DAkkS Deutsche Akkreditierungsstelle D-PL-12139-01-00

IMST

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SAR Evaluation Report

EUT Information	
Manufacturer	Panasonic
Model Name	KX-TGFA51
FCC ID	ACJ96NKX-TGFA51
EUT Type	portable device
Prepared by	
Testing Laboratory	IMST GmbH, Test Center Carl-Friedrich-Gauß-Str. 2 – 4 47475 Kamp-Lintfort Germany
Prepared for	
Applicant	Panasonic System Networks Co., Ltd. 1-62, 4 - chome Minoshima, Hakata Fukuoka 812-8531 Japan
Test Specification	
Standard Applied	FCC CFR § 2.1093; IEEE 1528-2013 and the published KDB procedures
Exposure Category	General Public / Uncontrolled Exposure
Configuration	Head and Body Worn Configuration
Report Information	
Data Stored	60320_6160544_TGFA51
Issue Date	November 25, 2016
Revision Date	-
Revision Number	-
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.

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1 Subject of Investigation and Test Results

1.1 Technical Data of EUT

Product Specifications	
IMEI / SN	01
Operation Mode	DECT UPCS (TDD)
Frequency Band	1920 – 1930 MHz
Duty Cycle	1/24 (4.2 %)*
Modulation	GFSK
Usage Configuration	head and body worn
Antenna Type	integrated (1x PCB)
Max. Output Power	20 dBm
Power Supply	DC 2.4V (2x 1.2V NiMH Batteries)
Used Accessory	RP-TCA430 headset

Notes:
*The basic, repeating, frame structure is 10 ms long. It is sub-divided into 24 slots. During a call, the handset transmits with 1 of 24 time slots under worst case.

1.2 Antenna Configuration

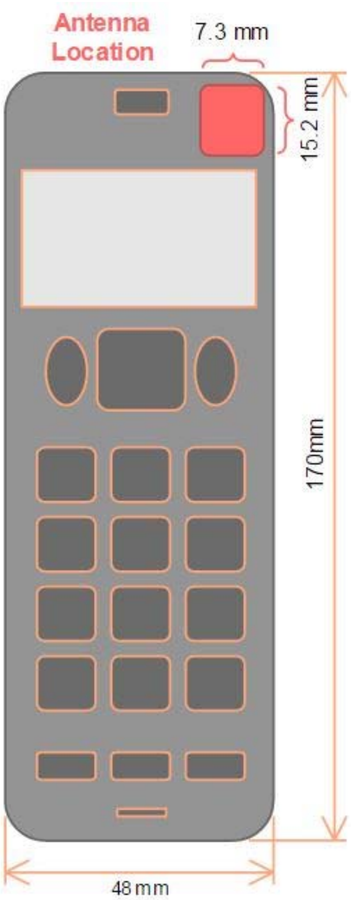

Fig. 1: Antenna location of the EUT.

1.3 Test Specification / Normative References

The tests documented in this report were 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
		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

1.4 Attestation of Test Results

Highest MeasuredSAR$_{1g}$ [W/kg]									
Band	**Frequency [MHz]**	**CH**	**Phantom Configuration**		**Gap [mm]**	**Pic.. No.**	**Highest Reported SAR1g [W/kg]**	**SAR1g Limit [W/kg]**	
DECT UPCS	1924.992	00	Head	Left Cheek	0	4	0.040	1.6	PASS
	1921.54	04	Body Worn	Front	0	8	0.038	1.6	PASS
Notes: To establish a connection at a specific channel and with maximum output power, engineering test software has been used.									

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Quality Assurance

2 Exposure Criteria and Limits

The exposure criteria are based on the withdrawn IEEE Standard C95.1-2005. The standards distinguish between uncontrolled and controlled environment.

General population / uncontrolled environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The exposures may occur in living quarters or workplaces.

Occupational / controlled environments are locations where there is exposure that may be incurred by persons who are aware of the potential for exposure as a concomitant of employment or by other cognizant persons. For exposure in controlled environments higher field strengths are admissible.

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 and trunk	1.6	1 g of tissue*	8.0	1 g of tissue*
Peak spatially-averaged SAR in the limbs	4.0	10 g of tissue*	20.0	10 g of tissue*
Note: *Defined as a tissue volume in the shape of a cube				

Table 1: SAR limits.

