C.2Near-field Probe



C.3 E-field Probe Calibration

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm²) using an RF Signal generator, TEM cell, and RF Power Meter.

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies 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 until the three channels show the maximum reading. The power density readings equates to 1 mW/cm².

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

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

Where:

Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

ΔT = Temperature increase due to RF exposure.

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

Where:

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m³).

C.4 Other Test Equipment

C.4.1 Data Acquisition Electronics(DAE)

The data acquisition electronics consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.



PictureC.4: DAE

C.4.2 Robot

The SPEAG DASY system uses the high precision robots (DASY4: RX90XL; DASY5: RX160L) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability 0.02mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements (brushless synchron motors; no stepper motors)
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)



Picture C.5DASY 4



Picture C.6DASY 5

C.4.3 Measurement Server

The Measurement server is based on a PC/104 CPU board with CPU (dasy4: 166 MHz, Intel Pentium; DASY5: 400 MHz, Intel Celeron), chipdisk (DASY4: 32 MB; DASY5: 128MB), RAM (DASY4: 64 MB, DASY5: 128MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all real-time data evaluation of field measurements and surface detection, controls robot movements and handles safety operation. The PC operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with an expansion port which is reserved for future applications. Please note that this expansion port does not have a standardized pinout, and therefore only devices provided by SPEAG can be connected. Devices from any other supplier could seriously damage the measurement server.



Picture C.7 Server for DASY 4

Picture C.8 Server for DASY 5

C.4.4 Device Holder for Phantom

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5mm distance, a positioning uncertainty of $\pm 0.5\text{mm}$ would produce a SAR uncertainty of $\pm 20\%$. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

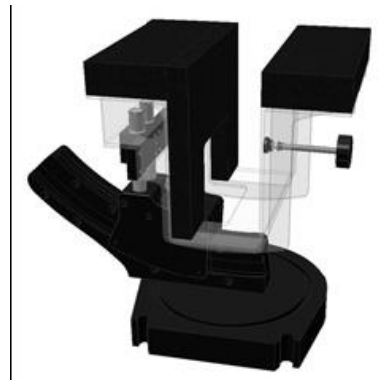
The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales are the ear reference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

<Laptop Extension Kit>

The extension is lightweight and made of POM, acrylic glass and foam. It 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 and ELI phantoms.



Picture C.9-1: Device Holder



Picture C.9-2: Laptop Extension Kit

C.4.5 Phantom

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to

Represent the 90th percentile of the population. The phantom enables the dissymmetric evaluation of SAR for both left and right handed handset usage, as well as body-worn usage using the flat phantom region. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. The shell phantom has a 2mm shell thickness (except the ear region where shell thickness increases to 6 mm).

Shell Thickness: $2 \pm 0.2 \text{ mm}$

Filling Volume: Approx. 25 liters

Dimensions: 810 x 1000 x 500 mm (H x L x W)
Available: Special



Picture C.10: SAM Twin Phantom

ANNEX D Position of the wireless device in relation to the phantom

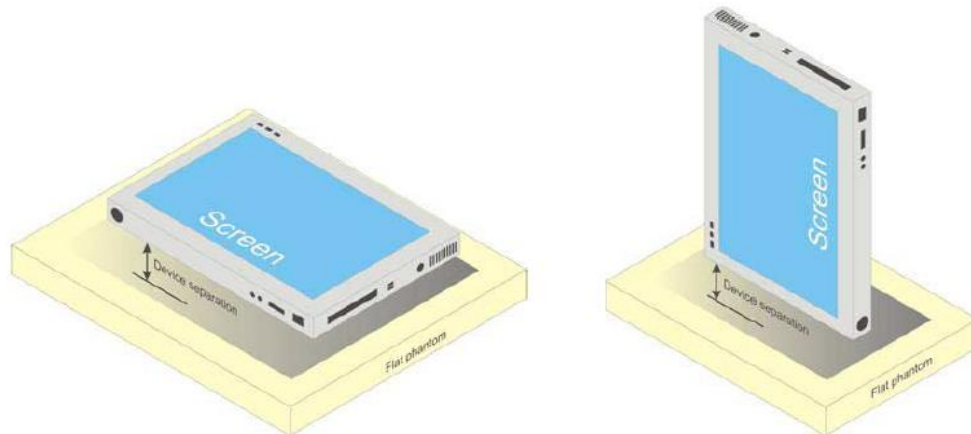
D.1 Body-supported device

Other devices that fall into this category include tablet type portable computers and credit card transaction authorisation terminals, point-of-sale and/or inventory terminals. Where these devices may be torso or limb-supported, the same principles for body-supported devices are applied. The example in Picture D.1 shows a tablet form factor portable computer for which SAR should be

separately assessed with

- a) each surface and
- b) the separation distances

positioned against the flat phantom that correspond to the intended use as specified by the manufacturer. If the intended use is not specified in the user instructions, the device shall be tested directly against the flat phantom in all usable orientations.



