SAR TEST REPORT

Test Report No. 14630447S-A-R2

Customer	**Sony Group Corporation**
Description of EUT	**Wireless Noise Canceling Stereo Headset**
Model Number of EUT	**YY2963**
FCC ID	**AK8YY2963**
Test Regulation	**FCC 47CFR Part 2 (2.1093)**
Test Result	**Complied (Refer to SECTION 3)**
Issue Date	**February 16, 2023**
Remarks	-

Representative Test Engineer	**Approved By**
Hiroshi Naka Engineer	Toyokazu Imamura Leader

CERTIFICATE 1266.03

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan, Inc.

☒ There is no testing item of "Non-accreditation".

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- The information provided from the applicant for this report is identified in Section 1.
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REVISION HISTORY

Original Test Report No.: 14630447S-A

This report is a revised version of 14630447S-A-R1. 14630447S-A-R1 is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14670447S-A	February 1, 2023	-
-R1	14670447S-A-R1	February 10, 2023	(p25) Corrected mistake of formula of "$corr_i$". (p27) Corrected mistake, Plot data (January 23, 24), Corrected F of ConvF (new: 2450 MHz). (p28) Corrected mistake, Deleted version information of (u, U) of uncertainty table (Meas., daily check). (p28) Add remarks of uncertainty table. "All listed error components have veff equal to ∞."
-R2	14670447S-A-R2	February 16, 2023	(p10) Corrected mistake, Corrected duty cycle of BT LE and re-calculated BT LE power data. (p11) Corrected mistake, Corrected calculation of duty cycle for BT LE (PHY1) and BT LE (PHY2) in the chart. (p13) Corrected mistake, Corrected duty cycle of BT LE and re-calculated Scaled SAR value.

(p10) (was)

BT-LE (1Mbps)	2402	0	1	46	86.1	0.65	1.16	7.42	5.52	**8.07**	6.41	-	**9.5**	-1.43	1.39	n/a	EUT: Left
	2440	19	1	46	86.1	0.65	1.16	7.27	5.33	**7.92**	6.19	-	**9.5**	-1.58	1.44	n/a	
	2480	39	1	46	86.1	0.65	1.16	7.26	5.32	**7.91**	6.18	-	**9.5**	-1.59	1.44	n/a	
BT-LE (2Mbps)	2402	0	2	46	57.5	2.40	1.74	5.64	3.66	**8.04**	6.37	-	**9.5**	-1.46	1.40	n/a	EUT: Left
	2440	19	2	46	57.5	2.40	1.74	5.50	3.55	**7.90**	6.17	-	**9.5**	-1.60	1.45	n/a	
	2480	39	2	46	57.5	2.40	1.74	5.49	3.54	**7.89**	6.15	-	**9.5**	-1.61	1.45	n/a	
BT-LE (1Mbps)	2402	0	1	46	86.1	0.65	1.16	7.06	5.08	**7.71**	5.90	-	**9.5**	-1.79	1.51	n/a	EUT: Right
	2440	19	1	46	86.1	0.65	1.16	6.92	4.92	**7.57**	5.71	-	**9.5**	-1.93	1.56	n/a	
	2480	39	1	46	86.1	0.65	1.16	6.87	4.86	**7.52**	5.65	-	**9.5**	-1.98	1.58	n/a	
BT-LE (2Mbps)	2402	0	2	46	57.5	2.40	1.74	5.28	3.37	**7.68**	5.86	-	**9.5**	-1.82	1.52	n/a	EUT: Right
	2440	19	2	46	57.5	2.40	1.74	5.15	3.27	**7.55**	5.69	-	**9.5**	-1.95	1.57	n/a	
	2480	39	2	46	57.5	2.40	1.74	5.11	3.24	**7.51**	5.64	-	**9.5**	-1.99	1.58	n/a	

(new)

85.2	0.70	1.17	**8.12**	6.49	-	**9.5**	-1.38	1.37
85.2	0.70	1.17	**7.97**	6.27	-	**9.5**	-1.53	1.42
85.2	0.70	1.17	**7.96**	6.25	-	**9.5**	-1.54	1.43
57.1	2.43	1.75	**8.07**	6.41	-	**9.5**	-1.43	1.39
57.1	2.43	1.75	**7.93**	6.21	-	**9.5**	-1.57	1.44
57.1	2.43	1.75	**7.92**	6.19	-	**9.5**	-1.58	1.44
85.2	0.70	1.17	**7.76**	5.97	-	**9.5**	-1.74	1.49
85.2	0.70	1.17	**7.62**	5.78	-	**9.5**	-1.88	1.54
85.2	0.70	1.17	**7.57**	5.71	-	**9.5**	-1.93	1.56
57.1	2.43	1.75	**7.71**	5.90	-	**9.5**	-1.79	1.51
57.1	2.43	1.75	**7.58**	5.73	-	**9.5**	-1.92	1.56
57.1	2.43	1.75	**7.54**	5.68	-	**9.5**	-1.96	1.57

(p13) (was)

Left	Front	0	Battery	BT LE (1Mbps)	2402	0	86.1	-	1.16	9.5	8.07	1.39	**0.529**	Positive	n/a (*a)	**0.853**	1g	1.6	-		>0.8 W/kg(1g)
	Front	0	Battery	BT LE (1Mbps)	2440	19	86.1	-	1.16	9.5	7.92	1.44	**0.261**	Positive	n/a (*a)	**0.436**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	BT LE (1Mbps)	2480	39	86.1	-	1.16	9.5	7.91	1.44	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	BT LE (2Mbps)	2402	0	57.5	-	1.74	9.5	8.04	1.40	**0.360**	Positive	n/a (*a)	**0.877**	1g	1.6	-		>0.8 W/kg(1g)
	Front	0	Battery	BT LE (2Mbps)	2440	19	57.5	-	1.74	9.5	7.90	1.45	**0.244**	Positive	n/a (*a)	**0.616**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	BT LE (2Mbps)	2480	39	57.5	-	1.74	9.5	7.89	1.45	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
Right	Front	0	Battery	BT LE (1Mbps)	2402	0	86.1	-	1.16	9.5	7.71	1.51	**0.300**	Positive	n/a (*a)	**0.525**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	BT LE (1Mbps)	2440	19	86.1	-	1.16	9.5	7.57	1.56	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	BT LE (1Mbps)	2480	39	86.1	-	1.16	9.5	7.52	1.58	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	BT LE (2Mbps)	2402	0	57.5	-	1.74	9.5	7.68	1.52	**0.209**	Positive	n/a (*a)	**0.553**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	BT LE (2Mbps)	2440	19	57.5	-	1.74	9.5	7.55	1.57	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	BT LE (2Mbps)	2480	39	57.5	-	1.74	9.5	7.51	1.58	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-

(new)

Left	Front	0	Battery	BT LE (1Mbps)	2402	0	85.2	-	1.17	9.5	8.07	1.39	**0.529**	Positive	n/a (*a)	**0.860**	1g	1.6	-		>0.8 W/kg(1g)
	Front	0	Battery	BT LE (1Mbps)	2440	19	85.2	-	1.17	9.5	7.92	1.44	**0.261**	Positive	n/a (*a)	**0.440**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	BT LE (1Mbps)	2480	39	85.2	-	1.17	9.5	7.91	1.44	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	BT LE (2Mbps)	2402	0	57.1	-	1.75	9.5	8.04	1.40	**0.360**	Positive	n/a (*a)	**0.882**	1g	1.6	-		>0.8 W/kg(1g)
	Front	0	Battery	BT LE (2Mbps)	2440	19	57.1	-	1.75	9.5	7.90	1.45	**0.244**	Positive	n/a (*a)	**0.619**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	BT LE (2Mbps)	2480	39	57.1	-	1.75	9.5	7.89	1.45	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
Right	Front	0	Battery	BT LE (1Mbps)	2402	0	85.2	-	1.17	9.5	7.71	1.51	**0.300**	Positive	n/a (*a)	**0.530**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	BT LE (1Mbps)	2440	19	85.2	-	1.17	9.5	7.57	1.56	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	BT LE (1Mbps)	2480	39	85.2	-	1.17	9.5	7.52	1.58	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	BT LE (2Mbps)	2402	0	57.1	-	1.75	9.5	7.68	1.52	**0.209**	Positive	n/a (*a)	**0.556**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	BT LE (2Mbps)	2440	19	57.1	-	1.75	9.5	7.55	1.57	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	BT LE (2Mbps)	2480	39	57.1	-	1.75	9.5	7.51	1.58	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-

