SAR Evaluation Report

DUT Information

Manufacturer	Ascom Sweden AB
Brand Name	Myco 3
Model Name	SH2-ADAA
FCC ID	BXZSH2D
IC Number	3724B-SH2D
DUT Type	handset
Intended Use	☒ < 20 cm to human body (portable device) ☐ > 20 cm to human body (mobile/fixed device) ☐ - ☒ next to the ear ☒ body-worn ☐ limb-worn ☐ hand-held ☐ front-of-face ☐ body supported ☐ clothing-integrated

Prepared by

Testing Laboratory	IMST GmbH, Test Center Carl-Friedrich-Gauß-Str. 2 – 4 47475 Kamp-Lintfort Germany
Laboratory Accreditation	The Test Center facility 'Dosimetric Test Lab' within IMST GmbH is accredited by the German National 'Deutsche Akkreditierungsstelle GmbH (DAkkS)' for testing according to the scope as listed in the accreditation certificate: D-PL-12139-01-01. The German Bundesnetzagentur (BNetzA) recognizes IMST GmbH as CAB-EMC on the basis of the Council Decision of 22. June 1998 concerning the conclusion of the MRA between the European Community and the United States of America (1999/178/EC) in accordance with § 4 of the Recognition Ordinance of 11. January 2016. The recognition is valid until 20. July 2021 under the registration number: BNetzA-CAB-16/21-14.

Prepared for

Manufacturer	Ascom Sweden AB Grimbodalen 2 SE-41749 Goteborg Sweden

Test Specification

Applied Standard / Rule	IEEE 1528-2013; FCC CFR 47 § 2.1093; RSS-102 Issue 5
Exposure Category	☒ general public / uncontrolled exposure ☐ occupational / controlled exposure
Test Result	☒ PASS ☐ FAIL

Report Information

Data Stored	6200132
Issue Date	February 21, 2020
Revision Date	July 29, 2020
Revision Number*	2
	***A new revision replaces all previous revisions and thus, become invalid herewith.**
Remarks	This report relates only to the item(s) evaluated. This report shall not be reproduced, except in its entirety, without the prior written approval of IMST GmbH. The results and statements contained in this report reflect the evaluation for the certain model described above. The manufacturer is responsible for ensuring that all production devices meet the intent of the requirements described in this report.

Table of Contents

1 Subject of Investigation and Test Results

The SH2-ADAA is a new handset from Ascom Sweden AB operating in DECT, WLAN and Bluetooth standards with three integrated antennas. Two DECT antennas are working in diversity mode and one WLAN/BT antenna is capable of working in simultaneous transmission in combination with DECT mode.

The objective of the measurements performed by IMST is the dosimetric assessment of DECT and WLAN/BT on one device in the intended use positions. Simultaneous transmission consideration has been taken in the worst case configurations of SH2-ABAA model.

1.1 Technical Data of DUT

Product Specifications		
Manufacturer	Ascom Sweden AB	
Model Name	SH2-ADAA (refer to chapter 1.2)	
SN / IMST DUT No.	radiated sample: SK00010044; conducted sample: SK00010037	
Integrated Transmitter	First Transmitter	Second Transmitter
Operation Mode	DECT	BT/WLAN
Frequency Range	1921.536 – 1928.448 MHz	2402 - 2480 MHz; 2412 – 2462 MHz; 5180 - 5320 MHz; 5500 - 5700 MHz; 5750 - 5825 MHz
Maximum Duty Cycle	4.17 %	100 %
Antenna Type	3x integrated (2x DECT, 1x BT/WLAN)	
Maximum Output Power	refer chapter 7.3	
Power Supply	internal Li-polymer battery DC 3.8V	
Used Accessory	belt clip	
DUT Stage	☒ production unit	☐ identical prototype
Notes:		

1.2 Product Family / Model Variants

As declared by the manufacturer, all variants of SH2-ADAA have identical RF design and antennas with the variant SH2-ABAA.

1.3 Antenna Configuration

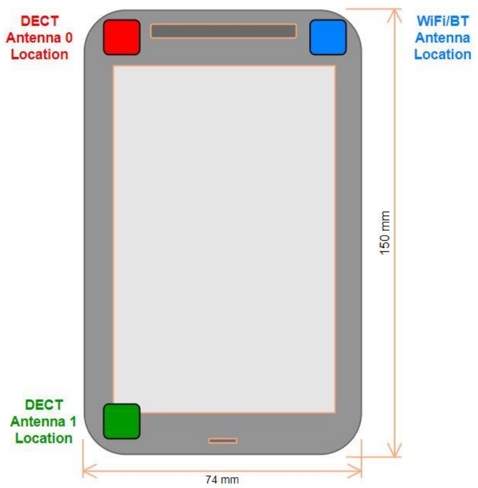

Fig. 1: Sketch of DUT and 2xDECT and 1xBT/WLAN antenna locations.

1.4 Test Specification / Normative References

The tests documented in this report have been performed according to the standards and rules described below.

Test Specifications			
Test Standard / Rule		Description	Issue Date
☒	IEEE 1528-2013	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.	June 14, 2013
☐	FCC CFR 47 § 2.1091	Code of Federal Regulations; Title 47. Radiofrequency radiation exposure evaluation: **Mobile Devices.**	October 01, 2010
☒	FCC CFR 47 § 2.1093	Code of Federal Regulations; Title 47. Radiofrequency radiation exposure evaluation: **Portable Devices.**	October 01, 2010
☒	RSS-102, Issue 5	Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)	March, 2015
Measurement Methodology KDB			
☒	KDB 865664 D01 v01r04	SAR measurement 100 MHz to 6 GHz	August 07, 2015
☒	KDB 865664 D02 v01r01	Exposure Reporting	October 23, 2015
Product KDB			
☒	KDB 447498 D01 v06	General RF Exposure Guidance	October 23, 2015
☒	KDB 648474 D04 v01r03	Handset SAR	October 23, 2015
Technology KDB			
☒	KDB 248227 D01 v02r02	802.11 Wi-Fi SAR	October 23, 2015

1.5 Attestation of Test Results

Highest Reported SAR [W/kg]								
Exposure Configuration / Position of DUT		Equipment Class				Σ SAR_{1g}	Limit SAR_{1g}	Verdict
		PUE	DSS	DTS	NII			
Standalone TX	Head	0.116	0.130	0.585	1.416	-	1.6	PASS
	Body	0.181	0.130	0.282	0.470	-	1.6	PASS
Simultaneous TX	Head	Left Cheek				**1.464**	1.6	PASS
	Body	Front				**0.491**	1.6	PASS
Notes: All SAR results and considered simultaneous transmission configurations are shown in chapter 7.7 on page 28.								

2 Quality Assurance

The responsible test engineer states that all the measurements and evaluations have been performed under the guidelines of the valid quality assurance plan according to DIN EN ISO IEC 17025-2017.

Prepared by: .... Reviewed by: ....

Dessislava Patrishkova
Test Engineer

Alexander Rahn
Quality Assurance

3 Exposure Criteria and Limits

3.1 SAR Limits

Human Exposure Limits				
Condition	**Uncontrolled Environment** (General Population)		**Controlled Environment** (Occupational)	
	SAR Limit [W/kg]	**Mass Avg.**	**SAR Limit [W/kg]**	**Mass Avg.**
SAR averaged over the whole body mass	0.08	whole body	0.4	whole body
Peak spatially-averaged SAR for the head, neck & trunk	1.6	1g of tissue*	8.0	1g of tissue*
Peak spatially-averaged SAR in the limbs	4.0	10g of tissue*	20.0	10g of tissue*
Note: *Defined as a tissue volume in the shape of a cube				

Table 1: SAR limits specified in IEEE Standard C95.1-2005 and Health Canada's Safety Code 6.

In this report the comparison between the exposure limits and the measured data is made using the spatial peak SAR; the power level of the device under test guarantees that the whole body averaged SAR is not exceeded.

3.2 Exposure Categories

General Public / Uncontrolled Exposure
General population comprises individuals of all ages and of varying health status, and may include particularly susceptible groups or individuals. In many cases, members of the public are unaware of their exposure to electromagnetic fields. Moreover, individual members of the public cannot reasonably be expected to take precautions to minimize or avoid exposure.
Occupational / Controlled Exposure
The occupationally exposed population consists of adults who are generally exposed under known conditions and are trained to be aware of potential risk and to take appropriate precautions.

Table 2: RF exposure categories.

3.3 Distinction between Maximum Permissible Exposure and SAR Limits

The biological relevant parameter describing the effects of electromagnetic fields in the frequency range of interest is the specific absorption rate SAR (dimension: power/mass). It is a measure of the power absorbed per unit mass. The SAR may be spatially averaged over the total mass of an exposed body or its parts. The SAR is calculated from the r.m.s. electric field strength E inside the human body, the conductivity σ and the mass density ρ of the biological tissue:

$$SAR = \sigma \frac{E^2}{\rho} = c \left. \frac{\partial T}{\partial t} \right|_{t \to 0+} \quad . \tag{1}$$

The specific absorption rate describes the initial rate of temperature rise $\partial T / \partial t$ as a function of the specific heat capacity c of the tissue. A limitation of the specific absorption rate prevents an excessive heating of the human body by electromagnetic energy.

As it is sometimes difficult to determine the SAR directly by measurement (e.g. whole body averaged SAR), the standard specifies more readily measurable maximum permissible exposures in terms of external electric E and magnetic field strength H and power density S, derived from the SAR limits. The limits for E, H and S have been fixed so that even under worst case conditions, the limits for the specific absorption rate SAR are not exceeded.