Picture D.1 Tablet form factor portable computer

D.2 DUT Setup Photos



Picture D.2

ANNEX E Equivalent Media Recipes

The liquid used for the frequency range of 800-3000 MHz consisted of water, sugar, salt, preventol, glycol monobutyl and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table E.1 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528 and IEC 62209.

TableE.1: Composition of the Tissue Equivalent Matter

| Frequency (MHz) | 835Head | 835Body | 1900 Head | 1900 Body | 2450 Head | 2450 Body | 5800 Head | 5800 Body |
|------------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| Ingredients (% by weight) | | | | | | | | |
| Water | 41.45 | 52.5 | 55.242 | 69.91 | 58.79 | 72.60 | 65.53 | 65.53 |
| Sugar | 56.0 | 45.0 | \ | \ | \ | \ | \ | \ |
| Salt | 1.45 | 1.4 | 0.306 | 0.13 | 0.06 | 0.18 | \ | \ |
| Preventol | 0.1 | 0.1 | \ | \ | \ | \ | \ | \ |
| Cellulose | 1.0 | 1.0 | \ | \ | \ | \ | \ | \ |
| Glycol Monobutyl | \ | \ | 44.452 | 29.96 | 41.15 | 27.22 | \ | \ |
| Diethylenglycol monohexylether | \ | \ | \ | \ | \ | \ | 17.24 | 17.24 |
| Triton X-100 | \ | \ | \ | \ | \ | \ | 17.24 | 17.24 |
| Dielectric Parameters Target Value | $\epsilon=41.5$ $\sigma=0.90$ | $\epsilon=55.2$ $\sigma=0.97$ | $\epsilon=40.0$ $\sigma=1.40$ | $\epsilon=53.3$ $\sigma=1.52$ | $\epsilon=39.2$ $\sigma=1.80$ | $\epsilon=52.7$ $\sigma=1.95$ | $\epsilon=35.3$ $\sigma=5.27$ | $\epsilon=48.2$ $\sigma=6.00$ |

Note: There are a little adjustment respectively for 750, 1750, 2600, 5G based on the recipe of closest frequency in table E.1.

ANNEX F System Validation

The SAR system must be validated against its performance specifications before it is deployed. When SAR probes, system components or software are changed, upgraded or recalibrated, these must be validated with the SAR system(s) that operates with such components.

Table F.1: System Validation for 7307

| Probe SN. | Liquid name | Validation date | Frequency point | Status (OK or Not) |
|-----------|-------------|-----------------|-----------------|--------------------|
|-----------|-------------|-----------------|-----------------|--------------------|

| | | | | |
|------|--------------|--------------|----------|----|
| 7307 | Head 750MHz | June.15,2020 | 750 MHz | OK |
| 7307 | Head 850MHz | June.15,2020 | 835 MHz | OK |
| 7307 | Head 900MHz | June.15,2020 | 900 MHz | OK |
| 7307 | Head 1750MHz | June.15,2020 | 1750 MHz | OK |
| 7307 | Head 1810MHz | June.15,2020 | 1810 MHz | OK |
| 7307 | Head 1900MHz | June.16,2020 | 1900 MHz | OK |
| 7307 | Head 2000MHz | June.16,2020 | 2000 MHz | OK |
| 7307 | Head 2100MHz | June.16,2020 | 2100 MHz | OK |
| 7307 | Head 2300MHz | June.16,2020 | 2300 MHz | OK |
| 7307 | Head 2450MHz | June.16,2020 | 2450 MHz | OK |
| 7307 | Head 2600MHz | June.17,2020 | 2600 MHz | OK |
| 7307 | Head 3500MHz | June.17,2020 | 3500 MHz | OK |
| 7307 | Head 3700MHz | June.17,2020 | 3700 MHz | OK |
| 7307 | Head 5200MHz | June.17,2020 | 5250 MHz | OK |
| 7307 | Head 5500MHz | June.17,2020 | 5600 MHz | OK |
| 7307 | Head 5800MHz | June.17,2020 | 5800 MHz | OK |
| 7307 | Body 750MHz | June.17,2020 | 750 MHz | OK |
| 7307 | Body 850MHz | June.18,2020 | 835 MHz | OK |
| 7307 | Body 900MHz | June.18,2020 | 900 MHz | OK |
| 7307 | Body 1750MHz | June.18,2020 | 1750 MHz | OK |
| 7307 | Body 1810MHz | June.18,2020 | 1810 MHz | OK |
| 7307 | Body 1900MHz | June.18,2020 | 1900 MHz | OK |
| 7307 | Body 2000MHz | June.19,2020 | 2000 MHz | OK |
| 7307 | Body 2100MHz | June.19,2020 | 2100 MHz | OK |
| 7307 | Body 2300MHz | June.19,2020 | 2300 MHz | OK |
| 7307 | Body 2450MHz | June.19,2020 | 2450 MHz | OK |
| 7307 | Body 2600MHz | June.19,2020 | 2600 MHz | OK |
| 7307 | Body 3500MHz | June.20,2020 | 3500 MHz | OK |
| 7307 | Body 3700MHz | June.20,2020 | 3700 MHz | OK |
| 7307 | Body 5200MHz | June.20,2020 | 5250 MHz | OK |
| 7307 | Body 5500MHz | June.20,2020 | 5600 MHz | OK |
| 7307 | Body 5800MHz | June.20,2020 | 5800 MHz | OK |