Reference : Abbreviations (Including words undescribed in this report) (radio_r0v09s03_221226)

A2LA	The American Association for Laboratory Accreditation
AC	Alternating Current
AFH	Adaptive Frequency Hopping
AM	Amplitude Modulation
Amp, AMP	Amplifier
ANSI	American National Standards Institute
Ant, ANT	Antenna
AP	Access Point
APD	Absorbed Power Density
ASK	Amplitude Shift Keying
Atten., ATT	Attenuator
AV	Average
BPSK	Binary Phase-Shift Keying
BR	Bluetooth Basic Rate
BT	Bluetooth
BT LE	Bluetooth Low Energy
BW	BandWidth
Cal Int	Calibration Interval
CCK	Complementary Code Keying
CDD	Cyclic Delay Diversity
Ch., CH	Channel
CISPR	Comite International Special des Perturbations Radioelectriques
CW	Continuous Wave
DBPSK	Differential BPSK
DC	Direct Current
D-factor	Distance factor
DFS	Dynamic Frequency Selection
DQPSK	Differential QPSK
DSSS	Direct Sequence Spread Spectrum
DUT	Device Under Test
EDR	Enhanced Data Rate
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
EN	European Norm
ERP, e.r.p.	Effective Radiated Power
ETSI	European Telecommunications Standards Institute
EU	European Union
EUT	Equipment Under Test
Fac.	Factor
FCC	Federal Communications Commission
FHSS	Frequency Hopping Spread Spectrum
FM	Frequency Modulation
Freq.	Frequency
FSK	Frequency Shift Keying
GFSK	Gaussian Frequency-Shift Keying
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
Hori.	Horizontal
ICES	Interference-Causing Equipment Standard
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IF	Intermediate Frequency
ILAC	International Laboratory Accreditation Conference
IPD	Incident Power Density
ISED	Innovation, Science and Economic Development Canada
ISO	International Organization for Standardization
JAB	Japan Accreditation Board
LAN	Local Area Network
LIMS	Laboratory Information Management System
MCS	Modulation and Coding Scheme
MIMO	Multiple Input Multiple Output (Radio)
MRA	Mutual Recognition Arrangement
MU-MIMO	Multi-User Multiple Input Multiple Output (Radio)
N/A	Not Applicable, Not Applied
NII	National Information Infrastructure (Radio)
NIST	National Institute of Standards and Technology
NS	No signal detect.
NSA	Normalized Site Attenuation
OBW	Occupied Band Width
OFDM	Orthogonal Frequency Division Multiplexing
P/M	Power meter
PCB	Printed Circuit Board
PER	Packet Error Rate
PHY	Physical Layer
PK	Peak
PN	Pseudo random Noise
PRBS	Pseudo-Random Bit Sequence
PSD	Power Spectral Density
QAM	Quadrature Amplitude Modulation
QP	Quasi-Peak
QPSK	Quadrature Phase Shift Keying
RBW	Resolution Band Width
RDS	Radio Data System
RE	Radio Equipment
RF	Radio Frequency
RMS	Root Mean Square
RSS	Radio Standards Specifications
Rx	Receiving
SA, S/A	Spectrum Analyzer
SAR	Specific Absorption Rate
SISO	Single Input Single Output (Radio)
SG	Signal Generator
SPLSR	SAR to Peak Location Separation Ratio
SVSWR	Site-Voltage Standing Wave Ratio
TSL	Tissue Simulation Liquid
T/R	Test Receiver
Tx	Transmitting
U-NII	Unlicensed National Information Infrastructure (Radio)
VBW	Video BandWidth
Vert.	Vertical
WLAN	Wireless LAN
Wi-Fi, WiFi	Wireless LAN, trademarked by Wi-Fi Alliance

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Contents of appendixes

SECTION 1: Customer information

Company Name	Sony Group Corporation
Address	1-7-1 Konan Minato-ku, Tokyo, 108-0075 Japan
Contact Person	Kazuhiko Nagano

The information provided from the customer is as follows;
- Customer name, Company name, Type of Equipment, Model No., FCC ID on the cover and other relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (EUT)
- SECTION 4: Operation of EUT during testing
- Appendix 1: The part of Antenna location information, Description of EUT and Support Equipment

* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2, SECTION 4 and Appendix 1.

SECTION 2: Equipment under test (EUT)

2.1 Identification of EUT

Type	Wireless Noise Canceling Stereo Headset
Model Number	YY2963
Serial Number	1300882
Rating	Re-chargeable Li-ion battery (DC 3.85 V)
Condition of sample	Engineering prototype (Not for sale: The sample is equivalent to mass-produced items.)
Receipt Date of sample	January 16, 2023 (for power measurement) (*. No modification by the Lab.) January 20, 2023 (for SAR test) (*. No modification by the Lab.)
Test Date (SAR)	January 23~24, 2023

2.2 Product Description

General

Feature of EUT	Model: YY2963 (referred to as the EUT in this report) is a Wireless Noise Canceling Stereo Headset.
SAR Category Identified	Portable device (*. Since EUT may contact to a human head during Bluetooth operation, the partial-body SAR (1g) shall be observed.)
SAR Accessory	Earbud tips. *. Earbud tips are built into the head contact side of the EUT.

Radio specification

Equipment type	Transceiver	Bluetooth version	Version 5.3
Frequency of operation	2402 MHz ~2480 MHz	RF operating voltage	DC 1.2 V / DC 1.8 V
Antenna gain	-3 dBi	Antenna type /connector type	Monopole antenna / Soldering

Bluetooth	BR	EDR		BT LE	
Data rate	1 Mbps	2 Mbps	3 Mbps	1 Mbps	2 Mbps
Channel spacing	1 MHz	1 MHz	1 MHz	2 MHz	2 MHz
Number of channel	79 ch	79 ch	79 ch	40 ch	40 ch
Type of modulation / carrier	GFSK / FHSS	π/4-DQPSK / FHSS	8DPSK / FHSS	GFSK / FHSS	GFSK / FHSS
Tune-up limit (maximum) power	13.5 dBm	10.5 dBm	10.5 dBm	9.5 dBm	9.5 dBm

***.** **T**une-up limit (maximum) is conducted burst average power and is defined by a customer as Duty cycle 100% (continuous transmitting).