In this report the comparison between the FCC 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.

2.1 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:

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

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.

For the relevant frequency range the maximum permissible exposure may be exceeded if the exposure can be shown by appropriate techniques to produce SAR values below the corresponding limits.

3 Measurement Procedure

3.1 General Requirements

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.

3.2 Device Operating next to a Person's Ear

3.2.1 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.

3.2.2 Test Positions

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. 2 - 1. 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. 2 and 1), 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. 2). The horizontal line is also tangential to the face of the handset at point A. The two lines intersect at point A.

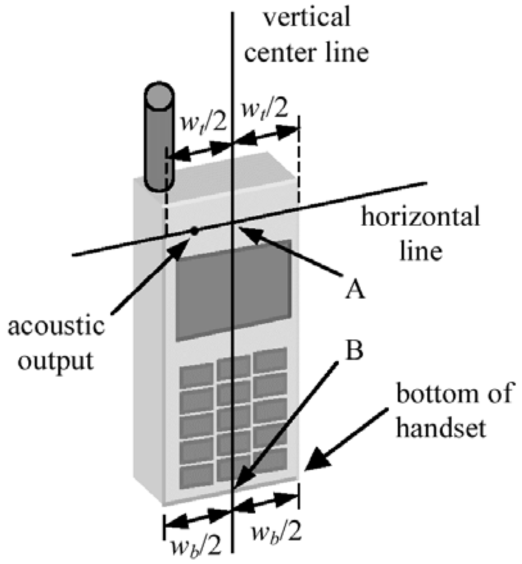

Fig. 2: Geometrical definitions on the telephone (bar phone).

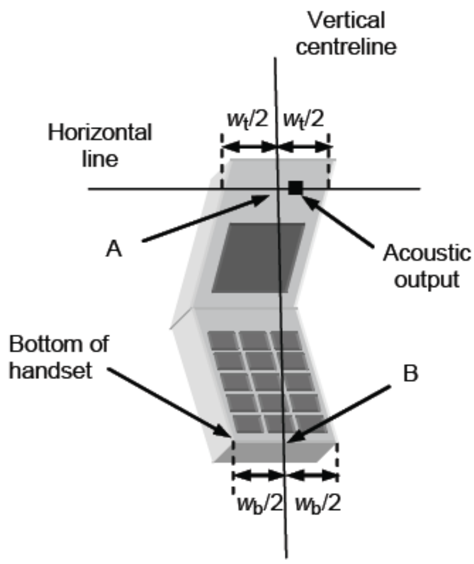

Fig. 3: Geometrical definitions on the telephone (clam shell or flip).

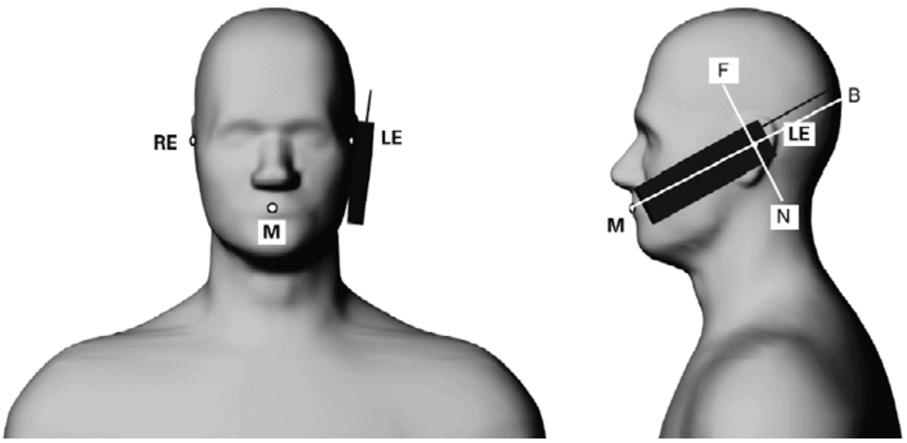

Fig. 4: Phantom reference points.

According to Fig. 4 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. 4. 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

- **Cheek Position (see Fig. 5):**

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. 4), 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.