ANNEX G Probe Calibration Certificate

Probe 7307 Calibration Certificate

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



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

Accreditation No.: **SCS 0108**

Client **CTTL (Auden)**

Certificate No: **EX3-7307_May20**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:7307**

Calibration procedure(s) **QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v5, QA CAL-23.v5,
 QA CAL-25.v7
 Calibration procedure for dosimetric E-field probes**



Calibration date: **May 29, 2020**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID | Cal Date (Certificate No.) | Scheduled Calibration |
|----------------------------|------------------|-----------------------------------|------------------------|
| Power meter NRP | SN: 104778 | 01-Apr-20 (No. 217-03100/03101) | Apr-21 |
| Power sensor NRP-Z91 | SN: 103244 | 01-Apr-20 (No. 217-03100) | Apr-21 |
| Power sensor NRP-Z91 | SN: 103245 | 01-Apr-20 (No. 217-03101) | Apr-21 |
| Reference 20 dB Attenuator | SN: CC2552 (20x) | 31-Mar-20 (No. 217-03106) | Apr-21 |
| DAE4 | SN: 660 | 27-Dec-19 (No. DAE4-660_Dec19) | Dec-20 |
| Reference Probe ES3DV2 | SN: 3013 | 31-Dec-19 (No. ES3-3013_Dec19) | Dec-20 |
| Secondary Standards | ID | Check Date (in house) | Scheduled Check |
| Power meter E4419B | SN: GB41293874 | 06-Apr-16 (in house check Jun-18) | In house check: Jun-20 |
| Power sensor E4412A | SN: MY41498087 | 06-Apr-16 (in house check Jun-18) | In house check: Jun-20 |
| Power sensor E4412A | SN: 000110210 | 06-Apr-16 (in house check Jun-18) | In house check: Jun-20 |
| RF generator HP 8648C | SN: US3642U01700 | 04-Aug-99 (in house check Jun-18) | In house check: Jun-20 |
| Network Analyzer E8358A | SN: US41080477 | 31-Mar-14 (in house check Oct-19) | In house check: Oct-20 |

| | Name | Function | Signature |
|---|----------------|-----------------------|---|
| Calibrated by: | Jeton Kastrati | Laboratory Technician |  |
| Approved by: | Katja Pokovic | Technical Manager |  |
| Issued: June 2, 2020 | | | |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. | | | |

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



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

Accreditation No.: **SCS 0108**

Glossary:

| | |
|--------------------------|---|
| TSL | tissue simulating liquid |
| NORM _{x,y,z} | sensitivity in free space |
| ConvF | sensitivity in TSL / NORM _{x,y,z} |
| DCP | diode compression point |
| CF | crest factor (1/duty_cycle) of the RF signal |
| A, B, C, D | modulation dependent linearization parameters |
| Polarization ϕ | ϕ rotation around probe axis |
| Polarization ϑ | ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis |
| Connector Angle | information used in DASY system to align probe sensor X to the robot coordinate system |

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E^2 -field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,y,z}**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM_x (no uncertainty required).

EX3DV4 – SN:7307

May 29, 2020

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7307

Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|----------|----------|----------|-----------|
| Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A | 0.43 | 0.56 | 0.62 | ± 10.1 % |
| DCP (mV) ^B | 100.0 | 98.2 | 100.3 | |