SECTION 3: Maximum SAR value, test specification and procedures

3.1 Summary of Maximum SAR Value

Band		Max. power [dBm]	Summary of Highest Reported SAR [W/kg]	
			Partial-body (Separation 0 mm, Flat phantom)	**Head** (Separation 0 mm, Flat phantom (*1))
			SAR (1g)	**SAR (1g)**
2.4GHz band, Bluetooth (BR)		13.5	**1.52** (*2)	**1.52** (*2)
Criteria	Partial body (head): 1.6 W/kg (SAR (1g)) for general population/uncontrolled exposure is specified in FCC 47 CFR part 2 (2.1093).			
Test Procedure	SAR measurement: KDB 447498 D04, KDB 248227 D01, KDB 865664 D01, IEC Std. 1528, UL Japan's SAR Work Procedures No.13-EM-W0429 and 13-EM-W0430.			
Category	FCC 47CFR §2.1093 (Portable device)			
SAR type	Partial-Body (including Head)			

*1. Since the EUT is worn in the ear during use, a flat phantom was used for SAR measurements instead of a SAM phantom.
*2. SAR for a Duty cycle of 83.3% of the maximum value for BT Classic..
Duty cycle of BT Classic is up to 83.3% due to Bluetooth specifications.
For DH5/2DH5/3DH5, Since 1 packet interval = 625 μs,
Tx interval : 625μs *5 packets = 3125 μs (on time), Rx interval : 625 μs (for 1 packet), 1 cycle = 3750 μs (Tx+Rx)
Duty cycle = 3125 μs /3750 μs = 0.83333 (83.3%)

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for head and partial body) specified in FCC 47 CFR part 2 (2.1093) and had been tested in accordance with the measurement methods and procedures specified in FCC KDB publications and IEEE 1528-2013.

3.2 Test specification

The tests documented in this report were performed in accordance with the following standard: FCC 47 CFR Parts 2 (2.1093), IEEE Std.1528-2013, and the following FCC Published RF exposure KDB procedures:

FCC 47 CFR part 2 (2.1093)	Radiofrequency radiation exposure evaluation: portable devices
ANSI/IEEE C95.1-1992	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 KHz to 300 GHz
IEEE Std. 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.
KDB 248227 D01	SAR Guidance for IEEE 802.11 (Wi-Fi) transmitters v02r02
KDB 447498 D04	Interim General RF Exposure Guidance v01
KDB 447498 D03	OET Bulletin 65, Supplement C Cross-Reference v01
KDB 865664 D01	SAR measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02	RF exposure compliance reporting and documentation considerations v01r02

*. The measurement uncertainty budget is suggested by IEC/IEEE 62209-1528:2020 and determined by Schmid & Partner Engineering AG, DASY8 Module SAR Manual, August 2022 (Chapter 6, DASY8 Uncertainty Budget, Frequency band: 300 MHz–6 GHz range). Refer to Appendix3-7 for more details.

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

TCB workshop, October 2016	RF Exposure Procedure, DUT Holder Perturbations When the highest reported SAR of an antenna is > 1.2 W/kg, holder perturbation verification is required for each antenna, using the highest SAR configuration among all applicable frequency bands.
TCB workshop, April 2019	RF Exposure Procedure, 802.11ax SAR Testing
TCB workshop, October 2019	RF Exposure Procedure, Tissue Simulating Liquids (TSL) -Effective February 19, 2019, FCC has permitted the use of single head tissue simulating liquid specified in IEC 62209 for all SAR tests. -Mix and Match of traditional FCC SAR TSLs and IEC 62209 TSL in a single application is not permitted. -TSL can be changed in a Permissive Change. If SAR increases and original SAR > 1.2 W/kg, additional SAR tests will be required. -If FCC parameters are used, 5 % tolerance. If IEC parameters, 10 %.

3.3 Exposure limit

Environments of exposure limit	Whole-Body (averaged over the entire body)	Partial-Body (averaged over any 1g of tissue)	Hands, Wrists, Feet and Ankles (averaged over any 10g of tissue)
(A) Limits for Occupational /Controlled Exposure (W/kg)	0.4	8.0	20.0
(B) Limits for General population /Uncontrolled Exposure (W/kg)	0.08	1.6	4.0

*. Occupational/Controlled Environments: are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).
*. 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 limit applied to this device which tested in this report is;

General population / uncontrolled exposure, Partial-Body (averaged over any 1g of tissue) limit: 1.6 W/kg

3.4 Addition, deviation and exclusion to the test procedure

No addition, exclusion nor deviation has been made from the test procedure.

3.5 Test Location

UL Japan, Inc., Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN
Telephone number: +81 463 50 6400 / Facsimile number: +81 463 50 6401

*. A2LA Certificate Number: 1266.03 (FCC Test Firm Registration Number: 626366, ISED Lab Company Number: 2973D / CAB identifier: JP0001)

Place	Width × Depth × Height (m)	Size of reference ground plane (m) / horizontal conducting plane
No.7 Shielded room	2.76 × 3.76 × 2.4	2.76 × 3.76

3.6 SAR measurement procedure

3.6.1 Normal SAR measurement procedure

Step 1: Confirmation before SAR testing

Before SAR test, the RF wiring for the sample had been switched to the antenna conducted power measurement line from the antenna line and the average power was measured. The SAR test reference power measurement and the SAR test were proceeded with the lowest data rate (which has the higher time-based average power typically) on each operation mode. Therefore, the average output power was measured on the lower, middle (or near middle), upper and specified channels with the lowest data rate of each operation mode. The power of other data rate was also measured to confirm the time-base average power and when if it's required. The power measurement result is shown in Section 5.

*. The EUT transmission power was verified that it was not more than 2 dB lower than the maximum tune-up tolerance limit when it was set the rated power. (KDB447498 D04 (v01))

Step 2: Power reference measurement

Measurement of the E-field at a fixed location above the central position of flat phantom (or/and furthermore an interpolated peak SAR location of area scan in step 2) was used as a reference value for assessing the power drop.

Step 3: Area Scan (Area scan parameters: KDB 865664 D01 (v01r04).)

The SAR distribution at the exposed side of head or body position was measured at a distance of each device from the inner surface of the shell. The area covered the entire dimension of the antenna of EUT and suitable horizontal grid spacing of EUT. Based on these data, the area of the maximum absorption was determined by splines interpolation.

	≤ 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.	

Step 4: Zoom Scan and post-processing (Zoom scan parameters: KDB 865664 D01 (v01r04).)

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure.

A volume of 30 mm (X) × 30 mm (Y) × 30 mm (Z) (or more) was assessed by measuring 7×7×7 points (or more) (by "Ratio step" method (*1)), for 2.4GHz band.

A volume of 24 mm (X) × 24 mm (Y) × 24mm (Z) (or more) was assessed by measuring 7×7×7 points (or more) (by "Ratio step" method (*1)), for 5GHz band.

When the SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are proceeded for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR. If the zoom scan measured as defined above complies with both of the following criteria. or if the peak spatial-average SAR is below 0.1 W/kg, no additional measurements are needed.

*. The smallest horizontal distance from the local SAR peaks to all points 3 dB below the SAR peak shall be larger than the horizontal grid steps in both x and y directions and recorded.
*. The ratio of the SAR at the second measured point to the SAR at the closest measured point at the x-y location of the measured maximum SAR value shall be at least 30 % and recorded.

				f ≤ 3 GHz	3 GHz < f ≤ 6 GHz
1	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*
2	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
3		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
4			$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$ mm	
5	Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm
	* The asterisk table-footnote is per KDB Pub. 865664 D01 v01r04. NOTE For uniformity purposes the integer frequency increments of rows 1 to 3 and 5 apply, rather than the corresponding variable and fixed parameters given in IEC 62209-1:2016 and IEC 62209-2:2010/AMD1:2019.				

Step 5: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 2. It was checked that the power drift is within ±5% in the evaluation procedure of SAR testing. The verification of power drift during the SAR test is that DASY system calculates the power drift by measuring the e-filed at the same location at beginning and the end of the scan measurement for each test position. The result is shown in SAR plot data of APPENDIX 2.