4 The Measurement System

DASY is an abbreviation of „Dosimetric Assessment System“ and describes a system that is able to determine the SAR distribution inside a phantom of a human being according to different standards. The DASY4 system consists of the following items as shown in Fig: 2. Additionally, Fig: 3 shows the equipment, similar to the installations in other laboratories.

- Fully compliant with all current measurement standards as stated in Fig. 9
- High precision robot with controller
- Measurement server (for surveillance of the robot operation and signal filtering)
- Data acquisition electronics DAE (for signal amplification and filtering)
- Field probes calibrated for use in liquids
- Electro-optical converter EOC (conversion from the optical into a digital signal)
- Light beam (improving of the absolute probe positioning accuracy)
- Two SAM phantoms filled with tissue simulating liquid
- DASY4 software
- SEMCAD

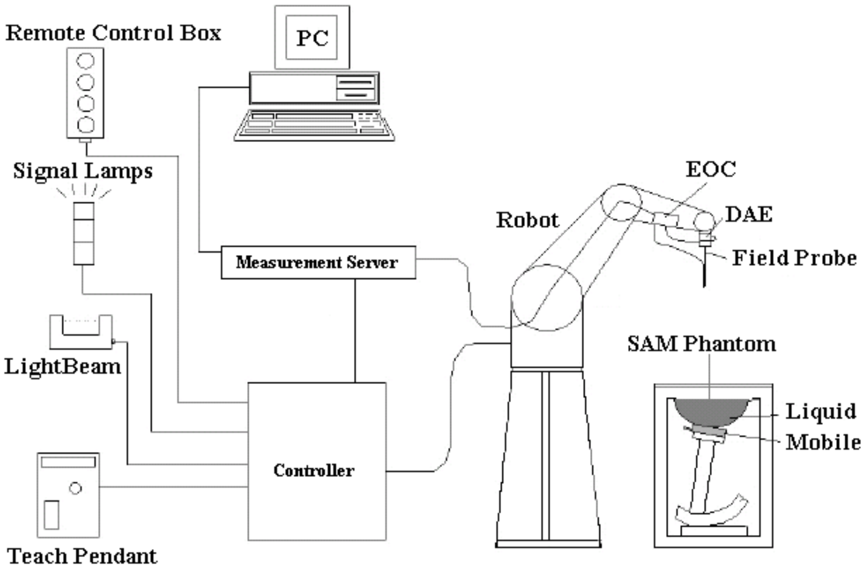

Fig. 2: The DASY4 measurement system.

Fig. 3: The measurement set-up with a DASY system and phantoms containing tissue simulating liquid.

The DUT operating at the maximum power level is placed by a non-metallic device holder (delivered from Schmid & Partner) in the above described positions at a shell phantom of a human being. The distribution of the electric field strength *E* is measured in the tissue simulating liquid within the shell phantom. For this miniaturised field probes with high sensitivity and low field disturbance are used. Afterwards the corresponding SAR values are calculated with the known electrical conductivity σ and the mass density ρ of the tissue in the SEMCAD FDTD software. The software is able to determine the averaged SAR values (averaging region 1 g or 10 g) for compliance testing.

The measurements are done by two scans: first a coarse scan determines the region of the maximum SAR, afterwards the averaged SAR is measured in a second scan within the shape of a cube.

4.1 Phantoms

TWIN SAM PHANTOM V4.0	
	Specific Anthropomorphic Mannequin defined in IEEE 1528 and IEC 62209-1 and delivered by Schmid & Partner Engineering AG. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. The details and the Certificate of conformity can be found in Fig. 10 on page 64.
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions	Length: 1000 mm; Width: 500 mm Height: adjustable feet
Filling Volume	approx. 25 liters

ELI PHANTOM V4.0	
	Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. The details and the Certificate of conformity can be found in Fig. 11 on page 65.
Shell Thickness	2.0 ± 0.2 mm (bottom plate)
Dimensions	Major axis: 600 mm Minor axis: 400 mm
Filling Volume	approx. 30 liters

4.2 E-Field-Probes

For the measurements the Dosimetric E-Field Probes ET3DV6R or EX3DV4 with following specifications are used. They are manufactured and calibrated in accordance with FCC and IEEE 1528-2013 recommendations annually by Schmid & Partner Engineering AG.

ET3DV6R	
Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system (ET3DV6 only) Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Dimensions	Overall length: 337 mm (Tip: 16 mm) Tip diameter: 6.8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.7 mm
Frequency	10 MHz to 2.3 GHz Linearity: ± 0.2 dB (30 MHz to 2.3 GHz)
Directivity	Axial isotropy: ± 0.2 dB in TSL (rotation around probe axis) Spherical isotropy: ± 0.4 dB in TSL (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Calibration Range	450 MHz / 750 MHz / 835 MHz / 1750 MHz / 1900 MHz

EX3DV4	
Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	Axial isotropy: ± 0.3 dB in TSL (rotation around probe axis) Spherical isotropy: ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Calibration Range	2450 MHz / 2600 MHz / 5250 MHz / 5600 MHz / 5800 MHz

5 Measurement Procedure

5.1 General Requirement

The test shall be performed in a laboratory with an environment which avoids influence on SAR measurements by ambient EM sources and any reflection from the environment itself. The ambient temperature shall be in the range of 20°C to 26°C and 30-70% humidity. All tests have been conducted according the latest version of all relevant KDBs.

5.2 Test Position of DUT operating next to the Human Ear

5.2.1 Phantom Requirements

The phantom is a simplified representation of the human anatomy and comprised of material with electrical properties similar to the corresponding tissues. The physical characteristics of the phantom model shall resemble the head and the neck of a user since the shape is a dominant parameter for exposure.

5.2.2 Reference Points

As it cannot be expected that the user will hold the mobile phone exactly in one well defined position, different operational conditions shall be tested. The standards require two test positions. For an exact description helpful geometrical definitions are introduced and shown in Fig. 4 - 6. There are two imaginary lines on the mobile, the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset: the midpoint of the width w_t of the handset at the level of the acoustic output (point A on Fig. 4 and 6), and the midpoint of the width w_b of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Fig. 4). The horizontal line is also tangential to the face of the handset at point A. The two lines intersect at point A.

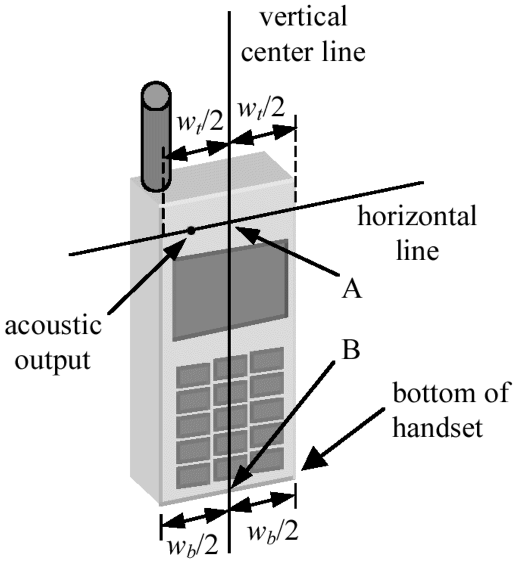

Fig. 4: Geometrical definitions on the telephone (bar phone).

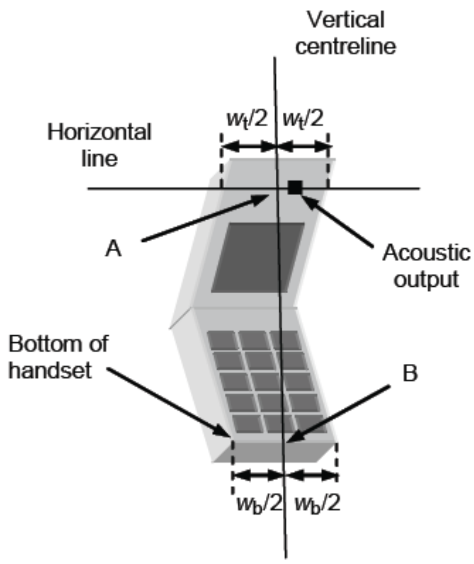

Fig. 5: Geometrical definitions on the telephone (clam shell or flip).

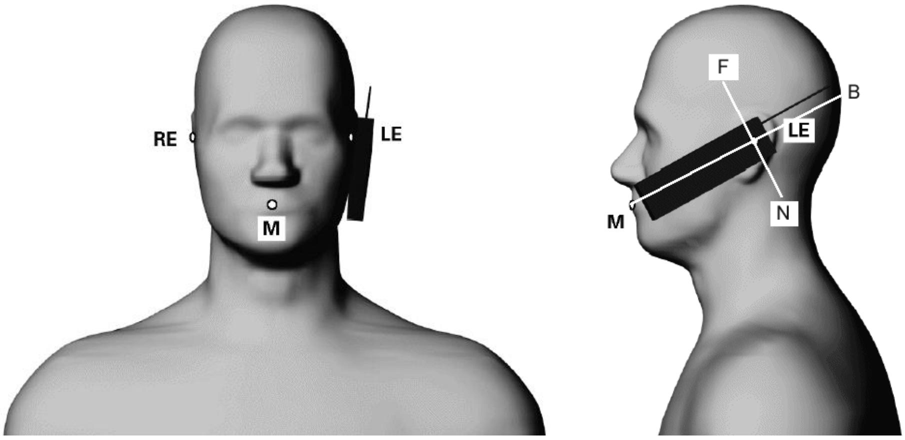

Fig. 6: Phantom reference points.