Calibration Results for Modulation Response

| UID | Communication System Name | | A dB | B dB $\sqrt{\mu\text{V}}$ | C | D dB | VR mV | Max dev. | Max Unc ^E (k=2) |
|-----------|-----------------------------|---|---------|------------------------------|-------|---------|----------|-------------|----------------------------------|
| 0 | CW | X | 0.00 | 0.00 | 1.00 | 0.00 | 153.0 | ± 3.0 % | ± 4.7 % |
| | | Y | 0.00 | 0.00 | 1.00 | | 151.6 | | |
| | | Z | 0.00 | 0.00 | 1.00 | | 158.4 | | |
| 10352-AAA | Pulse Waveform (200Hz, 10%) | X | 1.84 | 62.62 | 7.81 | 10.00 | 60.0 | ± 4.6 % | ± 9.6 % |
| | | Y | 6.38 | 76.27 | 14.75 | | 60.0 | | |
| | | Z | 1.45 | 61.01 | 7.00 | | 60.0 | | |
| 10353-AAA | Pulse Waveform (200Hz, 20%) | X | 0.81 | 60.00 | 5.70 | 6.99 | 80.0 | ± 3.2 % | ± 9.6 % |
| | | Y | 20.00 | 88.66 | 17.39 | | 80.0 | | |
| | | Z | 0.86 | 60.00 | 5.68 | | 80.0 | | |
| 10354-AAA | Pulse Waveform (200Hz, 40%) | X | 0.45 | 60.00 | 4.93 | 3.98 | 95.0 | ± 1.7 % | ± 9.6 % |
| | | Y | 20.00 | 91.41 | 17.41 | | 95.0 | | |
| | | Z | 0.51 | 60.00 | 5.04 | | 95.0 | | |
| 10355-AAA | Pulse Waveform (200Hz, 60%) | X | 0.29 | 60.62 | 5.22 | 2.22 | 120.0 | ± 1.2 % | ± 9.6 % |
| | | Y | 20.00 | 96.26 | 18.63 | | 120.0 | | |
| | | Z | 38.00 | 82.00 | 11.00 | | 120.0 | | |
| 10387-AAA | QPSK Waveform, 1 MHz | X | 1.69 | 67.29 | 15.38 | 1.00 | 150.0 | ± 1.8 % | ± 9.6 % |
| | | Y | 1.57 | 65.07 | 14.15 | | 150.0 | | |
| | | Z | 1.73 | 66.94 | 15.28 | | 150.0 | | |
| 10388-AAA | QPSK Waveform, 10 MHz | X | 2.20 | 68.11 | 15.92 | 0.00 | 150.0 | ± 1.1 % | ± 9.6 % |
| | | Y | 2.08 | 66.56 | 14.89 | | 150.0 | | |
| | | Z | 2.29 | 68.47 | 15.98 | | 150.0 | | |
| 10396-AAA | 64-QAM Waveform, 100 kHz | X | 2.35 | 68.48 | 18.03 | 3.01 | 150.0 | ± 0.8 % | ± 9.6 % |
| | | Y | 2.51 | 68.48 | 17.79 | | 150.0 | | |
| | | Z | 2.53 | 69.19 | 18.31 | | 150.0 | | |
| 10399-AAA | 64-QAM Waveform, 40 MHz | X | 3.38 | 66.64 | 15.59 | 0.00 | 150.0 | ± 0.9 % | ± 9.6 % |
| | | Y | 3.47 | 66.68 | 15.44 | | 150.0 | | |
| | | Z | 3.45 | 66.86 | 15.65 | | 150.0 | | |
| 10414-AAA | WLAN CCDF, 64-QAM, 40MHz | X | 4.67 | 65.35 | 15.39 | 0.00 | 150.0 | ± 1.9 % | ± 9.6 % |
| | | Y | 4.64 | 64.85 | 15.04 | | 150.0 | | |
| | | Z | 4.77 | 65.48 | 15.43 | | 150.0 | | |

Note: For details on UID parameters see Appendix

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

^A The uncertainties of Norm X,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

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

EX3DV4– SN:7307

May 29, 2020

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7307

Sensor Model Parameters

| | C1 fF | C2 fF | α V^{-1} | T1 $ms.V^{-2}$ | T2 $ms.V^{-1}$ | T3 ms | T4 V^{-2} | T5 V^{-1} | T6 |
|---|----------|----------|----------------------|-------------------|-------------------|----------|----------------|----------------|------|
| X | 35.6 | 260.75 | 34.45 | 5.76 | 0.00 | 4.90 | 1.28 | 0.00 | 1.00 |
| Y | 41.0 | 304.44 | 35.07 | 7.30 | 0.00 | 5.01 | 1.33 | 0.09 | 1.01 |
| Z | 40.7 | 299.93 | 34.68 | 9.21 | 0.00 | 4.91 | 0.98 | 0.11 | 1.00 |

Other Probe Parameters

| | |
|---|------------|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | 23.6 |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disabled |
| Probe Overall Length | 337 mm |
| Probe Body Diameter | 10 mm |
| Tip Length | 9 mm |
| Tip Diameter | 2.5 mm |
| Probe Tip to Sensor X Calibration Point | 1 mm |
| Probe Tip to Sensor Y Calibration Point | 1 mm |
| Probe Tip to Sensor Z Calibration Point | 1 mm |
| Recommended Measurement Distance from Surface | 1.4 mm |