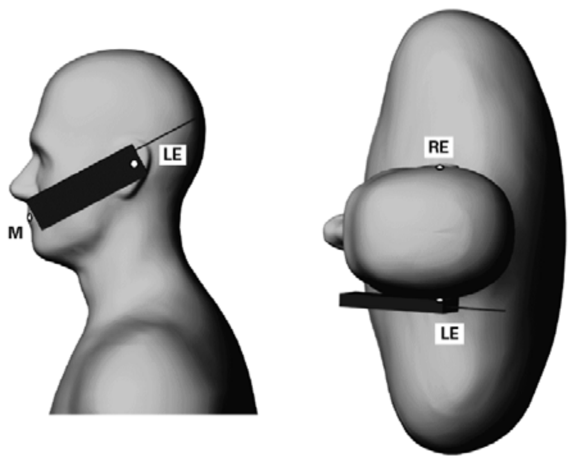

Fig. 5: The cheek position.

- **Tilted Position (see Fig. 6):**

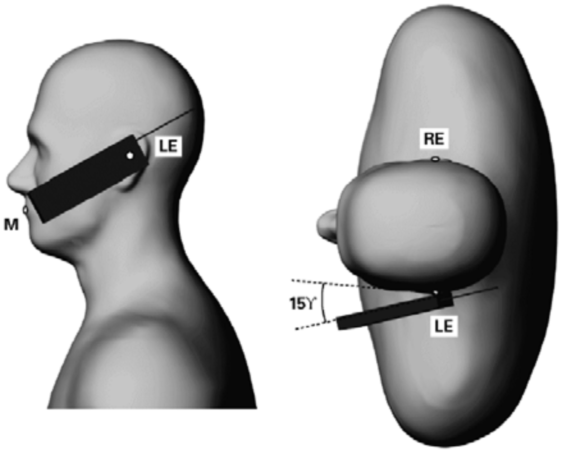

Fig. 6: The tilted position.

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.

3.2.3 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.

3.3 Body-Worn Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to 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.

3.3.1 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.

3.4 Measurement Variability

According KDB 865664 repeated measurements are required only when the measured SAR is ≥ 0.80 W/kg. If the measured SAR value of the initial repeated measurement is < 1.45 W/kg with ≤ 20% variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. A second repeated measurement is required only if the measured result for the initial repeated measurement is within 10% of the SAR limit and vary by more than 20%, which are often related to device and measurement setup difficulties. 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 (~ 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.

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: 7. Additionally, Fig: 7 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

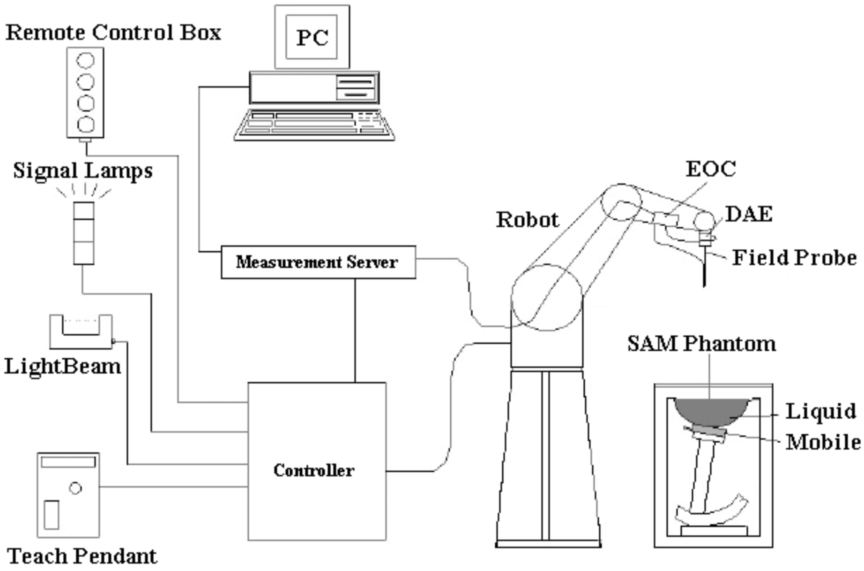

Fig. 7: The DASY4 measurement system.

Fig. 8: The measurement set-up with two SAM phantoms containing tissue simulating liquid.

The EUT 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. The measurement time takes about 20 minutes.