According to Fig. 6 the human head position is given by means of the following three reference points: auditory canal opening of both ears (RE and LE) and the center of the closed mouth (M). The ear reference points are 15 - 17 mm above the entrance to the ear canal along the BM line (back-mouth), as shown in Fig. 6. The plane passing through the two ear canals and M is defined as the reference plane. The line NF (Neck-Front) perpendicular to the reference plane and passing through the RE (or LE) is called the reference pivoting line. Line BM is perpendicular to the NF line. With this definitions the test positions are given by

5.2.3 Cheek Position:

Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Fig. 6), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom. Translate the handset towards the phantom along the line passing through RE and LE until the handset touches the ear. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to MB-NF including the line MB (called the reference plane). Rotate the phone around the vertical centerline until the phone (horizontal line) is symmetrical with respect to the line NF. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, rotate the handset about the line NF until any point on the handset is in contact with a phantom point below the ear.

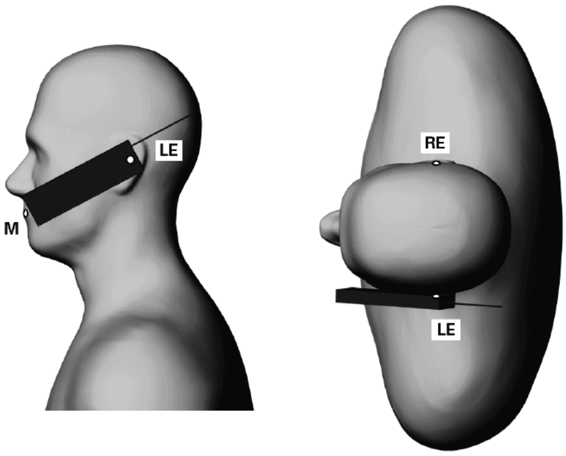

Fig. 7: The cheek position.

5.2.4 Tilted Position:

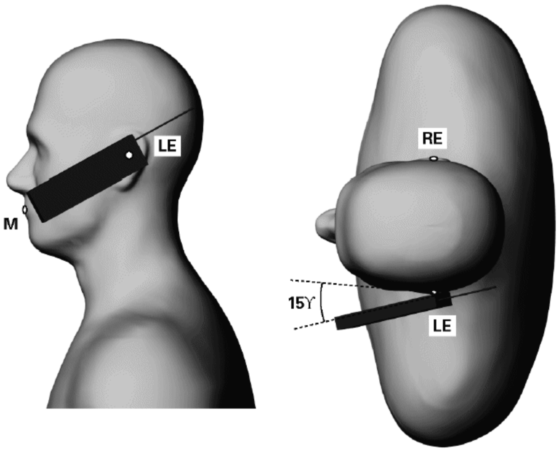

Fig. 8: The tilted position.

While maintaining the orientation of the phone retract the phone parallel to the reference plane far enough to enable a rotation of the phone by 15°. Rotate the phone around the horizontal line by 15°. While maintaining the orientation of the phone, move the phone parallel to the reference plane until any part of the phone touches the head. In this position, point A will be located on the line RE-LE.

5.2.5 Test to be Performed

The SAR test shall be performed with both phone positions described above, on the left and right side of the phantom. The device shall be measured for all modes operating when the device is next to the ear, even if the different modes operate in the same frequency band.

For devices with retractable antenna the SAR test shall be performed with the antenna fully extended and fully retracted. Other factors that may affect the exposure shall also be tested. For example, optional antennas or optional battery packs which may significantly change the volume, lengths, flip open/closed, etc. of the device, or any other accessories which might have the potential to considerably increase the peak spatial-average SAR value.

The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional.

5.3 Test Position of DUT operating next to the Human Body

Body-worn operating configurations are tested with available accessories applied on the device and positioned against a flat phantom in a normal use configuration. Per FCC KDB 648474, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB 447498 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body worn accessory, measured without headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body worn accessory with a headset attached to the handset.

For purpose of determining test requirements, accessories may be divided into two categories: those that do not contain metallic components and those that do. For multiple accessories that do not contain metallic components, the device may be tested only with that accessory which provides the closest spacing to the body.

For multiple accessories that contain metallic components, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component, only the accessory that provides the closest spacing to the body must be tested.

Devices that are designed to operate on the body of users using lanyards and straps, or without requiring additional body worn accessories, must be tested for SAR compliance using a conservative minimum test separation distance ≤ 5 mm to support compliance. Nevertheless, all accessories that contain metallic components must be tested for compliance additionally.

Other separation distances may be used, but they shall not exceed 2.5 cm.

5.3.1 Test to be Performed

For devices with retractable antenna the SAR test shall be performed with the antenna fully extended and fully retracted. Other factors that may affect the exposure shall also be tested. For example, optional antennas or optional battery packs which may significantly change the volume, lengths, flip open/closed, etc. of the device, or any other accessories which might have the potential to considerably increase the peak spatial-average SAR value.

The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at the middle channel resp. that channel with the highest output power for each test configuration is < 0.4 W/kg, testing at the high and low channels is optional.

5.4 Measurement Procedure

The following steps are used for each test position:

- Establish a call with the maximum output power with a base station simulator. The connection between the mobile phone and the base station simulator is established via air interface.
- Measurement of the local E-field value at a fixed location (P1). This value serves as a reference value for calculating a possible power drift.
- Measurement of the SAR distribution with resolution settings for area scan and zoom scan according KDB 865664 D01 as shown in Table *3*.
- The used extrapolation and interpolation routines are all based on the modified Quadratic Shepard´s method [DASY4].
- Repetition of the E-field measurement at the fixed location (P1) and repetition of the whole procedure if the two results differ by more than ± 0.21dB.

<table>
<tr><th colspan="3"></th><th>≤ 3 GHz</th><th>≥ 3 GHz</th></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 - 3 GHz: ≤ 12 mm</td><td>3 - 4 GHz: ≤ 12 mm
4 - 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: ΔX_{Zoom}, ΔY_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 - 3 GHz: ≤ 5 mm*</td><td>3 - 4 GHz: ≤ 5 mm*
4 - 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">Uniform grid: $\Delta Z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 - 4 GHz: ≤ 4 mm
4 - 5 GHz: ≤ 3 mm
5 - 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta Z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 - 4 GHz: ≤ 3 mm
4 - 5 GHz: ≤ 2.5 mm
5 - 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta Z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta Z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 - 4 GHz: ≥ 28 mm
4 - 5 GHz: ≥ 25 mm
5 - 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">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 reported 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</td></tr>
</table>

Table 3: Parameters for SAR scan procedures.

5.5 Additional Information for IEEE 802.11 (WiFi) Transmitters

According to KDB 248227 D01, for both DSSS and OFDM wireless modes an initial test position must be established for each applicable exposure configuration using either:

- Design implementation defined by the manufacturer, or
- Investigative results by the test lab based on:
  - Exclusions based on the distance from the antenna to the surface, or
  - Highest measured SAR from the area-scan-only measurements on all applicable test positions at the Initial Test Configuration, if found to require SAR tests.

Then, the initial test position procedure defines the required complete SAR scan measurements on each exposure configuration as following:

- When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurements is not required for the remaining test positions in that configuration as well as 802.11 transmission mode combinations within the frequency or aggregated band.
- When the reported SAR of the initial test position is > 0.4 W/kg, further SAR measurements is required in the initial test position or next closest/smallest test separation distance based on manufacturer justification, on the following highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions are tested.
- When the reported SAR for all initial and subsequent test positions is > 0.8 W/kg, further SAR measurements is required on these positions on the subsequent next highest measured output power channels, until the reported SAR is ≤ 1.2 W/kg or all required channels have been tested.

For OFDM transmission configurations in 2.4 GHz and 5 GHz bands, it is important to determine SAR Initial Test Configuration for each stand alone and aggregated frequency band according to the maximum output power and tune-up tolerance specified for production units. The procedure is as following:

- Highest output power channel is chosen; if there are channels with same maximum output power then the closest to the mid-band frequency is preferred. If there are more than one channel with same maximum output power and same distance to the mid-band frequency, then the channel with the higher frequency is preferred.
- When SAR measurement is required for a subsequent test configuration and the channel bandwidth is smaller than that in the initial test configuration, all channels in the subsequent test configuration that overlap with the larger bandwidth channel tested in the initial test configuration should be used to determine the highest maximum output power channel in the subsequent test configuration.

Along with the initial test position reduction guidelines, the following procedures are also applied to SAR measurement requirements when multiple OFDM configurations are supported:

- When the reported SAR of the initial test configuration with the highest output power channel is > 0.8 W/kg, further SAR measurements is required for next highest output power channel in the initial test configuration, until the reported SAR is ≤ 1.2 W/kg or all required channels have been tested.
- When the reported SAR of the subsequent test configuration with the highest output power channel is > 1.2 W/kg, further SAR measurements is required for next highest output power channel in this test configuration, until the reported SAR is ≤ 1.2 W/kg or all required channels have been tested.
- When the reported SAR of the subsequent test configuration is > 1.2 W/kg, further SAR measurements for the following subsequent test configurations are required.

6 System Verification and Test Conditions

6.1 Date of Testing

Date of Testing				
Band	**Test Position**	**Frequency [MHz]**	**Date of System Check**	**Date of SAR Measurement**
DECT	Head	1900	January 30, 2020	January 30, 2020
	Body	1900	February 12, 2020	February 12, 2020
WiFi 2.4 GHz	Head	2450	July 21, 2020	July 21, 2020
	Body	2450	July 21, 2020	July 21, 2020
WiFi 5 GHz	Head	5250	July 6, 2020	July 7, 2020
		5250 - 5600	July 9, 2020	July 9 - 10, 2020
		5600 - 5800	July 14, 2020	July 14 - 15, 2020
		5250 - 5600	July 16, 2020	July 16, 2020
		5250	July 20, 2020	July 20 - 21, 2020
	Body	5250 - 5800	July 16, 2020	July 16 - 17, 2020

Table 4: Date of testing.