EX3DV4– SN:7307

May 29, 2020

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7307

Calibration Parameter Determined in Head Tissue Simulating Media

| f (MHz) ^C | Relative Permittivity ^F | Conductivity (S/m) ^F | ConvF X | ConvF Y | ConvF Z | Alpha ^G | Depth ^G (mm) | Unc (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-----------|
| 64 | 54.2 | 0.75 | 14.38 | 14.38 | 14.38 | 0.00 | 1.00 | ± 13.3 % |
| 150 | 52.3 | 0.76 | 13.49 | 13.49 | 13.49 | 0.00 | 1.00 | ± 13.3 % |
| 300 | 45.3 | 0.87 | 11.83 | 11.83 | 11.83 | 0.10 | 1.20 | ± 13.3 % |
| 450 | 43.5 | 0.87 | 11.16 | 11.16 | 11.16 | 0.12 | 1.30 | ± 13.3 % |
| 750 | 41.9 | 0.89 | 10.41 | 10.41 | 10.41 | 0.55 | 0.80 | ± 12.0 % |
| 835 | 41.5 | 0.90 | 10.20 | 10.20 | 10.20 | 0.47 | 0.80 | ± 12.0 % |
| 900 | 41.5 | 0.97 | 9.95 | 9.95 | 9.95 | 0.44 | 0.87 | ± 12.0 % |
| 1450 | 40.5 | 1.20 | 8.85 | 8.85 | 8.85 | 0.40 | 0.80 | ± 12.0 % |
| 1640 | 40.2 | 1.31 | 8.74 | 8.74 | 8.74 | 0.39 | 0.86 | ± 12.0 % |
| 1750 | 40.1 | 1.37 | 8.64 | 8.64 | 8.64 | 0.39 | 0.86 | ± 12.0 % |
| 1810 | 40.0 | 1.40 | 8.39 | 8.39 | 8.39 | 0.38 | 0.86 | ± 12.0 % |
| 1900 | 40.0 | 1.40 | 8.33 | 8.33 | 8.33 | 0.35 | 0.86 | ± 12.0 % |
| 2000 | 40.0 | 1.40 | 8.31 | 8.31 | 8.31 | 0.35 | 0.88 | ± 12.0 % |
| 2100 | 39.8 | 1.49 | 8.29 | 8.29 | 8.29 | 0.30 | 0.88 | ± 12.0 % |
| 2300 | 39.5 | 1.67 | 8.15 | 8.15 | 8.15 | 0.33 | 0.90 | ± 12.0 % |
| 2450 | 39.2 | 1.80 | 7.77 | 7.77 | 7.77 | 0.34 | 0.90 | ± 12.0 % |
| 2600 | 39.0 | 1.96 | 7.61 | 7.61 | 7.61 | 0.35 | 0.90 | ± 12.0 % |
| 3300 | 38.2 | 2.71 | 7.09 | 7.09 | 7.09 | 0.35 | 1.30 | ± 13.1 % |
| 3500 | 37.9 | 2.91 | 6.72 | 6.72 | 6.72 | 0.35 | 1.30 | ± 13.1 % |
| 3700 | 37.7 | 3.12 | 6.50 | 6.50 | 6.50 | 0.35 | 1.30 | ± 13.1 % |
| 3900 | 37.5 | 3.32 | 6.60 | 6.60 | 6.60 | 0.40 | 1.60 | ± 13.1 % |
| 4100 | 37.2 | 3.53 | 6.50 | 6.50 | 6.50 | 0.40 | 1.60 | ± 13.1 % |
| 4200 | 37.1 | 3.63 | 6.40 | 6.40 | 6.40 | 0.40 | 1.70 | ± 13.1 % |
| 4400 | 36.9 | 3.84 | 6.30 | 6.30 | 6.30 | 0.40 | 1.70 | ± 13.1 % |
| 4600 | 36.7 | 4.04 | 6.22 | 6.22 | 6.22 | 0.40 | 1.70 | ± 13.1 % |
| 4800 | 36.4 | 4.25 | 6.18 | 6.18 | 6.18 | 0.40 | 1.80 | ± 13.1 % |
| 4950 | 36.3 | 4.40 | 5.90 | 5.90 | 5.90 | 0.40 | 1.80 | ± 13.1 % |
| 5200 | 36.0 | 4.66 | 5.72 | 5.72 | 5.72 | 0.40 | 1.80 | ± 13.1 % |
| 5250 | 35.9 | 4.71 | 5.61 | 5.61 | 5.61 | 0.40 | 1.80 | ± 13.1 % |
| 5300 | 35.9 | 4.76 | 5.51 | 5.51 | 5.51 | 0.40 | 1.80 | ± 13.1 % |
| 5500 | 35.6 | 4.96 | 5.20 | 5.20 | 5.20 | 0.40 | 1.80 | ± 13.1 % |
| 5600 | 35.5 | 5.07 | 5.10 | 5.10 | 5.10 | 0.40 | 1.80 | ± 13.1 % |
| 5750 | 35.4 | 5.22 | 5.05 | 5.05 | 5.05 | 0.40 | 1.80 | ± 13.1 % |
| 5800 | 35.3 | 5.27 | 4.95 | 4.95 | 4.95 | 0.40 | 1.80 | ± 13.1 % |