*. DASY system calculation Power drift value[dB] =20log(Ea)/(Eb) (where, Before SAR testing: Eb[V/m] / After SAR testing: Ea[V/m])
Limit of power drift[W] = ±5%; Power drift limit (X) [dB] = 10log(P_drift)=10log(1.05/1) = 10log(1.05)-10log(1) = <u>0.21dB</u>
from E-filed relations with power; S=E×H=E^2/η=P/(4×π×r^2) (η: Space impedance) → P=(E^2×4×π×r^2)/η
Therefore, The correlation of power and the E-filed
Power drift limit (X) dB=10log(P_drift) = 10log(E_drift)^2=20log(E_drift)
From the above mentioned, **<u>the calculated power drift of DASY system must be the less than (±) 0.21 dB.</u>**

*. The all SAR tests were conservatively performed with test separation distance 0 mm. The phantom bottom thickness is approx. 2mm. Typical distance from probe tip to dipole centers is 1mm. The distance between the SAR probe tip to the surface of test device which is touched the bottom surface of the phantom is approx. 3 mm for 2.4GHz band and 2.4 mm for 5GHz band.

*1. For 2.4GHz band, "Ratio step" method parameters used; the first measurement point: "1.4 mm" from the phantom surface, the initial z grid separation: "1.5 mm", subsequent graded grid ratio: "1.5". For 5GHz band, "Ratio step" method parameters used; the first measurement point: "1.4 mm" from the phantom surface, the initial z grid separation: "1.4 mm", subsequent graded grid ratio: "1.4". These parameters comply with the requirement of KDB 865664 D01and recommended by Schmid & Partner Engineering AG (DASY8 manual).

SECTION 4: Operation of EUT during testing

4.1 Operating modes for SAR testing

The EUT has BR, EDR and BT LE continuous transmitting modes. The frequency and the modulation used in the SAR testing are shown as a following.

Operation mode	BR	EDR		BT LE	
Tx Band [MHz]	2402~2480				
Max.power [dBm]	13.5	10.5	10.5	9.5	9.5
Modulation	GFSK	π/4-DQPSK	8DPSK	GFSK	GFSK
Data rate [Mbps]	1 (DH5)	2 (2DH5)	3 (3DH5)	1M-PHY	2M-PHY
Channel spacing [MHz]	1	1	1	2	2
Frequency tested [MHz]	2402, 2441, 2480	2402, 2441, 2480	2402, 2441 (*1)	2402, 2440 (*1)	2402, 2440 (*1)

Controlled software	Test name	Software name	Version	Date	Storage location / Remarks
	Power measurement, SAR test	Main Unit Software	Version 100	2023/1/16	Memory of EUT (firmware)
		Earbuds BT Test 0.04	Version 0.04	2022/10/31	Host PC

*. Max.power: Maximum power (tune-up limit power), n/a: SAR test was not applied.
*1. SAR test applies in according to the following "SAR test reduction considerations" procedure.

SAR test reduction considerations

(KDB 447498 D04 (v01), General RF Exposure Guidance) Testing of other required channels within the operating mode of a frequency band is not required when the reported 1g or 10g SAR for the mid-band or highest output power channel is:

(1) ≤ 0.8 W/kg for 1g , or 2.0 W/kg for 10g respectively, when the transmission band is ≤ 100 MHz
(2) ≤ 0.6 W/kg for 1g, or 1.5 W/kg for 10g respectively, when the transmission band is between 100 MHz and 200 MHz
(3) ≤ 0.4 W/kg for 1g, or 1.0 W/kg for 10g respectively, when the transmission band is ≥ 200 MHz

4.2 RF exposure conditions

Antenna separation distances in each test setup plan are shown as follows.

Setup plan	Explanation of SAR test setup plan (*. Refer to Appendix 1 for test setup photographs which had been tested.)	Left: D [mm]	Left: SAR Tested /Reduced (*2)	Right: D [mm]	Right: SAR Tested /Reduced (*2)	SAR type
Front	The other side of the ear side of EUT is touched to the Flat phantom.	**0.8**	**Tested**	**0.8**	**Tested**	Head touch (inner ear)
Left	The rear side of EUT (back of the head) is touched to the Flat phantom.	**2.2**	**Tested**	**2.2**	**Tested**	
Bottom	The bottom side of EUT is touched to the Flat phantom.	**2.7**	**Tested**	**3.5**	**Tested**	
Top	The top side of EUT is touched to the Flat phantom.	**3.5**	**Tested**	**2.7**	**Tested**	
Right	The forward side of EUT (face side) is touched to the Flat phantom.	**6.6**	**Tested**	**6.6**	**Tested**	
Back	The ear side of EUT is touched to the Flat phantom.	**17.5**	**Tested**	**17.5**	**Tested**	

*. **D:** Antenna separation distance. It is the distance from the antenna inside EUT to the outer surface of EUT which user may touch.

***2. [SAR test exemption consideration by KDB 447498 D04 (v01)]**

							Judge of SAR test exemption ("Test "or "Exempt") / SAR based Threshold power					
							D: Antenna separation distance [mm]					
Tx mode	Higher frequency [MHz]	Conducted: Max. ave. power		Antenna: Gain	ERP		D: ≤ 5 (0.8)	D: ≤ 5 (2.2)	D: ≤ 5 (2.7)	D: ≤ 5 (3.5)	D: 7 mm	D: 18 mm
							Front (L), Front (R)	Left (L), Left (R)	Bottom (L), Top (R)	Top (L), Bottom (R)	Right (L), Right (R)	Back (L), Back (R)
		[dBm]	[mW]	[dBi]	[dBm]	[mW]	SAR1g	SAR1g	SAR1g	SAR1g	SAR1g	SAR1g
BR	2480	13.5	**22.4**	-3	8.35	6.8	**Test**, 3 mW	**Test**, 3 mW	**Test**, 3 mW	**Test**, 3 mW	**Test**, 5 mW	Can be reduced, 31 mW
EDR	2480	10.5	**11.2**	-3	5.35	3.4	**Test**, 3 mW	**Test**, 3 mW	**Test**, 3 mW	**Test**, 3 mW	**Test**, 5 mW	Can be reduced, 31 mW
BT LE	2480	9.5	**8.9**	-3	4.35	2.7	**Test**, 3 mW	**Test**, 3 mW	**Test**, 3 mW	**Test**, 3 mW	**Test**, 5 mW	Can be reduced, 31 mW

*. Module-based antenna gains with maximum values were used conservatively.
*. Antenna separation distance is rounded to the nearest integer numbers (in mm) before calculation.
*. (Calculating formula) ERP (dBm) = (max. conducted output power, dBm) + (antenna gain, dBi) – 2.15

<Conclusion for consideration for SAR test reduction>

1) The all SAR tests were conservatively performed with test separation distance 0 mm.
2) All surface (6 face) of EUT's setup are applied the SAR test because the EUT is small device (higher than calculated threshold power).

*. SAR-based thresholds (Pth (mW) shown below table of "Example Power Thresholds [mW]" are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum time-averaged power or maximum time-averaged effective radiated power (ERP), whichever is greater. The SAR-based exemption is calculated by Formula (B.2) in below, applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold Pth (mW).
When 10-g extremity SAR applies, SAR test exemption may be considered by applying a factor of 2.5 to the SAR-based exemption thresholds.
*. This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive).