6.2 Environment Conditions

Environment Conditions		
Ambient Temperature[°C]	**Liquid Temperature [°C]**	**Humidity [%]**
22.0 ± 2	22.0 ± 2	40.0 ± 10
Notes: To comply with the required noise level (less than 12 mW/kg) periodically measurements without a DUT were conducted.		

Table 5: Environment Conditions.

6.3 Tissue Simulating Liquid Recipes

Tissue Simulating Liquid								
Frequency Range		**Water**	**Tween 20**	**Tween 80**	**Salt**	**Preventol**	**DGME**	**Triton X/100**
[MHz]		**[%]**	**[%]**	**[%]**	**[%]**	**[%]**	**[%]**	**[%]**
Head Tissue								
☐	450	50.8	47.5	-	1.6	0.1	-	-
☐	700 - 1000	52.8	46.0	-	1.1	0.1	-	-
☐	1600 - 1800	55.4	44.1	-	0.4	0.1	-	-
☒	1850 - 1980	55.2	44.5	-	0.2	0.1	-	-
☒	2000 - 2700	55.7	45.2	-	-	0.1	-	-
☒	5000 - 6000	65.5	-	-	-	-	17.25	17.25
Body Tissue								
☐	450	71.0	28.0	-	0.9	0.1	-	-
☐	700 - 1000	71.2	28.0	-	0.7	0.1	-	-
☐	1600 - 1800	71.4	28.0	-	0.5	0.1	-	-
☐	1850 - 1980	71.5	28.0	-	0.4	0.1	-	-
☐	2000 - 2700	71.6	28.0	-	0.3	0.1	-	-
☐	5000 - 6000	79.9	-	20.0	-	0.1	-	-

Table 6: Recipes of the tissue simulating liquid.

6.4 Tissue Simulating Liquid Parameters

For the measurement of the following parameters the Speag DAK-3.5 dielectric probe kit is used, representing the open-ended coaxial probe measurement procedure.

Recommended values for the dielectric parameters of the tissue simulating liquids are given in IEEE 1528 and FCC published RF Exposure KDB Procedures. All tests were carried out using liquids with dielectric parameters within +/- 5% of the recommended values. The dielectric properties of the tissue simulating liquid have been measured within 24 h before SAR testing. The depth of the tissue simulant was at least 15.0 cm for all system check and device tests, measured from the ear reference point in case of the SAM phantom and from the inner surface of the flat phantom.

Tissue Simulating Liquids Parameters									
Ambient Temperature(C) : 22.0 ± 2				Liquid Temperature(C) : 22.0 ± 2			Humidity(%) : 40.0 ± 5		
Band	Date	Frequency	Channel	Permittivity			Conductivity		
				Measured	Target	Delta	Measured	Target	Delta
		[MHz]		ε'	ε'	+/- 5 [%]	σ [S/m]	σ [S/m]	+/- 5 [%]
DECT 1900 MHz	Jan 30, 2020	1900.0	System Check	38.8	40.0	-3.0	1.41	1.40	0.8
		1921.536	4	38.7	40.0	-3.2	1.43	1.40	2.1
		1924.992	2	38.7	40.0	-3.3	1.43	1.40	2.3
		1928.448	0	38.7	40.0	-3.4	1.44	1.40	2.7
DECT 1900 MHz	Feb 12, 2020	1900.0	System Check	52.9	53.3	-0.7	1.53	1.52	0.9
		1921.536	4	52.9	53.3	-0.7	1.55	1.52	1.9
		1924.992	2	52.9	53.3	-0.8	1.55	1.52	2.1
		1928.448	0	52.9	53.3	-0.8	1.56	1.52	2.4
WiFi 5250 MHz	July 6, 2020	5250.0	System Check	36.5	35.9	1.5	4.67	4.71	-0.7
		5290.0	58	36.4	35.9	1.5	4.73	4.75	-0.4
WiFi 5250 MHz	July 9, 2020	5250	System Check	36.6	35.9	1.9	4.51	4.71	-4.2
		5210	42	36.7	36.0	1.9	4.47	4.67	-4.1
		5270	54	36.6	35.9	1.8	4.53	4.73	-4.1
		5310	62	36.4	35.9	1.6	4.58	4.77	-3.9
WiFi 5600 MHz	July 9, 2020	5600	System Check	35.8	35.5	0.8	4.91	5.07	-3.1
		5530	106	36.0	35.6	1.0	4.82	4.99	-3.4
		5610	122	35.8	35.5	0.8	4.92	5.08	-3.1
		5690	138	35.6	35.4	0.5	5.01	5.16	-2.9
WiFi 5600 MHz	July 14, 2020	5600	System Check	35.6	35.5	0.3	4.93	5.07	-2.6
		5530	106	35.8	35.6	0.6	4.84	4.99	-3.0
		5590	118	35.6	35.5	0.3	4.92	5.05	-2.7
		5600	120	35.6	35.5	0.3	4.93	5.07	-2.6
WiFi 5800 MHz	July 14, 2020	5800	System Check	35.2	35.3	-0.3	5.15	5.27	-2.3
		5755	151	35.3	35.4	0.0	5.10	5.22	-2.3
		5775	155	35.3	35.3	-0.2	5.12	5.24	-2.3
		5785	157	35.3	35.3	-0.2	5.13	5.25	-2.3
WiFi 5250 MHz	July 16, 2020	5250	System Check	36.4	35.9	1.3	4.54	4.71	-3.6
		5290	58	36.3	35.9	1.2	4.59	4.75	-3.4
WiFi 5600 MHz	July 16, 2020	5600	System Check	35.7	35.5	0.5	4.94	5.07	-2.4
		5610	122	35.7	35.5	0.5	4.95	5.08	-2.4

Table 7: Parameters of the head tissue simulating liquid.

Tissue Simulating Liquids Parameters										
Ambient Temperature(C) : 22.0 ± 2				Liquid Temperature(C) : 22.0 ± 2			Humidity(%) : 40.0 ± 5			
Band	**Date**	**Frequency**	**Channel**	**Permittivity**			**Conductivity**			
				Measured	**Target**	**Delta**	**Measured**	**Target**	**Delta**	
		[MHz]		**ε'**	**ε'**	**+/- 5 [%]**	**σ [S/m]**	**σ [S/m]**	**+/- 5 [%]**	
WiFi 5250 MHz	July 20, 2020	*5250*	*System Check*	*36.3*	*35.9*	*1.0*	*4.64*	*4.71*	*-1.5*	
		5210	42	36.4	36.0	1.1	4.60	4.67	-1.5	
		5260	52	36.3	35.9	0.9	4.65	4.72	-1.3	
		5280	56	36.2	35.9	0.9	4.68	4.74	-1.3	
		5300	60	36.2	35.9	0.8	4.70	4.76	-1.3	
		5320	64	36.1	35.8	0.8	4.72	4.78	-1.2	
WiFi 2450 MHz	July 21, 2020	*2450*	*System Check*	*38.0*	*39.2*	*-3.1*	*1.88*	*1.80*	*4.4*	
		2412	*1*	38.2	39.3	-2.8	1.84	1.76	4.0	
		2437	6	38.1	39.2	-2.9	1.86	1.79	4.1	
		2462	11	38.0	39.2	-3.1	1.89	1.81	4.4	
Notes:										

Table 8: Parameters of the head tissue simulating liquid.

6.5 Simplified Performance Checking

The simplified performance check was realized using the dipole validation kit. The input power of the dipole antenna was 250 mW (CW) and it was placed under the flat part of the SAM phantom. The target and measured results are listed in the table 9 and shown in Appendix C - System Verification Plots. The target values were adopted from the calibration certificates found also in the appendix.

System Check Results											
Frequency [MHz]	**Dipole #SN**	**Measured**				**Target**		**Delta**		**Date**
		with 250 mW		**scaled to 1 W**		**normalized to 1 W**		**+/- 10 [%]**		
		1g	**10g**	**1g**	**10g**	**1g**	**10g**	**1g**	**10g**	
1900	D1900V2 #535	9.39	5.04	37.56	20.16	40.60	21.20	-7.49	-4.91	Jan 30, 2020
1900	D1900V2 #535	9.25	5.00	37.00	20.00	39.30	20.70	-5.85	-3.38	Feb 12, 2020
5250	D5GHzV2 #1028	19.60	5.50	78.40	22.00	77.50	22.20	1.16	-0.90	July 6, 2020
5250	D5GHzV2 #1028	18.20	5.16	72.80	20.64	77.50	22.20	-6.06	-7.03	July 9, 2020
5600	D5GHzV2 #1028	20.40	5.71	81.60	22.84	82.00	23.40	-0.49	-2.39	
5600	D5GHzV2 #1028	20.40	5.72	81.60	22.88	82.00	23.40	-0.49	-2.22	July 14, 2020
5800	D5GHzV2 #1028	18.10	5.08	72.40	20.32	78.50	22.10	-7.77	-8.05	
5250	D5GHzV2 #1028	19.00	5.39	76.00	21.56	77.50	22.20	-1.94	-2.88	July 16, 2020
5600	D5GHzV2 #1028	20.50	5.75	82.00	23.00	82.00	23.40	0.00	-1.71	
5250	D5GHzV2 #1028	19.50	5.54	78.00	22.16	77.50	22.20	0.65	-0.18	July 20, 2020
2450	D2450V2 #709	13.80	6.35	55.20	25.40	53.50	25.00	3.18	1.60	July 21, 2020

Table 9: Dipole target and measured results.