^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

EX3DV4– SN:7307

May 29, 2020

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7307

Calibration Parameter Determined in Body Tissue Simulating Media

| f (MHz) ^C | Relative Permittivity ^F | Conductivity (S/m) ^F | ConvF X | ConvF Y | ConvF Z | Alpha ^G | Depth ^G (mm) | Unc (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-----------|
| 150 | 61.9 | 0.80 | 13.01 | 13.01 | 13.01 | 0.00 | 1.00 | ± 13.3 % |
| 300 | 58.2 | 0.92 | 11.81 | 11.81 | 11.81 | 0.06 | 1.20 | ± 13.3 % |
| 450 | 56.7 | 0.94 | 11.33 | 11.33 | 11.33 | 0.07 | 1.30 | ± 13.3 % |
| 750 | 55.5 | 0.96 | 10.47 | 10.47 | 10.47 | 0.34 | 0.95 | ± 12.0 % |
| 835 | 55.2 | 0.97 | 10.12 | 10.12 | 10.12 | 0.51 | 0.80 | ± 12.0 % |
| 900 | 55.0 | 1.05 | 9.88 | 9.88 | 9.88 | 0.43 | 0.88 | ± 12.0 % |
| 1450 | 54.0 | 1.30 | 8.90 | 8.90 | 8.90 | 0.34 | 0.80 | ± 12.0 % |
| 1640 | 53.7 | 1.42 | 8.70 | 8.70 | 8.70 | 0.39 | 0.86 | ± 12.0 % |
| 1750 | 53.4 | 1.49 | 8.41 | 8.41 | 8.41 | 0.45 | 0.86 | ± 12.0 % |
| 1810 | 53.3 | 1.52 | 8.34 | 8.34 | 8.34 | 0.45 | 0.86 | ± 12.0 % |
| 1900 | 53.3 | 1.52 | 8.30 | 8.30 | 8.30 | 0.32 | 0.88 | ± 12.0 % |
| 2000 | 53.3 | 1.52 | 8.27 | 8.27 | 8.27 | 0.32 | 0.88 | ± 12.0 % |
| 2100 | 53.2 | 1.62 | 8.24 | 8.24 | 8.24 | 0.42 | 0.88 | ± 12.0 % |
| 2300 | 52.9 | 1.81 | 7.91 | 7.91 | 7.91 | 0.40 | 0.90 | ± 12.0 % |
| 2450 | 52.7 | 1.95 | 7.79 | 7.79 | 7.79 | 0.34 | 0.90 | ± 12.0 % |
| 2600 | 52.5 | 2.16 | 7.63 | 7.63 | 7.63 | 0.27 | 0.90 | ± 12.0 % |
| 3300 | 51.6 | 3.08 | 6.66 | 6.66 | 6.66 | 0.40 | 1.30 | ± 13.1 % |
| 3500 | 51.3 | 3.31 | 6.36 | 6.36 | 6.36 | 0.40 | 1.40 | ± 13.1 % |
| 3700 | 51.0 | 3.55 | 6.27 | 6.27 | 6.27 | 0.40 | 1.40 | ± 13.1 % |
| 3900 | 51.2 | 3.78 | 6.24 | 6.24 | 6.24 | 0.40 | 1.60 | ± 13.1 % |
| 4100 | 50.5 | 4.01 | 6.20 | 6.20 | 6.20 | 0.40 | 1.60 | ± 13.1 % |
| 4200 | 50.4 | 4.13 | 6.10 | 6.10 | 6.10 | 0.40 | 1.60 | ± 13.1 % |
| 4400 | 50.1 | 4.37 | 6.02 | 6.02 | 6.02 | 0.40 | 1.70 | ± 13.1 % |
| 4600 | 49.8 | 4.60 | 5.81 | 5.81 | 5.81 | 0.40 | 1.70 | ± 13.1 % |
| 4800 | 49.6 | 4.83 | 5.50 | 5.50 | 5.50 | 0.50 | 1.90 | ± 13.1 % |
| 4950 | 49.4 | 5.01 | 5.30 | 5.30 | 5.30 | 0.50 | 1.90 | ± 13.1 % |
| 5200 | 49.0 | 5.30 | 4.85 | 4.85 | 4.85 | 0.50 | 1.90 | ± 13.1 % |
| 5250 | 48.9 | 5.36 | 4.81 | 4.81 | 4.81 | 0.50 | 1.90 | ± 13.1 % |
| 5300 | 48.9 | 5.42 | 4.80 | 4.80 | 4.80 | 0.50 | 1.90 | ± 13.1 % |
| 5500 | 48.6 | 5.65 | 4.47 | 4.47 | 4.47 | 0.50 | 1.90 | ± 13.1 % |
| 5600 | 48.5 | 5.77 | 4.37 | 4.37 | 4.37 | 0.50 | 1.90 | ± 13.1 % |
| 5750 | 48.3 | 5.94 | 4.45 | 4.45 | 4.45 | 0.50 | 1.90 | ± 13.1 % |
| 5800 | 48.2 | 6.00 | 4.31 | 4.31 | 4.31 | 0.50 | 1.90 | ± 13.1 % |