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.
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

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 / 900 MHz / 1750 MHz / 1900 MHz / 1950 MHz for head and body simulating liquid

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	1950 MHz / 2450 MHz / 2600 MHz / 3500 MHz / 5200 MHz / 5300 MHz / 5600 MHz / 5800 MHz for head and body simulating liquid

4.3 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 2.
- 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.

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

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

Table 2: Parameters for SAR scan procedures.

5 System Verification and Test Conditions

5.1 Date of Testing

Date of Testing				
Band		**Frequency [MHz]**	**Date of System Check**	**Date of SAR Measurement**
DECT UPCS	**Head**	1900	November 21, 2016	November 21, 2016
	Body	1900	November 23, 2016	November 23, 2016

Table 3: Date of testing.

5.2 Environment Conditions

Environment Conditions		
Ambient Temperature[°C]	**Liquid Temperature [°C]**	**Humidity [%]**
22.0 ± 2	22.0 ± 2	40.0 ± 5
Notes: To comply with the required noise level (less than 12 mW/kg) periodically measurements without a DUT were conducted.		

Table 4: Environment Conditions.

5.3 Tissue Recipes

Tissue Recipes			
Frequency [MHz]	**Substance**	**Head**	**Body**
		Quantity [%]	**Quantity [%]**
1900	Diethylenglykol-monobutylether	44.51	30.00
	De-Ionized Water	55.41	69.79
	Salt	0.08	0.20
Notes: *The recipes are provided in percentage by weight*			

Table 5: Recipes of the tissue simulating liquid.

5.4 Tissue 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.

Tissue Simulating Liquids								
Band	**Frequency**	**Channel**	**Permittivity**			**Conductivity**		
			Measured	**Target**	**Delta**	**Measured**	**Target**	**Delta**
	[MHz]		**ε'**	**ε'**	**+/- 5 [%]**	**σ [S/m]**	**σ [S/m]**	**+/- 5 [%]**
DECT UPCS Head	*1900.0*	*System Check*	*38.4*	*40.0*	*-4.0*	*1.40*	*1.40*	*-0.3*
	1921.536	4	38.3	40.0	-4.2	1.42	1.40	1.1
	1924.992	2	38.3	40.0	-4.3	1.42	1.40	1.5
	1928.448	0	38.3	40.0	-4.3	1.43	1.40	1.9
DECT UPCS Body	*1900.0*	*System Check*	*52.0*	*53.3*	*-2.4*	*1.54*	*1.52*	*1.5*
	1921.536	4	52.0	53.3	-2.5	1.56	1.52	2.8
	1924.992	2	52.0	53.3	-2.5	1.57	1.52	3.1
	1928.448	0	52.0	53.3	-2.5	1.57	1.52	3.5
Notes: The dielectric properties of the tissue simulating liquid must be measured within 24 h before the SAR testing.								

Table 6: Parameters of the tissue simulating liquid.

5.5 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 signal) and it was placed under the flat part of the SAM phantom. The target and measured results are listed in the table 3 and shown in plots 11 - 12. The target values were adopted from the calibration certificates found in the appendix.

Target and Measured Results				
Band	**Used Dipole**		**SAR1g [W/kg]**	**Delta [%]**
1900 MHz HEAD	**D1900V2, SN #535**	Target Values Head	10.03	- 5.28
		Measured Values Head	9.5	
1900 MHz BODY	**D1900V2, SN #535**	Target Values Body	9.93	-3.02
		Measured Values Body	9.63	

Table 7: Dipole target and measured results.

6 SAR Measurement Conditions and Results

6.1 SAR Measurement Conditions

Test Conditions					
Band	**TX Range [MHz]**	**RX Range [MHz]**	**Used Channels**	**Crest Factor**	**Phantom**
DECT UPCS	1921.536 - 1928.448	1921.536 - 1928.448	04, 02, 00	24	SAM Twin Phantom V4.0

Table 8: Used channels and crest factors during the test.

6.2 Output Power Values and Tune-Up Information

Average Measured and Maximum Transmit Output Power [dBm]				
Mode	**Freq. [MHz]**	**CH**	**Measured Output Power**	**Tune-Up Limit**
DECT UPCS	1921.536	04	18.63	20.0
	1924.992	02	18.59	20.0
	1928.448	00	18.85	20.0

Table 9: Conducted output power and maximum transmit power values.