7 SAR Measurement Conditions and Results

7.1 Test Conditions

Test Conditions				
Band	**TX Range [MHz]**	**Used Channels**	**Crest Factor**	**Phantom**
DECT	1921.536 - 1928.448	04, 02, 00	24	SAM Twin Phantom V4.0
WLAN 2.4 GHz	2412.0 – 2462.0	1, 6, 11	1	
WLAN 5 GHz U-NII-1 / U-NII-2A	5180.0 – 5320.0	42, 52, 54, 56, 58, 60, 62, 64	1	
WLAN 5 GHz U-NII-2C	5500.0 – 5720.0	106, 122, 138	1	
WLAN 5 GHz U-NII-3	5745.0 – 5825.0	155	1	
Notes:				

Table 10: Used channels and crest factors during the test.

7.2 Tune-Up Information

Tune-Up Output Power			
Band	**Frequency [MHz]**	**CH**	**Max. Tune-Up Limit [dBm]**
DECT	1921.536	04	20.8
	1924.992	02	20.8
	1928.448	00	20.8
Notes: According to the manufacturer both antennas have the same tune-up output values.			

Table 11: Maximum transmitting output power values for DECT declared by the manufacturer.

Tune-Up Output Power				
Band	**Frequency [MHz]**	**Mode**	**CH**	**Max. Tune-Up Limit [dBm]**
WLAN 2.4	2412 - 2452	b	1 - 9	16.0
	2457 - 2462		10 - 11	18.5
	2412 - 2452	g	1 - 9	15.0
	2457 - 2462		10 - 11	17.0
	2412 - 2452	n HT20	1 - 9	15.0
	2457 - 2462		10 - 11	17.0
	2412 - 2452	n HT40	1 - 11	16.0
WLAN 5 GHz U-NII-1 / U-NII-2A	5180 - 5320	a, n, ac	36 - 64	15.0
WLAN 5 GHz U-NII-2C	5500 - 5720	a, n, ac	100 - 144	13.0
WLAN 5 GHz U-NII-3	5745 - 5825	a, n, ac	149 - 165	13.0
BT	2402 - 2480	GFSK / π/4QPSK / 8DPSK	0 - 78	5.0
BLE	2402 - 2480	GFSK	0 - 39	5.0
Notes:				

Table 12: Maximum transmitting output power values for WLAN and BT declared by the manufacturer.

7.3 Measured Output Power

7.3.1 DECT Output Power

Max. Averaged Output Power				
Antenna	**Mode**	**Frequency [MHz]**	**CH**	**Measured Output Power [dBm]**
DECT Ant. 0	GFSK	1921.536	04	20.1
		1924.992	02	20.1
		1928.448	00	20.1
DECT Ant. 1	GFSK	1921.536	04	19.9
		1924.992	02	19.9
		1928.448	00	19.9
Notes: -				

Table 13: Conducted output power values for DECT.

7.3.2 WLAN 2.4 GHz Output Power

Max. Averaged Output Power (RMS) [dBm]										
2.4 GHz Range	**Frequency [MHz]**	**CH**	**SW PWL 19**							
			Data Rate [Mbit/s]							
Mode			**1**		**2**		**5.5**		**11**	
b	2412	1	15.3		-		-		-	
	2437	6	15.8		-		-		-	
	2462	11	18.2		-		-		-	
Mode	**Frequency [MHz]**	**CH**	**SW PWL 19**							
			Data Rate [Mbit/s]							
			6.0	**9**	**12**	**18**	**24**	**36**	**48**	**54**
g	2412	1	13.3	-	-	-	-	-	-	-
	2437	6	14.1	-	-	-	-	-	-	-
	2462	11	15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6
Mode	**Frequency [MHz]**	**CH**	**SW PWL 19**							
			MCS Index No.							
			MCS0	**MCS1**	**MCS2**	**MCS3**	**MCS4**	**MCS5**	**MCS6**	**MCS7**
n HT20	2412	1	13.2	-	-	-	-	-	-	-
	2437	6	14.0	-	-	-	-	-	-	-
	2462	11	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4
n HT40	2422	3	14.4	-	-	-	-	-	-	-
	2437	6	14.3	-	-	-	-	-	-	-
	2452	9	14.1	-	-	-	-	-	-	-
Notes:										

Table 14: Conducted output power values for WLAN 2.4 GHz.

7.3.3 WLAN 5 GHz Output Power

Max. Averaged Output Power (RMS) [dBm]										
Mode	Frequency [MHz]	Data Rate [Mbit/s]								
		CH	6.0	9	12	18	24	36	48	54
5.2 - 5.3 GHz Range		SW PWL 15.5								
a - HT20 U-NII-1	5180	36	14.0	-	-	-	-	-	-	-
	5200	40	14.1	-	-	-	-	-	-	-
	5220	44	14.1	-	-	-	-	-	-	-
	5240	48	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1
a - HT20 U-NII-2A	5260	52	14.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1
	5280	56	14.1	-	-	-	-	-	-	-
	5300	60	14.0	-	-	-	-	-	-	-
	5320	64	14.0	-	-	-	-	-	-	-
Mode	Frequency [MHz]	CH	MCS Index No.							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
5.2 - 5.3 GHz Range		SW PWL 15.5								
n - HT20 U-NII-1	5180	36	14.0	-	-	-	-	-	-	-
	5200	40	14.0	-	-	-	-	-	-	-
	5220	44	13.8	-	-	-	-	-	-	-
	5240	48	13.9	-	-	-	-	-	-	-
n - HT20 U-NII-2A	5260	52	13.9	13.9	13.9	13.9	13.9	13.9	13.9	13.9
	5280	56	14.1	-	-	-	-	-	-	-
	5300	60	14.0	-	-	-	-	-	-	-
	5320	64	14.0	-	-	-	-	-	-	-
n – HT40 U-NII-1	5190	38	13.7	-	-	-	-	-	-	-
	5230	46	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7
n – HT40 U-NII-2A	5270	54	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
	5310	62	13.7	-	-	-	-	-	-	-
ac – VHT80 U-NII-1	5210	42	13.9	-	-	-	-	-	-	-
ac – VHT80 U-NII-2A	5290	58	13.8	-	-	-	-	-	-	-
Notes:										

Table 15: Conducted output power values for WLAN 5.2 - 5.3 GHz Range.

Max. Averaged Output Power (RMS) [dBm]										
Mode	Frequency [MHz]	Data Rate [Mbit/s]								
		CH	6.0	9	12	18	24	36	48	54
5.5 - 5.8 GHz Range		SW PWL 13.5								
a - HT20 U-NII-2C	5500	100	11.7	-	-	-	-	-	-	-
	5600	120	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9
	5720	144	11.8	-	-	-	-	-	-	-
a - HT20 U-NII-3	5745	149	11.4	-	-	-	-	-	-	-
	5785	157	11.6	11.6	11.6	11.6	11.6	11.6	11.6	11.6
	5825	165	11.5	-	-	-	-	-	-	-
Mode	Frequency [MHz]	CH	MCS Index No.							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
5.5 - 5.8 GHz Range		SW PWL 13.5								
n - HT20 U-NII-2C	5500	100	11.7	-	-	-	-	-	-	-
	5560	112	12.0	-	-	-	-	-	-	-
	5600	120	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
	5720	144	11.2	-	-	-	-	-	-	-
n - HT20 U-NII-3	5745	149	11.5	-	-	-	-	-	-	-
	5785	157	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
	5825	165	11.5	-	-	-	-	-	-	-
n – HT40 U-NII-2C	5510	102	11.6	-	-	-	-	-	-	-
	5550	110	11.7							
	5590	118	11.9	-	-	-	-	-	-	-
	5670	134	11.2	-	-	-	-	-	-	-
n – HT40 U-NII-3	5755	151	11.3	-	-	-	-	-	-	-
	5795	159	11.4	-	-	-	-	-	-	-
ac – VHT80 U-NII-2C	5530	106	12.0	-	-	-	-	-	-	-
	5610	122	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9
	5690	138	12.0	-	-	-	-	-	-	-
ac – VHT80 U-NII-3	5775	155	11.5	-	-	-	-	-	-	-
Notes:										

Table 16: Conducted output power values for WLAN 5.5 - 5.8 GHz Range.

7.4 Standalone SAR Test Exclusion according to KDB 447498

SAR test exclusion is determined for the DUT according to KDB 447498 D01 with 1g SAR exclusion thresholds for 100 MHz to 6GHz at test separation distances ≤ 50 mm determined by:

*[(max power of channel. incl. tune-up tolerance. mW) / (min test separation distance. mm)] * [√f(GHz)]*

≤ 3.0 for 1g SAR and ≤ 7.5 for 10g extremity SAR, where

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

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

Standalone SAR Test Exclusion Consideration (FCC)												
Mode	**Freq.**	**Distance**	**Output Power (peak)**		**Maximum Duty Cycle**	**Output Power (average)**		**Threshold Comparison Value**	**Exclusion Threshold SAR 1g**	**SAR Testing Exclusion**	**Estimated SAR Values**	**SAR Testing Required**
	[MHz]	**[mm]**	**[dBm]**	**[mW]**	**[%]**	**[dBm]**	**[mW]**					
DECT	1925	5	20.80	120.2	4.2	7.00	5.0	1.4	≤ 3.0	YES	measured	NO
BT	2440	5	5.00	3.2	100.0	5.00	3.2	1.0	≤ 3.1	YES	0.13	NO
BLE	2440	5	5.00	3.2	100.0	5.00	3.2	1.0	≤ 3.2	YES	0.13	NO
WLAN	2450	5	18.50	70.8	100.0	18.50	70.8	22.2	≤ 3.3	NO	measured	YES
	5250	5	15.00	31.6	100.0	15.00	31.6	14.5	≤ 3.4	NO	measured	YES
	5600	5	13.00	20.0	100.0	13.00	20.0	9.4	≤ 3.5	NO	measured	YES
	5750	5	13.00	20.0	100.0	13.00	20.0	9.6	≤ 3.6	NO	measured	YES
Notes:												

Table 17: SAR test exclusion for the applicable transmitter according to KDB 447498.