^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

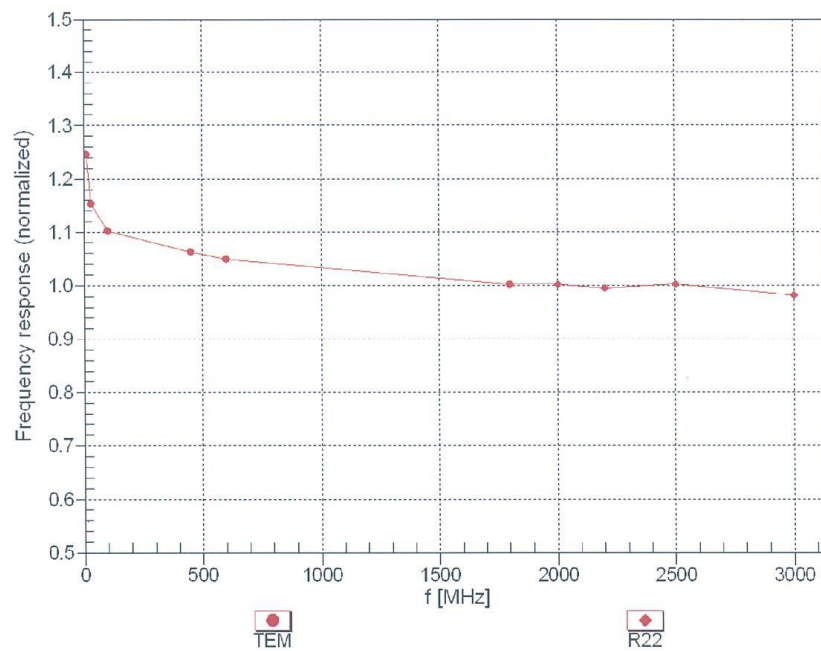
^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from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

EX3DV4– SN:7307

May 29, 2020

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)

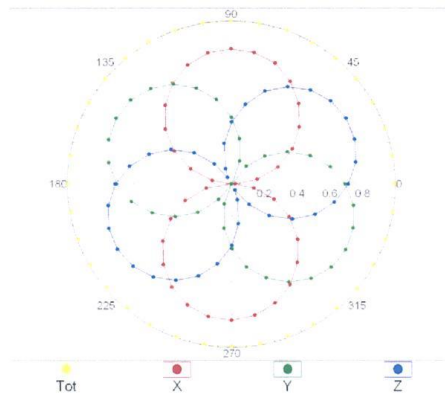
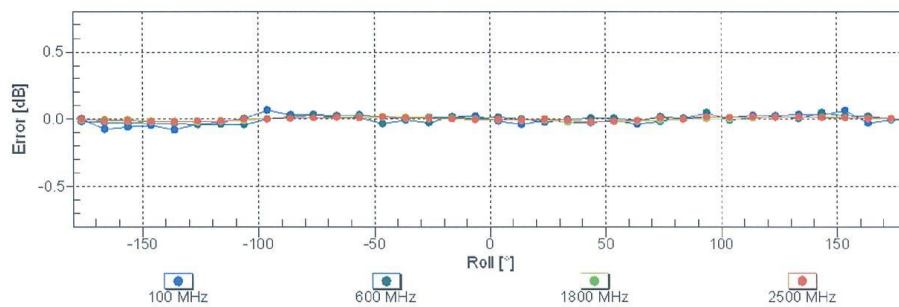
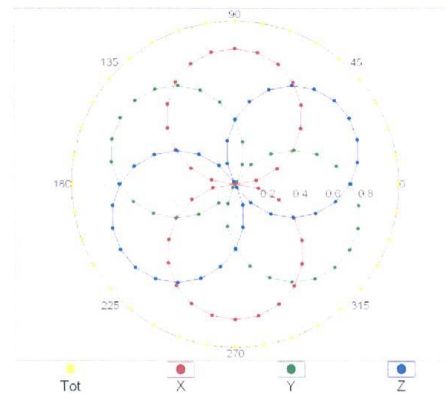