6.3 SAR Results

The tables below contain the measured SAR values averaged over a mass of 1 g. SAR assessment was conducted in the worst case configuration with output power values according Table 9.

According KDB 447498 D01 V05, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.

- Scaling Factor = tune-up limit power (mW) / RF power (mW)
- Reported SAR = measured SAR * scaling factor

Furthermore, testing of other required channels within the operating mode of frequency band is not required when the reported SAR for the mid-band or highest output power channel is ≤ 0.4 W/kg for transmission band ≥ 200 MHz.

SAR Measurement Results in Head and Body Worn Configurations											
Band	**Freq. [MHz]**	**CH**	**Phantom Configuration**		**Gap [mm]**	**Pic. No.**	**Measured SAR1g [W/kg]**	**Power Drift [dB]**	**Tune-Up Scaling Factor**	**Reported SAR1g [W/kg]**	**Plot No.**
DECT UPCS	1924.992	02	Left Head	Cheek	0	4	0.029	-0.131	1.384	0.040	1
				Tilted	0	5	0.019	0.039	1.384	0.026	2
			Right Head	Cheek	0	6	0.023	-0.182	1.384	0.032	3
				Tilted	0	7	0.015	-0.080	1.384	0.021	4
	1921.536	04	Left Head	Cheek	0	4	0.026	-0.031	1.371	0.036	5
	1928.448	00		Cheek	0	4	0.026	-0.056	1.303	0.034	6
	1924.99	02	Body Worn*	Front	0	8	0.022	0.067	1.384	0.030	7
				Back	0	9	0.007	0.117	1.384	0.009	8
	1921.54	04		Front	0	8	0.028	-0.181	1.371	0.038	9
	1928.45	00		Front	0	8	0.026	-0.083	1.303	0.034	10
Notes: Since the measured max SAR is < 0.8 W/kg measurement variability assessment according to KDB 865664 is not applicable. *Measurements in body worn configuration were performed with attached headset.											

Table 10: SAR results

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: (Drift[dB]). This ensures that the power drift during one measurement is within 5%.

7 Administrative Measurement Data

7.1 Calibration of Test Equipment

Test Equipment				
Test Equipment	**Model**	**Serial Number**	**Last Calibration**	**Next Calibration**
DASY4 Systems				
Software Versions DASY4	V4.7	N/A	N/A	N/A
Software Versions SEMCAD	V1.8	N/A	N/A	N/A
Dosimetric E-Field Probe	ET3DV6R	1579	02/2016	02/2017
Data Acquisition Electronics	DAE 3	335	02/2016	02/2017
Phantom	SAM	1340	N/A	N/A
Dipoles				
Validation Dipole	D1900V2	535	03/2015	03/2017
Material Measurement				
Network Analyzer	E5071C	MY46103220	07/2015	07/2017
Dielectric Probe Kit	DAK-3.5	1234	01/2016	01/2018
Power Meters				
Power Meter. Agilent	E4416A	GB41050414	02/2015	02/2017
Power Meter. Agilent	E4417A	GB41050441	02/2015	02/2017
Power Sensors				
Power Sensor. Agilent	E9301H	US40010212	03/2015	03/2017
Power Sensor. Agilent	E9301A	MY41495584	03/2015	03/2017
RF Sources				
Network Analyzer	E5071C	MY46103220	07/2015	07/2017
Rohde & Schwarz	SME300	100142	N/A	N/A
Amplifiers				
Mini Circuits	ZHL-42	D012296	N/A	N/A
Mini Circuits	ZHL-42	D031104#01	N/A	N/A
Mini Circuits	ZVE-8G	D031004	N/A	N/A
Radio Tester				
Rohde & Schwarz	MT8815B	6200576536	04/2016	04/2018

Table 11: Calibration of test equipment.

7.2 Uncertainty Assessment

According to the KDB 865664 D01, SAR Measurement 100 MHz to 6 GHz, when the highest measured 1g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE 1528-2013 is not required in SAR reports submitted for equipment approval.

8 Report History

Revision History				
Revision	**Description of Revision**	**Date**	**Revised Page**	**Revised By**
/	Initial Release	November 25, 2016	-	-

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