When the standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas the standalone SAR must be estimated according to KDB 447498 in order to determine simultaneous transmission SAR test exclusion:

- *(max. power of channel. including tune-up tolerance. mW)/(min. test separation distance. mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm;*

where x = 7.5 for 1-g SAR and x = 18.75 for 10-g SAR

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

- *0.4 W/kg for 1g SAR and 1.0 W/kg for 10g SAR. when the test separation distance is > 50 mm*

7.5 SAR Test Exclusion Consideration according to RSS-102

Standalone SAR Test Exclusion Consideration (ISED)										
Mode	Freq.	Distance	Output Power (peak)		Maximum Duty Cycle	Output Power (average)		Exemption Limit for SAR 1g [mW]	SAR Testing Exclusion	SAR Testing Required
	[MHz]	[mm]	[dBm]	[mW]	[%]	[dBm]	[mW]			
DECT	1925	5	20.80	120.2	4.2	7.00	5.0	6.8	YES	NO
BT	2440	5	5.00	3.2	100.0	5.00	3.2	4.0	YES	NO
BLE	2440	5	5.00	3.2	100.0	5.00	3.2	4.0	YES	NO
WLAN	2450	5	18.50	70.8	100.0	18.50	70.8	4.0	NO	YES
	5250	5	15.00	31.6	100.0	15.00	31.6	2.0	NO	YES
	5600	5	13.00	20.0	100.0	13.00	20.0	1.5	NO	YES
	5750	5	13.00	20.0	100.0	13.00	20.0	1.0	NO	YES
Notes:										

Table 18: SAR test exclusion for the applicable transmitter according to RSS-102, section 2.5.1.

7.6 SAR Measurement Results

SAR assessment was conducted in the worst case configuration with output power values according to the tables in Chapter 7.3. According to KDB 447498 D01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance limit shown in Table 11.

Reported SAR is calculated by the following formulas:

- Scaling factor tune up limit = tune-up limit power (mW) / RF power (mW)
- Scaling factor max. duty cycle = max. possible duty cycle / used duty cycle for SAR measurement
- Reported SAR = measured SAR * scaling factor tune up limit * scaling factor max. duty cycle

The plots with the highest measured SAR values are shown in Appendix B - SAR Distribution Plots.

7.6.1 SAR Measurement Results for DECT

SAR Measurement Results in Head Configuration (DECT)												
Band	Freq. [MHz]	CH	DUT* Position	Gap [mm]	Pic. No.	Measured SAR1g [W/kg]	Power Drift [dB]	Power [dBm]		Tune-Up SF	Reported SAR1g [W/kg]	Plot No.
								Measured	Limit			
DECT Ant 0	1924.99	2	LC	0	5	0.041	-0.080	20.1	20.8	1.175	0.048	-
			LT	0	6	0.028	0.040	20.1		1.175	0.033	-
			RC	0	7	0.079	-0.088	20.1		1.175	0.093	-
			RT	0	8	0.040	0.050	20.1		1.175	0.047	-
	1921.54	4	RC	0	7	0.077	-0.037	20.1		1.175	0.090	-
	1924.99	0	RC	0	7	0.099	-0.019	20.1		1.175	**0.116**	1
DECT Ant 1	1924.99	2	LC	0	5	0.002	0.057	19.9		1.230	0.002	-
			LT	0	6	0.001	-0.030	19.9		1.230	0.001	-
			RC	0	7	0.001	-0.132	19.9		1.230	0.001	-
			RT	0	8	0.001	-0.160	19.9		1.230	0.001	-
	1921.54	4	LC	0	5	0.002	-0.166	19.9		1.230	0.002	2
	1924.99	0	LC	0	5	0.002	0.149	19.9		1.230	0.002	-
Notes:	* LC – Left Cheek; LT – Left Tilted; RC-Right Cheek; RT – Right Tilted;											

Table 19: SAR measurement results in head configuration for DECT.

SAR Measurement Results in Body Worn Configurations (DECT)												
Band	**Freq. [MHz]**	**CH**	**DUT* Position**	**Gap [mm]**	**Pic. No.**	**Measured SAR1g [W/kg]**	**Power Drift [dB]**	**Power [dBm]**		**Tune-Up SF**	**Reported SAR1g [W/kg]**	**Plot No.**
								Measured	**Limit**			
DECT Ant 0	1924.99	2	F	0	9	0.076	0.135	20.1	20.8	1.175	0.089	-
			R	0	11	0.008	-0.209	20.1		1.175	0.009	-
	1921.54	4	F	0	9	0.207	0.188	20.1		1.175	0.243	-
	1928.45	0	F	0	9	0.237	0.199	20.1		1.175	**0.278**	3
DECT Ant 1	1924.99	2	F	0	9	0.192	0.039	19.9		1.230	0.236	4
			R	0	11	0.147	0.013	19.9		1.230	0.181	-
	1921.54	4	F	0	9	0.185	0.121	19.9		1.230	0.228	-
	1928.45	0	F	0	9	0.178	-0.007	19.9		1.230	0.219	-
Notes:	* F – Front Side; R – Rear Side;											

Table 20: SAR measurement results in body worn configuration (DECT).

7.6.2 SAR Measurement Results for WLAN 2.4 GHz

SAR Measurement Results in Head Configuration (WLAN 2.4 GHz)														
Band	**Mode IEEE 802.11**	**Freq. [MHz]**	**CH**	**DUT Position**	**Gap [mm]**	**Pic. No.**	**Measured SAR1g [W/kg**	**Power Drift [dB]**	**Power [dBm]**		**Tune-Up SF**	**Reported SAR1g [W/kg]**	**Plot No.**	**Note No.**
									Meas.	**Limit**				
2.4 DSSS	**b** 1Mbps	2462	11	LC	0	5	0.148	-0.191	18.0	18.5	1.122	0.166		1
		2462	11	LT	0	6	0.111	-0.008	18.0		1.122	0.125		
		2462	11	RC	0	7	0.041	0.156	18.0		1.122	0.046		
		2462	11	RT	0	8	0.038	0.079	18.0		1.122	0.043		
		2437	6	LC	0	5	0.515	-0.057	15.6	16.0	1.096	0.565		
		2437	6	LT	0	6	0.382	-0.184	15.6		1.096	0.419		
		2437	6	RC	0	7	0.136	0.083	15.6		1.096	0.149		
		2437	6	RT	0	8	0.191	0.122	15.6		1.096	0.209		
		2412	1	LC	0	5	0.454	0.085	14.9		1.288	**0.585**	5	
Notes:	LC – Left Cheek; LT – Left Tilted; RC-Right Cheek; RT – Right Tilted;													
1)	When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg or when KDB 447498 D01 SAR test exclusion applies to the OFDM configuration.													

Table 21: SAR measurement results in head configuration for WLAN 2.4 GHz.

SAR Measurement Results in Body-Worn Configuration (WLAN 2.4 GHz)														
Band	**Mode IEEE 802.11**	**Freq. [MHz]**	**CH**	**DUT Position**	**Gap [mm]**	**Pic. No.**	**Measured SAR1g [W/kg**	**Power Drift [dB]**	**Power [dBm]**		**Tune-Up SF**	**Reported SAR1g [W/kg]**	**Plot No.**	**Note No.**
									Meas.	**Limit**				
2.4 DSSS	**b** 1Mbps	2462	11	Front	5	10	0.075	-0.103	18.0	18.5	1.122	0.084		1, 2
				Rear	0	11	0.063	0.190	18.0		1.122	0.071		
		2437	6	Front	5	10	0.257	-0.213	15.6	16.0	1.096	**0.282**	6	1
		2412	1				0.182	0.183	14.9		1.288	0.234		
Notes:														
1)	When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg or when KDB 447498 D01 SAR test exclusion applies to the OFDM configuration.													
2)	Initial test configuration with highest output power													

Table 22: SAR measurement results in body-worn configuration for WLAN 2.4 GHz.

7.6.3 SAR Measurement Results for WLAN 5 GHz

SAR Measurement Results in Head Configuration (WLAN 5 GHz)														
Band	**Mode IEEE 802.11**	**Freq. [MHz]**	**CH**	**DUT* Position**	**Gap [mm]**	**Pic. No.**	**Measured SAR1g [W/kg]**	**Power Drift [dB]**	**Power [dBm]**		**Tune-Up SF**	**Reported SAR1g [W/kg]**	**Plot No.**	**Note No.**
									Meas.	**Limit**				
5.2 U-NII-1	**ac VHT80** MCS0	5210	42	LC	0	5	0.800	0.193	13.9	15.0	1.288	**1.031**	7	2, 3, 4
		5210	42	LT	0	6	0.697	0.168	13.9		1.288	0.898		
		5210	42	CR	0	7	0.448	-0.179	13.9		1.288	0.577		
		5210	42	TR	0	8	0.414	0.117	13.9		1.288	0.533		
5.3 U-NII-2A	**a** 6Mbps	5260	52	LC	0	5	1.010	0.134	14.1		1.230	1.243		3, 5
		5280	56	LC	0	5	1.010	-0.083	14.1		1.230	1.243		
		5300	60	LC	0	5	0.988	0.032	14.0		1.259	1.244		
		5320	64	LC	0	5	1.100	-0.023	14.0		1.259	1.385		
	n HT40 MCS0	5270	54	LC	0	5	0.900	-0.031	13.8		1.318	1.186		5
		5310	62	LC	0	5	1.050	-0.175	13.7		1.349	**1.416**	8	
	ac VHT80 MCS0	5290	58	LC	0	5	1.010	0.107	13.8		1.318	1.331		1, 2
		5290	58	LT	0	6	0.789	-0.096	13.8		1.318	1.040		
		5290	58	CR	0	7	0.631	0.178	13.8		1.318	0.832		
		5290	58	TR	0	8	0.565	0.137	13.8		1.318	0.745		
5.5 U-NII-2C	**ac VHT80** MCS0	5610	122	LC	0	5	0.753	0.176	11.9	13.0	1.288	0.970		2, 3, 4
		5610	122	LT	0	6	0.857	0.138	11.9		1.288	**1.104**	9	
		5610	122	CR	0	7	0.418	-0.132	11.9		1.288	0.538		
		5610	122	TR	0	8	0.380	-0.078	11.9		1.288	0.490		
		5530	106	LT	0	6	0.819	0.062	12.0		1.259	1.031		
		5690	138	LT	0	6	0.762	-0.071	12.0		1.259	0.959		
5.8 U-NII-3	**ac VHT80** MCS0	5775	155	LC	0	5	0.784	0.069	11.5		1.413	**1.107**	10	2, 3, 4
		5775	155	LT	0	6	0.619	0.166	11.5		1.413	0.874		
		5775	155	CR	0	7	0.379	-0.082	11.5		1.413	0.535		
		5775	155	TR	0	8	0.335	0.209	11.5		1.413	0.473		