Table: Example Power Thresholds [mW] (SAR(1g), KDB 447498 D01 (v07))

Frequency [MHz] \ Distance [mm]	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	35	40	45	50
2402	3	4	5	7	9	10	12	15	17	20	22	25	28	32	35	39	42	46	50	55	59	64	68	73	78	84	112	144	180	220
2412	3	4	5	7	8	10	12	15	17	20	22	25	28	32	35	39	42	46	50	55	59	64	68	73	78	83	112	144	180	220
2450	3	4	5	7	8	10	12	15	17	19	22	25	28	31	35	38	42	46	50	54	59	63	68	73	78	83	111	143	179	219
2462	3	4	5	7	8	10	12	14	17	19	22	25	28	31	35	38	42	46	50	54	58	63	68	73	78	83	111	143	179	219
2480	3	4	5	7	8	10	12	14	17	19	22	25	28	31	35	38	42	46	50	54	58	63	67	72	77	82	111	143	179	218
3600	2	3	4	5	6	8	10	11	13	16	18	20	23	26	29	32	35	38	42	45	49	53	57	62	66	71	96	125	158	195
5180	2	2	3	4	5	6	8	9	11	13	15	17	19	21	24	26	29	32	35	38	42	45	49	53	57	61	84	110	141	175
5240	1	2	3	4	5	6	8	9	11	13	14	17	19	21	24	26	29	32	35	38	42	45	49	53	57	61	83	110	140	174
5260	1	2	3	4	5	6	8	9	11	13	14	16	19	21	24	26	29	32	35	38	42	45	49	52	56	61	83	110	140	174
5320	1	2	3	4	5	6	8	9	11	12	14	16	19	21	23	26	29	32	35	38	41	45	48	52	56	60	83	109	139	173
5500	1	2	3	4	5	6	7	9	10	12	14	16	18	21	23	26	28	31	34	37	41	44	48	51	55	59	82	108	138	172
5700	1	2	3	4	5	6	7	9	10	12	14	16	18	20	23	25	28	31	34	37	40	43	47	51	55	59	81	107	136	170
5745	1	2	3	4	5	6	7	9	10	12	14	16	18	20	22	25	28	31	34	37	40	43	47	51	54	58	80	106	136	169
5800	1	2	3	4	5	6	7	9	10	12	14	16	18	20	22	25	28	30	33	36	40	43	47	50	54	58	80	106	136	169
5825	1	2	3	4	5	6	7	9	10	12	14	16	18	20	22	25	28	30	33	36	40	43	47	50	54	58	80	106	135	169

TABLE B.1—THRESHOLDS FOR SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	-	1.34	159 m	-	35.6 m	1,920 R^2
1.34	-	30	35.6 m	-	1.6 m	3,450 R^2/f^2
30	-	300	1.6 m	-	159 mm	3.83 R^2
300	-	1,500	159 mm	-	31.8 mm	0.0128 $R^2 f$
1,500	-	100,000	31.8 mm	-	0.5 mm	19.2 R^2

Subscripts L and H are low and high; λ is wavelength.
From §1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.

R is in meter, f is in MHz
Threshold ERP [W] = 19.2 × R^2 (~formula (A.1))
(*. where "R" is: > 0.4 m)

Calculating formula:

$$P_{th}\ (\text{mW}) = ERP_{20\ \text{cm}}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases} \quad \text{(B.1)}$$

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ \text{cm}} (d/20\ \text{cm})^x & d \le 20\ \text{cm} \\ ERP_{20\ \text{cm}} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases} \quad \text{(B.2)} \qquad x = -\log_{10}\left(\frac{60}{ERP_{20\ \text{cm}}\sqrt{f}}\right)$$

and f is in GHz, d is the separation distance (cm), and ERP_{20cm} is per Formula (B.1).

SECTION 5: Confirmation before testing

5.1 SAR reference power measurement (*. antenna terminal conducted average power)

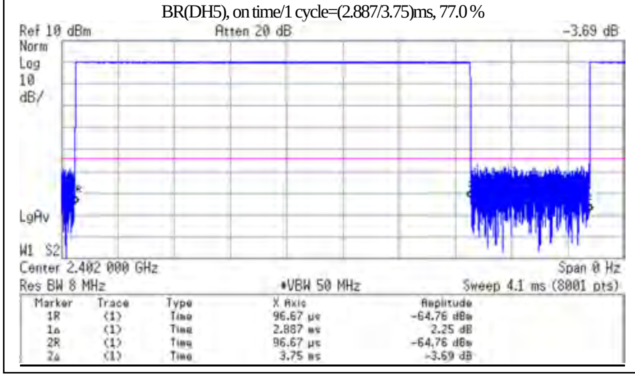
*. Antenna gain (peak): -3 dBi (2.4 GHz band)

Mode	Frequency		Data rate	Power Setting (software)	Duty cycle	Duty factor	Duty scaled factor	Measurement Result: Time average power		Measurement Result: Burst power		Power correction: Power Typical	Power correction: Power Max.	Power correction: Δ from max.	Power correction: Tune-up factor	Power tuning applied?	Remarks
	[MHz]	CH	[Mbps]	[-]	[%]	[dB]	[-]	[dBm]	[mW]	[dBm]	[mW]	[dBm]	[dBm]	[dB]	[-]		
BR	2402	0	1, DH5	55	77.0	1.14	1.30	11.24	13.30	**12.38**	17.30	-	**13.5**	-1.12	1.29	n/a	EUT: Left
	2441	39	1, DH5	55	77.0	1.14	1.30	11.07	12.79	**12.21**	16.63	-	**13.5**	-1.29	1.35	n/a	
	2480	78	1, DH5	55	77.0	1.14	1.30	11.09	12.85	**12.23**	16.71	-	**13.5**	-1.27	1.34	n/a	
EDR (2 Mbps)	2402	0	2, 2DH5	55	77.0	1.14	1.30	8.64	7.31	**9.78**	9.51	-	**10.5**	-0.72	1.18	n/a	EUT: Left
	2441	39	2, 2DH5	55	77.0	1.14	1.30	8.40	6.92	**9.54**	8.99	-	**10.5**	-0.96	1.25	n/a	
	2480	78	2, 2DH5	55	77.0	1.14	1.30	8.41	6.93	**9.55**	9.02	-	**10.5**	-0.95	1.24	n/a	
EDR (3 Mbps)	2402	0	3, 3DH5	55	77.2	1.12	1.30	8.64	7.31	**9.76**	9.46	-	**10.5**	-0.74	1.19	n/a	EUT: Left
	2441	39	3, 3DH5	55	77.2	1.12	1.30	8.41	6.93	**9.53**	8.97	-	**10.5**	-0.97	1.25	n/a	
	2480	78	3, 3DH5	55	77.2	1.12	1.30	8.41	6.93	**9.53**	8.97	-	**10.5**	-0.97	1.25	n/a	
BT-LE (1 Mbps)	2402	0	1	46	85.2	0.70	1.17	7.42	5.52	**8.12**	6.49	-	**9.5**	-1.38	1.37	n/a	EUT: Left
	2440	19	1	46	85.2	0.70	1.17	7.27	5.33	**7.97**	6.27	-	**9.5**	-1.53	1.42	n/a	
	2480	39	1	46	85.2	0.70	1.17	7.26	5.32	**7.96**	6.25	-	**9.5**	-1.54	1.43	n/a	
BT-LE (2 Mbps)	2402	0	2	46	57.1	2.43	1.75	5.64	3.66	**8.07**	6.41	-	**9.5**	-1.43	1.39	n/a	EUT: Left
	2440	19	2	46	57.1	2.43	1.75	5.50	3.55	**7.93**	6.21	-	**9.5**	-1.57	1.44	n/a	
	2480	39	2	46	57.1	2.43	1.75	5.49	3.54	**7.92**	6.19	-	**9.5**	-1.58	1.44	n/a	
BR	2402	0	1, DH5	55	77.0	1.14	1.30	10.86	12.19	**12.00**	15.85	-	**13.5**	-1.50	1.41	n/a	EUT: Right
	2441	39	1, DH5	55	77.0	1.14	1.30	10.79	11.99	**11.93**	15.60	-	**13.5**	-1.57	1.44	n/a	
	2480	78	1, DH5	55	77.0	1.14	1.30	10.72	11.80	**11.86**	15.35	-	**13.5**	-1.64	1.46	n/a	
EDR (2 Mbps)	2402	0	2, 2DH5	55	77.0	1.14	1.30	8.21	6.62	**9.35**	8.61	-	**10.5**	-1.15	1.30	n/a	EUT: Right
	2441	39	2, 2DH5	55	77.0	1.14	1.30	8.11	6.47	**9.25**	8.41	-	**10.5**	-1.25	1.33	n/a	
	2480	78	2, 2DH5	55	77.0	1.14	1.30	8.04	6.37	**9.18**	8.28	-	**10.5**	-1.32	1.36	n/a	
EDR (3 Mbps)	2402	0	3, 3DH5	55	77.2	1.12	1.30	8.21	6.62	**9.33**	8.57	-	**10.5**	-1.17	1.31	n/a	EUT: Right
	2441	39	3, 3DH5	55	77.2	1.12	1.30	8.11	6.47	**9.23**	8.38	-	**10.5**	-1.27	1.34	n/a	
	2480	78	3, 3DH5	55	77.2	1.12	1.30	8.04	6.37	**9.16**	8.24	-	**10.5**	-1.34	1.36	n/a	
BT-LE (1 Mbps)	2402	0	1	46	85.2	0.70	1.17	7.06	5.08	**7.76**	5.97	-	**9.5**	-1.74	1.49	n/a	EUT: Right
	2440	19	1	46	85.2	0.70	1.17	6.92	4.92	**7.62**	5.78	-	**9.5**	-1.88	1.54	n/a	
	2480	39	1	46	85.2	0.70	1.17	6.87	4.86	**7.57**	5.71	-	**9.5**	-1.93	1.56	n/a	
BT-LE (2 Mbps)	2402	0	2	46	57.1	2.43	1.75	5.28	3.37	**7.71**	5.90	-	**9.5**	-1.79	1.51	n/a	EUT: Right
	2440	19	2	46	57.1	2.43	1.75	5.15	3.27	**7.58**	5.73	-	**9.5**	-1.92	1.56	n/a	
	2480	39	2	46	57.1	2.43	1.75	5.11	3.24	**7.54**	5.68	-	**9.5**	-1.96	1.57	n/a	