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

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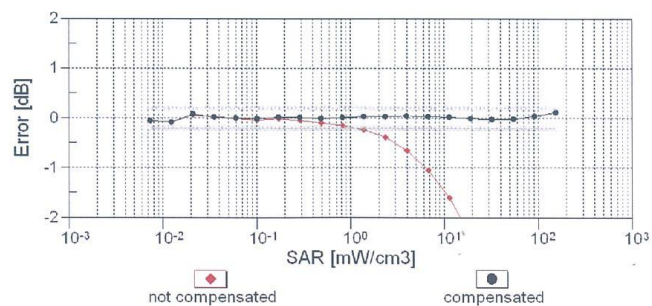
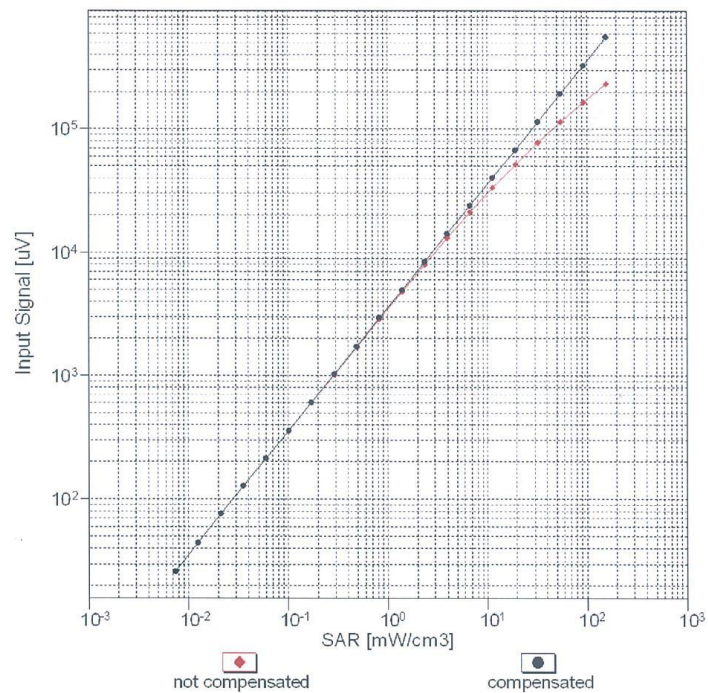
Receiving Pattern (ϕ), $\theta = 0^\circ$

 $f=600$ MHz,TEM

 $f=1800$ MHz,R22

Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

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Dynamic Range $f(\text{SAR}_{\text{head}})$ (TEM cell , $f_{\text{eval}} = 1900 \text{ MHz}$)

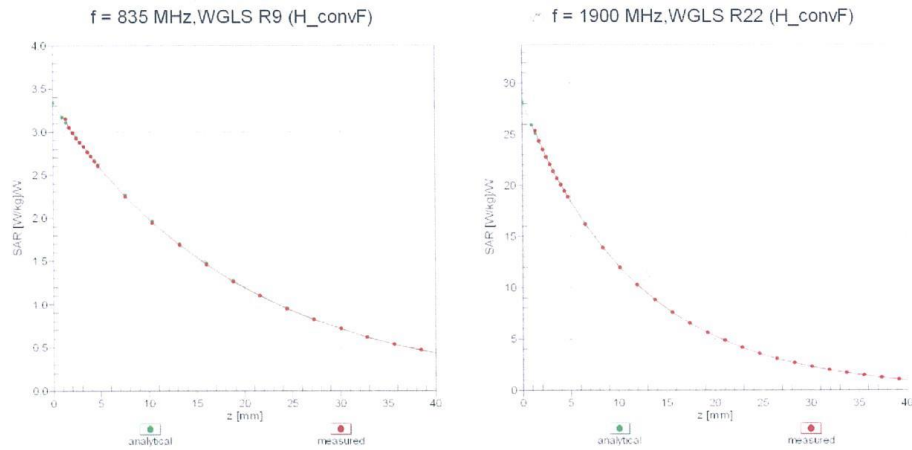


Uncertainty of Linearity Assessment: $\pm 0.6\%$ ($k=2$)

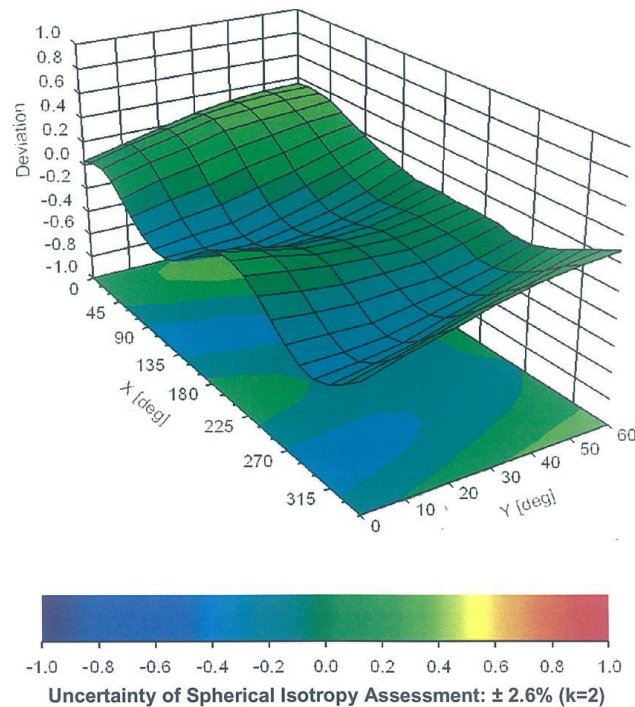
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Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ, θ), $f = 900 \text{ MHz}$



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