Notes: LC – Left Cheek; LT – Left Tilted; RC-Right Cheek; RT – Right Tilted;

1) When the same max. output power is specified for both bands, begin SAR measurement in U-NII-2A by applying the OFDM SAR requirements. If the highest reported SAR is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band.
2) When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11 a/g/n/ac mode is used for SAR measurement.
3) When the reported SAR is > 0.8 W/kg, SAR measurement is tested for the subsequent next highest output power channels until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
4) When the highest reported SAR for the initial test configuration (when applicable, include subsequent highest output channels), according to the initial test position or fixed exposure requirements, is adjusted by the ratio of the subsequent test configuration to the initial test configuration specified maximum output power and the adjusted SAR is 1.2 W/Kg, SAR is not required for that subsequent test configuration
5) SAR for subsequent highest measured maximum output power channels in the subsequent test configuration is required only when the reported SAR of the preceding higher maximum output power channel(s) in the subsequent test configuration is >1.2 W/Kg or until all required channels are tested.

Table 23: SAR measurement results in head configuration for WLAN 5 GHz.

SAR Measurement Results in Body-Worn Configuration (WLAN 5 GHz)														
Band	**Mode IEEE 802.11**	**Freq. [MHz]**	**CH**	**DUT* Position**	**Gap [mm]**	**Pic. No.**	**Measured SAR1g [W/kg]**	**Power Drift [dB]**	**Power [dBm] Meas.**	**Power [dBm] Limit**	**Tune-Up SF**	**Reported SAR1g [W/kg]**	**Plot No.**	**Note No.**
5.3 U-NII-2A	**ac VHT80** MCS0	5290	58	Front	5	10	0.312	-0.074	13.7	15.0	1.349	**0.421**	11	1, 2, 3, 4
		5290	58	Rear	0	11	0.136	0.048	13.7		1.349	0.183		
5.5 U-NII-2C	**ac VHT80** MCS0	5610	122	Front	5	10	0.365	-0.190	11.9	13.0	1.288	**0.470**	12	2, 3, 4
		5610	122	Rear	0	11	0.058	-0.092	11.9		1.288	0.075		
5.8 U-NII-3	**ac VHT80** MCS0	5775	155	Front	5	10	0.246	-0.101	11.5		1.413	**0.347**	13	2, 3, 4
		5775	155	Rear	0	11	0.097	0.071	11.5		1.413	0.137		

Notes:

1) When the same max. output power is specified for both bands, begin SAR measurement in U-NII-2A by applying the OFDM SAR requirements. If the highest reported SAR is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band.
2) When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11 a/g/n/ac mode is used for SAR measurement.
3) When the reported SAR is > 0.8 W/kg, SAR measurement is tested for the subsequent next highest output power channels until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
4) When the highest reported SAR for the initial test configuration (when applicable, include subsequent highest output channels), according to the initial test position or fixed exposure requirements, is adjusted by the ratio of the subsequent test configuration to the initial test configuration specified maximum output power and the adjusted SAR is 1.2 W/Kg, SAR is not required for that subsequent test configuration

Table 24: SAR measurement results in body-worn configuration for WLAN 5 GHz.

To control the output power stability during the SAR test the used 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 the above tables labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

7.6.4 Measurement Variability

According to KDB 865664 D01 repeated measurements are required when the measured SAR is ≥ 0.80 W/kg. Additional measurements need to be repeated after the completion of all measurements in accordance to the following procedure:

1) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
2) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3) 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.

SAR Results for Measurement Variability									
Band	**Mode**	**Freq. [MHz]**	**CH**	**DUT* Position**	**Highest Measured**	**1st Repeated Measurement**		**2nd Repeated Measurement**	
					SAR_{1g} [W/kg]	**SAR_{1g} [W/kg]**	**SAR Ratio**	**SAR_{1g} [W/kg]**	**SAR Ratio**
5.2 U-NII-1	**ac VHT80** MCS0	5210	42	Left Cheek	0.800	0.825	1.03	NR	NR
5.3 U-NII-2A	**a** 6Mbps	5320	64	Left Cheek	1.100	1.130	1.03	NR	NR
5.3 U-NII-2A	**ac VHT80** MCS0	5290	58	Left Cheek	1.010	0.949	1.06	NR	NR
5.5 U-NII-2C	**ac VHT80** MCS0	5610	122	Left Tilted	0.857	0.915	1.07	NR	NR
Notes:	2nd and 3rd repeated measurement are not required since the ratio of the largest to smallest SAR for the original and 1st repeated measurement is < 1.20.								

Table 25: Results for SAR measurement variability.

7.7 Simultaneous Transmission Consideration

Simultaneous Transmission Capabilities of DUT		
ANT0 DECT	**ANT1 DECT**	**ANT2 Bluetooth / WLAN**
V	X	V
X	V	V
Notes: Simultaneous Transmission can be performed only in combination of Ant0 + Ant 2, or Ant1 + Ant 2.		

Table 26: Simultaneous transmission capabilities.

For the following simultaneous transmission analysis the worst case SAR results shown in Tables 19 - 24 and in the following Table 27 are taken to introduce the highest reported SAR results for standalone transmission at WLAN/BT antenna.

Highest Reported SAR for Standalone Transmission [W/kg]									
Exposure Position of DUT		**DECT**	**BT**	**BLE**	**WiFi 2.4 GHz**	**WiFi 5 GHz**			
		PUE	**DSS**	**DTS**	**DTS**	**U-NII-1**	**U-NII-2A**	**U-NII-2C**	**U-NII-3**
Head	Left Cheek	0.048	0.13*	0.13*	0.585	1.031	**1.416**	1.104	1.107
	Left Tilted	0.033	0.13*	0.13*	0.419	0.898	1.040	**1.104**	0.874
	Right Cheek	0.116	0.13*	0.13*	0.149	0.577	**0.832**	0.538	0.535
	Right Tilted	0.047	0.13*	0.13*	0.209	0.533	**0.745**	0.490	0.473
Body	Front	0.021	0.13*	0.13*	0.282	-	0.421	0**.470**	0.347
	Rear	0.181	0.13*	0.13*	0.071	-	**0.183**	0.075	0.137
Notes:	*Estimated SAR values according to Table 17								

Table 27: Reported SAR for standalone transmission for WLAN/BT.

According to KDB 447498, the following table gives an overview about the ∑SAR for simultaneous transmitting modes. When ∑SAR > 1.6 W/kg. a SAR test exclusion is determined by the SAR to peak location separation ratio. The ratio is determined by $(SAR1 + SAR2)^{1.5}/Ri$ rounded to two decimal digits and must be ≤ 0.04 for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion. Where Ri is the separation distance between the peak SAR locations for the antenna pair in mm. When SAR is measured for both antennas in a pair the peak location separation distance is computed by the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$ where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the area scans or extrapolated peak SAR locations in the zoom scans as appropriate.

Highest Reported SAR for Simultaneous Transmission [W/kg]					
Exposure Configuration / Position of DUT		**DECT + BT/WLAN**	**Σ SAR_{1g}**	**Limit SAR_{1g}**	**SPLSR Analysis**
		PCB + U-NII			
Simultaneous TX	Head	Left Cheek	**1.464**	1.6	NO
	Body	Front	**0.491**	1.6	NO
Notes:	According to simultaneous transmission capabilities shown in Table				

Table 28: SAR for simultaneous transmission scenario.