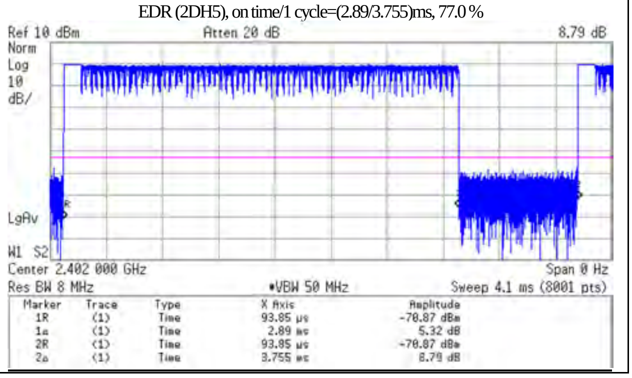
*. The SAR test powers by setting power were not more than 2dB lower than maximum tune-up power (KDB 447498 D04 (v01) requirement).
*. CH: Channel; Max: Maximum; n/a: not applied.

*. Calculating formula: Time average power (dBm) = (P/M Reading, dBm)+(Cable loss, dB)+(Attenuator, dB)
Burst power (dBm) = (P/M Reading, dBm)+(Cable loss, dB)+(Attenuator, dB)+(duty factor, dB)
Duty cycle: (duty cycle, %) = (Tx on time) / (1 cycle time) × 100, Duty factor (dBm) = 10 × log (100/(duty cycle, %))
Duty cycle scaled factor: Duty cycle correction factor for obtained SAR value, Duty scaled factor [-] = 100(%) / (duty cycle, %)
Δ from max. (Deviation form maximum power, dB) = (Burst power measured (average, dBm)) - (Max.tune-up limit power (average, dBm))
Tune-up factor: Power tune-up factor for obtained SAR value, Tune-up factor [-] = 1 / (10 ^ ("Deviation from max., dB" / 10))
*. Date measured: January 17, 2023 / Measured by: H. Naka/ Place: Preparation room of No. 7 shield room. (20 deg.C./ 40 %RH)
*. Uncertainty of antenna port conducted test; (±) 1.3 dB (Average power), (±) 0.27 % (duty cycle).
*. Chart of the worst duty cycle for each operation mode in right and in follows.

BR(DH5), on time/1 cycle=(2.887/3.75)ms, 77.0 %



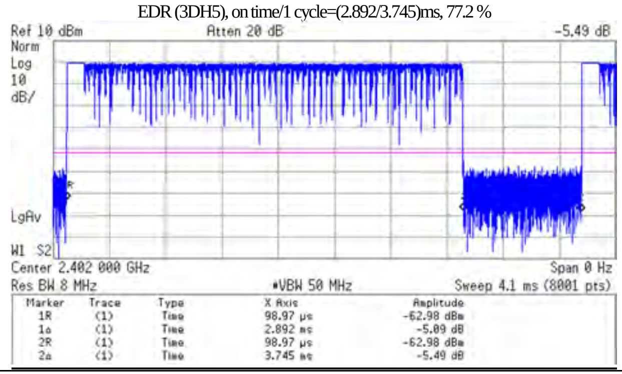
EDR (2DH5), on time/1 cycle=(2.89/3.755)ms, 77.0 %



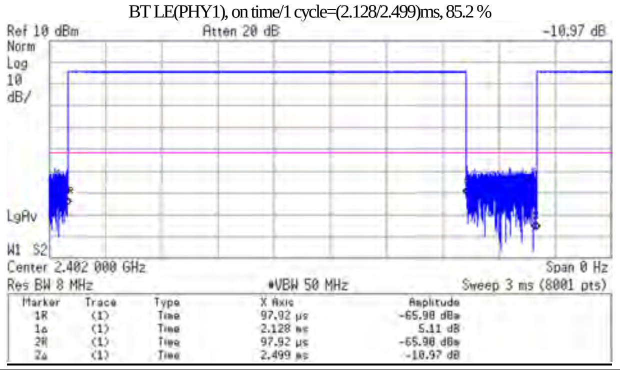
(cont'd)

(cont'd)

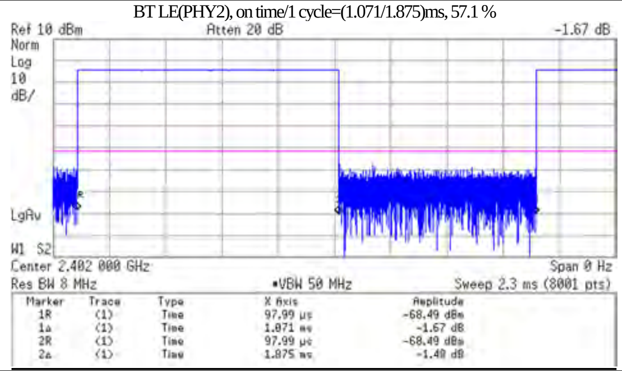
EDR (3DH5), on time/1 cycle=(2.892/3.745)ms, 77.2 %



BT LE(PHY1), on time/1 cycle=(2.128/2.499)ms, 85.2 %



BT LE(PHY2), on time/1 cycle=(1.071/1.875)ms, 57.1 %



SECTION 6: SAR Measurement results

6.1 Tissue simulating liquid measurement

6.1.1 Target of tissue simulating liquid

Nominal dielectric values of the tissue simulating liquids in the phantom are listed in the following table. (Appendix A, KDB 865664 v01r04)

Target Frequency	Head		Body	
(MHz)	ε_r	σ(S/m)	ε_r	σ(S/m)
1800~2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95

Target Frequency	Head		Body	
(MHz)	ε_r	σ(S/m)	ε_r	σ(S/m)
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

6.1.2 Liquid measurement (Liquid verification)

Frequency [MHz]	Liquid type	Liquid parameters (*a)														ΔSAR Coefficients(*b)			Date measured
		Liquid Temp. [deg.C.]	Liquid depth of phantom [mm]	Permittivity (εr) [-]						Conductivity [S/m]						ΔSAR		Correction required? (*c)	
				Target value	Measured				Δend, >48hrs [%] (*1)	Target value	Measured				Δend, >48hrs [%] (*1)	(1g) [%]	(10g) [%]		
					Value	Δεr [%]	Interpolated?	Limit [%]			Value	Δσ [%]	Interpolated?	Limit [%]					
2402	Head	22.0	150	***39.29***	40.14	2.2	☐	5	begin	***1.757***	1.795	2.2	☐	5	begin	0.6	0.2	not required.	January 23,. 2023 (These parameters were used until January 24.)
2440				***39.22***	40.08	2.2	☐	5	begin	***1.791***	1.824	1.8	☐	5	begin	0.4	0.1	not required.	
2441				***39.22***	40.07	2.2	☐	5	begin	***1.792***	1.825	1.8	☐	5	begin	0.4	0.1	not required.	
2480				***39.16***	40.00	2.1	☐	5	begin	***1.833***	1.855	1.2	☐	5	begin	0.1	0.0	not required.	

*1. "begin": SAR test has ended within 24 hours from the liquid parameter measurement, "< 48 hrs.": Since SAR test has ended within 48 hours (2 days) from the liquid parameter measurement and a change in the liquid temperature was within 1 degree, liquid parameters measured on first day were used on next day continuously, "value (%)": Since the SAR test series took longer than 48 hours, the liquid parameters were measured on every 48 hours period and on the date which was end of test series. Since the difference of liquid parameters between the beginning and next measurement was smaller than 5%, the liquid parameters measured in beginning were used until end of each test series.
Calculating formula: "Δend(>48 hrs.) (%)"" = {(dielectric properties, end of test series) / (dielectric properties, beginning of test series) -1} × 100

*a. The target values of (2000, 2450, 3000, 5800) MHz are parameters defined in Appendix A of KDB 865664 D01. For other frequencies, the target nominal dielectric values shall be obtained by linear interpolation between the higher and lower tabulated figures. Above 5800MHz were obtained using linear extrapolation.

*b. The coefficients in below are parameters defined in IEEE Std.1528-2013.
Calculating formula: $\Delta SAR(1g) = C\varepsilon r \times \Delta\varepsilon r + C\sigma \times \Delta\sigma$, $C\varepsilon r = -7.854E\text{-}4 \times f^3 + 9.402E\text{-}3 \times f^2 - 2.742E\text{-}2 \times f - 0.2026$ / $C\sigma = 9.804E\text{-}3 \times f^3 - 8.661E\text{-}2 \times f^2 + 2.981E\text{-}2 \times f + 0.7829$
Calculating formula: $\Delta SAR(10g) = C\varepsilon r \times \Delta\varepsilon r + C\sigma \times \Delta\sigma$, $C\varepsilon r = 3.456 \times 10^{-3} \times f^3 - 3.531 \times 10^{-2} \times f^2 + 7.675 \times 10^{-2} \times f - 0.1860$ / $C\sigma = 4.479 \times 10^{-3} \times f^3 - 1.586 \times 10^{-2} \times f^2 - 0.1972 \times f + 0.7717$
Since the calculated ΔSAR values of the tested liquid had shown positive correction, the measured SAR was not converted by ΔSAR correction.
Calculating formula: ΔSAR corrected SAR (W/kg) = (Measured SAR (W/kg)) × (100 - (ΔSAR(%)) / 100

*. Calibration frequency of the SAR measurement probe (and used conversion factors for each frequency.)
The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

Liquid	SAR test frequency	Probe calibration frequency	Validity	Conversion factor	Uncertainty
Head	(2402, 2440, 2441 2480) MHz	2450 MHz	within ± 5 0MHz of calibration frequency	6.86	± 12.0 %