8 Administrative Measurement Data

8.1 Calibration of Test Equipment

Test Equipment Overview						
	Test Equipment	Manufacturer	Model	Serial Number	Last Calibration	Next Calibration
DASY System Components						
☒	Software Versions DASY4	SPEAG	V4.7	N/A	N/A	N/A
☒	Software Versions SEMCAD	SPEAG	V1.8	N/A	N/A	N/A
☐	Dosimetric E-Field Probe	SPEAG	ET3DV6R	1579	02/2018	02/2020
☒	Dosimetric E-Field Probe	SPEAG	ET3DV6R	1669	02/2019	02/2021
☐	Dosimetric E-Field Probe	SPEAG	EX3DV4	3536	09/2018	09/2020
☒	Dosimetric E-Field Probe	SPEAG	EX3DV4	3860	10/2019	10/2021
☒	Data Acquisition Electronics	SPEAG	DAE 3	335	02/2019	02/2020
☒	Data Acquisition Electronics	SPEAG	DAE 4	631	10/2019	10/2020
☒	Phantom	SPEAG	SAM	1059	N/A	N/A
☐	Phantom	SPEAG	SAM	1176	N/A	N/A
☒	Phantom	SPEAG	SAM	1340	N/A	N/A
☒	Phantom	SPEAG	SAM	1341	N/A	N/A
☐	Phantom	SPEAG	ELI4	1004	N/A	N/A
Dipoles						
☐	System Validation Dipole	SPEAG	D450V2	1014	03/2018	03/2021
☐	System Validation Dipole	SPEAG	D835V2	470	03/2018	03/2021
☐	System Validation Dipole	SPEAG	D1640V2	311	09/2018	09/2021
☐	System Validation Dipole	SPEAG	D1750V2	1005	03/2018	03/2021
☒	System Validation Dipole	SPEAG	D1900V2	535	03/2018	03/2021
☒	System Validation Dipole	SPEAG	D2450V2	709	11/2018	11/2021
☐	System Validation Dipole	SPEAG	D2600V2	1019	11/2018	11/2021
☒	System Validation Dipole	SPEAG	D5GHzV2	1028	05/2017	05/2020
Material Measurement						
☒	Network Analyzer	Agilent	E5071C	MY46103220	08/2019	08/2021
☒	Dielectric Probe Kit	SPEAG	DAK-3.5	1234	02/2018	02/2020
☒	Thermometer	LKMelectronic	DTM3000	3511	02/2018	02/2020
Power Meters and Sensors						
☒	Power Meter	Anritsu	ML2487A	6K00002319	06/2018	06/2020
☒	Power Sensor	Anritsu	MA2472A	990365	06/2018	06/2020
☒	Power Meter	Anritsu	ML2488A	6K00002078	06/2018	06/2020
☒	Power Sensor	Anritsu	MA2472A	002122	06/2018	06/2020
☒	Spectrum Analyzer	Rohde & Schwarz	FSP7	100433	04/2018	04/2020
RF Sources						
☒	Network Analyzer	Agilent	E5071C	MY46103220	08/2019	08/2021
☐	RF Generator	Rohde & Schwarz	SM300	100142	N/A	N/A
Amplifiers						
☒	Amplifier 10 MHz – 4200 MHz	Mini Circuits	ZHL-42-42W	D080504-1	N/A	N/A
☒	Amplifier 2 GHz – 6 GHz	Ciao Wireless	CA26-451	37452	N/A	N/A
Radio Tester						
☐	Radio Communication Tester	Anritsu	MT8815B	6200576536	04/2018	04/2020
☐	Radio Communication Tester	Anritsu	MT8820C	6200918336	04/2018	04/2020
Notes: Used test equipment for measurement is checked above.						

Table 29: Calibration of test equipment.

8.2 Uncertainty Assessment

Uncertainty Budget for SAR Measurements according to IEEE 1528-2013 (300 MHz - 6 GHz)								
Error Sources	**Uncertainty Value [± %]**	**Probability Distribution**	**Divisor**	**ci**	**ci**	**Standard Uncertainty [± %]**		**vi² or veff**
Measurement System				1g	10g	1g	10g	
Probe calibration	6.7	Normal	1	1	1	6.7	6.7	∞
Axial isotropy	0.3	Rectangular	√3	√0.5	√0.5	0.1	0.1	∞
Hemispherical isotropy	1.3	Rectangular	√3	√0.5	√0.5	0.5	0.5	∞
Boundary effects	1.0	Rectangular	√3	1	1	0.6	0.6	∞
Linearity	0.3	Rectangular	√3	1	1	0.2	0.2	∞
System detection limit	1.0	Rectangular	√3	1	1	0.6	0.6	∞
Modulation response	4.0	Rectangular	√3	1	1	2.3	2.3	∞
Readout electronics	0.3	Normal	1	1	1	0.3	0.3	∞
Response time	0.8	Rectangular	√3	1	1	0.5	0.5	∞
Integration time	1.4	Rectangular	√3	1	1	0.8	0.8	∞
RF ambient conditions - noise	3.0	Rectangular	√3	1	1	1.7	1.7	∞
RF ambient conditions - refl.	3.0	Rectangular	√3	1	1	1.7	1.7	∞
Probe positioner mech. tol.	0.4	Rectangular	√3	1	1	0.2	0.2	∞
Probe positioning	2.9	Rectangular	√3	1	1	1.7	1.7	∞
Algorithms for max SAR eval.	4.0	Rectangular	√3	1	1	2.3	2.3	∞
Test Sample Related								
Test sample positioning	2.9	Normal	1	1	1	2.9	2.9	145
Device holder uncertainty	3.6	Normal	1	1	1	3.6	3.6	5
SAR drift measurement (< 0.2 dB)	4.7	Rectangular	√3	1	1	2.7	2.7	∞
SAR scaling	2.0	Rectangular	√3	1	1	1.2	1.2	∞
Phantom and Set-up								
Phantom uncertainty	4.0	Rectangular	√3	1	1	2.3	2.3	∞
SAR correction for perm./cond.	1.9	Normal	1	1	0.84	1.9	1.6	∞
Liquid conductivity (meas.)	5.0	Normal	1	0.78	0.71	3.9	3.6	∞
Liquid permittivity (meas.)	5.0	Normal	1	0.23	0.26	1.2	1.3	∞
Liquid conductivity temp. unc.	2.9	Rectangular	√3	0.78	0.71	1.3	1.2	∞
Liquid permittivity temp. unc.	1.8	Rectangular	√3	0.23	0.26	0.2	0.3	∞
Combined Standard Uncertainty						11.1	11.0	
Coverage Factor for 95%						kp=2		
Expanded Standard Uncertainty						**22.2**	**21.9**	
Notes: *Worst case probe calibration uncertainty has been applied for all available probes and frequencies.*								

Table 30: Uncertainty budget for SAR measurements.

Uncertainty Budget for SAR System Validation according to IEEE 1528-2013 (300 MHz - 6 GHz)								
Error Sources	**Uncertainty Value [± %]**	**Probability Distribution**	**Divisor**	**ci**	**ci**	**Standard Uncertainty [± %]**		**vi² or veff**
Measurement System				1g	10g	1g	10g	
Probe calibration	6.7	Normal	1	1	1	6.7	6.7	∞
Axial isotropy	0.3	Rectangular	√3	1	1	0.1	0.1	∞
Hemispherical isotropy	1.3	Rectangular	√3	0	0	0.0	0.0	∞
Boundary effects	1.0	Rectangular	√3	1	1	0.6	0.6	∞
Linearity	0.3	Rectangular	√3	1	1	0.2	0.2	∞
System detection limit	1.0	Rectangular	√3	1	1	0.6	0.6	∞
Modulation response	0.0	Rectangular	√3	0	0	0.0	0.0	∞
Readout electronics	0.3	Normal	1	1	1	0.3	0.3	∞
Response time	0.0	Rectangular	√3	0	0	0.0	0.0	∞
Integration time	0.0	Rectangular	√3	0	0	0.0	0.0	∞
RF ambient conditions - noise	1.0	Rectangular	√3	1	1	0.6	0.6	∞
RF ambient conditions - refl.	1.0	Rectangular	√3	1	1	0.6	0.6	∞
Probe positioner mech. tol.	0.4	Rectangular	√3	1	1	0.2	0.2	∞
Probe positioning	2.9	Rectangular	√3	1	1	1.7	1.7	∞
Algorithms for max SAR eval.	4.0	Rectangular	√3	1	1	2.3	2.3	∞
Validation Dipole								
Dev. of exp. dipole from num.	5.0	Normal	1	1	1	5.0	5.0	∞
Input power and SAR drift (< 0.2 dB)	4.7	Rectangular	√3	1	1	2.7	2.7	∞
Dipole axis to liquid distance (< 2deg)	2.0	Rectangular	√3	1	1	1.2	1.2	∞
Phantom and Set-up								
Phantom uncertainty	4.0	Rectangular	√3	1	1	2.3	2.3	∞
SAR correction for perm./cond.	1.9	Normal	1	1	0.84	1.9	1.6	∞
Liquid conductivity (meas.)	5.0	Normal	1	0.78	0.71	3.9	3.6	∞
Liquid permittivity (meas.)	5.0	Normal	1	0.23	0.26	1.2	1.3	∞
Liquid conductivity temp. unc.	2.9	Rectangular	√3	0.78	0.71	1.3	1.2	∞
Liquid permittivity temp. unc.	1.8	Rectangular	√3	0.23	0.26	0.2	0.3	∞
Combined Standard Uncertainty						10.7	10.6	
Coverage Factor for 95%						kp=2		
Expanded Standard Uncertainty						**21.5**	**21.2**	
Notes: *Worst case probe calibration uncertainty has been applied for all available probes and frequencies.*								

Table 31: Uncertainty budget for SAR system validation.

9 Report History

Revision History				
Revision	**Description of Revision**	**Date**	**Revised Page**	**Revised By**
/	Initial Release	February 21, 2020	-	-
1	FCC ID and IC No corrected	April 16, 2020	1; 27	AR
2	Measurements for WLAN performed, tune-up limits and SAR results for standalone and simultaneous transmission revised	July 29, 2020		DP/AR

END OF THE SAR REPORT

Please refer to separated appendix file for the following data:

- Appendix A - Pictures
- Appendix B - SAR Distribution Plots
- Appendix C - System Verification Plots
- Appendix D – Certificates of Conformity
- Appendix E – Calibration Certificates for DAEs
- Appendix F – Calibration Certificates for E-Field Probes
- Appendix G – Calibration Certificates for Dipoles