6.2 SAR results

Ear side	Test position	Gap [mm]	Source power.	Mode (D/R)	[MHz]	CH	Duty [%]	max. Duty of Theory [%]	Duty scaled factor (*2)	Max. tune-up limit [dBm]	Measured conducted [dBm]	Power scaled factor	SAR results [W/kg] (Max.value of multi-peak): Measured	ΔSAR [%]	ΔSAR corrected	Scaled (*b)	SAR type	SAR Limit [W/kg]	SAR plot # in Appx. 2	Setup photo# in Appx. 1-3	Remarks
Test setup				Mode and Frequency (Mark with "*" is the initial mode & frequency.)			Duty cycle (*2)			Power correction											
Left	Front	0	Battery	BR (1Mbps)*	2402*	0	77.0	83.3	1.08	13.5	12.38	1.29	**1.06**	Positive	n/a (*a)	**1.477**	1g	1.6	1-1	P1	>0.8 W/kg(1g)
	Front	0	Battery	BR (1Mbps)*	2402*	0	77.0	83.3	1.08	13.5	12.38	1.29	**1.09**	Positive	n/a (*a)	**1.519**	1g	1.6	3-1	P14	Without device holder. (*1)
	Front	0	Battery	BR (1Mbps)*	2441	39	77.0	83.3	1.08	13.5	12.21	1.35	**0.747**	Positive	n/a (*a)	**1.089**	1g	1.6	-	P1	>0.8 W/kg(1g)
	Front	0	Battery	BR (1Mbps)*	2480	78	77.0	83.3	1.08	13.5	12.23	1.34	**0.365**	Positive	n/a (*a)	**0.528**	1g	1.6	-	P1	-
	Front	0	Battery	EDR (2Mbps)	2402	0	77.0	83.3	1.08	10.5	9.78	1.18	**0.713**	Positive	n/a (*a)	**0.909**	1g	1.6	-		>0.8 W/kg(1g)
	Front	0	Battery	EDR (2Mbps)	2441	39	77.0	83.3	1.08	10.5	9.54	1.25	**0.660**	Positive	n/a (*a)	**0.891**	1g	1.6	-		>0.8 W/kg(1g)
	Front	0	Battery	EDR (2Mbps)	2480	78	77.0	83.3	1.08	10.5	9.55	1.24	**0.678**	Positive	n/a (*a)	**0.908**	1g	1.6	-		
	Front	0	Battery	EDR (3Mbps)	2402	0	77.2	83.3	1.08	10.5	9.76	1.19	**0.693**	Positive	n/a (*a)	**0.891**	1g	1.6	-		>0.8 W/kg(1g)
	Front	0	Battery	EDR (3Mbps)	2441	39	77.2	83.3	1.08	10.5	9.53	1.25	**0.357**	Positive	n/a (*a)	**0.482**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	EDR (3Mbps)	2480	78	77.2	83.3	1.08	10.5	9.53	1.25	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	BT LE (1Mbps)	2402	0	85.2	-	1.17	9.5	8.07	1.39	**0.529**	Positive	n/a (*a)	**0.860**	1g	1.6	-		>0.8 W/kg(1g)
	Front	0	Battery	BT LE (1Mbps)	2440	19	85.2	-	1.17	9.5	7.92	1.44	**0.261**	Positive	n/a (*a)	**0.440**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	BT LE (1Mbps)	2480	39	85.2	-	1.17	9.5	7.91	1.44	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	BT LE (2Mbps)	2402	0	57.1	-	1.75	9.5	8.04	1.40	**0.360**	Positive	n/a (*a)	**0.882**	1g	1.6	-		>0.8 W/kg(1g)
	Front	0	Battery	BT LE (2Mbps)	2440	19	57.1	-	1.75	9.5	7.90	1.45	**0.244**	Positive	n/a (*a)	**0.619**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	BT LE (2Mbps)	2480	39	57.1	-	1.75	9.5	7.89	1.45	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Left	0	Battery	BR (1Mbps)*	2402*	0	77.0	83.3	1.08	13.5	12.38	1.29	**0.359**	Positive	n/a (*a)	**0.500**	1g	1.6	-	P2	-
	Bottom	0	Battery	BR (1Mbps)*	2402*	0	77.0	83.3	1.08	13.5	12.38	1.29	**0.238**	Positive	n/a (*a)	**0.332**	1g	1.6	-	P3	-
	Top	0	Battery	BR (1Mbps)*	2402*	0	77.0	83.3	1.08	13.5	12.38	1.29	**0.130**	Positive	n/a (*a)	**0.181**	1g	1.6	-	P4	-
	Right	0	Battery	BR (1Mbps)*	2402*	0	77.0	83.3	1.08	13.5	12.38	1.29	**0.069**	Positive	n/a (*a)	**0.096**	1g	1.6	-	P5	-
	Back	0	Battery	BR (1Mbps)*	2402*	0	77.0	83.3	1.08	13.5	12.38	1.29	**0.021**	Positive	n/a (*a)	**0.029**	1g	1.6	-	P6	-
Right	Front	0	Battery	BR (1Mbps)*	2402*	0	77.0	83.3	1.08	13.5	12.00	1.41	**0.546**	Positive	n/a (*a)	**0.831**	1g	1.6	1-2	P7	>0.8 W/kg(1g)
	Front	0	Battery	BR (1Mbps)*	2441	39	77.0	83.3	1.08	13.5	11.93	1.44	**0.318**	Positive	n/a (*a)	**0.495**	1g	1.6	-	P7	<0.8 W/kg(1g)
	Front	0	Battery	BR (1Mbps)*	2480	78	77.0	83.3	1.08	13.5	11.86	1.46	**0.283**	Positive	n/a (*a)	**0.446**	1g	1.6	-	P7	*.Worst mode-
	Front	0	Battery	EDR (2Mbps)	2402	0	77.0	83.3	1.08	10.5	9.35	1.30	**0.323**	Positive	n/a (*a)	**0.453**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	EDR (2Mbps)	2441	39	77.0	83.3	1.08	10.5	9.25	1.33	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	EDR (2Mbps)	2480	78	77.0	83.3	1.08	10.5	9.18	1.36	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	EDR (3Mbps)	2402	0	77.2	83.3	1.08	10.5	9.33	1.31	**0.270**	Positive	n/a (*a)	**0.382**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	EDR (3Mbps)	2441	39	77.2	83.3	1.08	10.5	9.23	1.34	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	EDR (3Mbps)	2480	78	77.2	83.3	1.08	10.5	9.16	1.36	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	BT LE (1Mbps)	2402	0	85.2	-	1.17	9.5	7.71	1.51	**0.300**	Positive	n/a (*a)	**0.530**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	BT LE (1Mbps)	2440	19	85.2	-	1.17	9.5	7.57	1.56	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	BT LE (1Mbps)	2480	39	85.2	-	1.17	9.5	7.52	1.58	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	BT LE (2Mbps)	2402	0	57.1	-	1.75	9.5	7.68	1.52	**0.209**	Positive	n/a (*a)	**0.556**	1g	1.6	-		<0.8 W/kg(1g)
	Front	0	Battery	BT LE (2Mbps)	2440	19	57.1	-	1.75	9.5	7.55	1.57	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Front	0	Battery	BT LE (2Mbps)	2480	39	57.1	-	1.75	9.5	7.51	1.58	Reduced	Positive	n/a (*a)	Reduced	1g	1.6	-		-
	Left	0	Battery	BR (1Mbps)*	2402*	0	77.0	83.3	1.08	10.5	12.00	1.41	**0.194**	Positive	n/a (*a)	**0.295**	1g	1.6	-	P8	-
	Top	0	Battery	BR (1Mbps)*	2402*	0	77.0	83.3	1.08	10.5	12.00	1.41	**0.352**	Positive	n/a (*a)	**0.536**	1g	1.6	-	P9	-
	Bottom	0	Battery	BR (1Mbps)*	2402*	0	77.0	83.3	1.08	10.5	12.00	1.41	**0.180**	Positive	n/a (*a)	**0.274**	1g	1.6	-	P10	-
	Right	0	Battery	BR (1Mbps)*	2402*	0	77.0	83.3	1.08	10.5	12.00	1.41	**0.132**	Positive	n/a (*a)	**0.201**	1g	1.6	-	P11	-
	Back	0	Battery	BR (1Mbps)*	2402*	0	77.0	83.3	1.08	10.5	12.00	1.41	**0.009**	Positive	n/a (*a)	**0.014**	1g	1.6	-	P12	-

*1. Without device holder. Refer to clause 6.5 in this report.
*2. SAR for a Duty cycle of 83.3% of the maximum value for BT Classic..
Duty cycle of BT Classic is up to 83.3% due to Bluetooth specifications.
For DH5/2DH5/3DH5, Since 1 packet interval = 625 μs,
Tx interval : 625μs *5 packets = 3125 μs (on time), Rx interval : 625 μs (for 1 packet), 1 cycle = 3750 μs (Tx+Rx)
Duty cycle = 3125 μs /3750 μs = 0.83333 (83.3%)

Notes: *. For the L and R sides, the highest scaled (reported) SARs are marked with yellow marker (x.xxx), respectively.
*. Appx. Appendix, Max.: maximum.; n/a: not applied. Gap: It is the separation distance between the EUT surface and the bottom outer surface of phantom.
*. Before SAR test, the battery of EUT was full charged.
*. During SAR test, the radiated power is always monitored by Spectrum Analyzer.

*a. Since the calculated ΔSAR values of the tested liquid had shown positive correction, the measured SAR was not converted by ΔSAR correction.
Calculating formula: ΔSAR corrected SAR (W/kg) = (Measured SAR (W/kg)) × (100 - (ΔSAR(%)) / 100
*b. Calculating formula: Scaled SAR (W/kg) = (Measured SAR (W/kg)) × (Duty scaled factor) × (Power scaled factor)
where, Duty scaled factor (BR,EDR) [-] = 83.3(%) / (measured duty cycle, %), Duty scaled factor (BT LE) [-] = 100(%) / (measured duty cycle, %),
Power scaled factor [-] = 10 ^ (((Max.tune-up limit power, dBm) - (Measured conducted power, dBm)) / 10)

6.3 Simultaneous transmission evaluation

Since the EUT has single antenna and single mode operation, simultaneous transmission evaluation is not required.

6.4 SAR Measurement Variability (Repeated measurement requirement)

Result: Pass ("Largest to Smallest SAR Ratio" is smaller than KDB 865664 D01 requirement.)

*. In accordance with published RF Exposure KDB procedure 865664 D01 (v01r04) SAR measurement 100 MHz to 6 GHz. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR(1g) 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.

EUT setup		Band [GHz]	Mode	Frequency [MHz]	Higher measured SAR(1g) on each operation band [W/kg]										SAR plot # in Appendix 2 / Setup photo# in Appendix 1-3		
Ear side	Position				Original		1st Repeated				2nd Repeated				Original	1st Repeated	2nd Repeated
					Highest	Judge	Measured	Judge	Ratio	Judge	Measured	Judge	Ratio	Judge			
Left	Front	2.4	BR (1Mbps)	2402	**1.06**	> 0.8	**1.09**	Pass, < 1.45	**1.028** (*1)	Pass, < 1.20	**n/a**	-	-	-	Plot 1-1 /Phot: P1	2-1 / P13	-

*1 It was smaller than 5.0 % of uncertainty of the "Dxyz: Test Sample positioning."

6.5 Device holder perturbation verification

Result: Pass (The influence of a device holder is small enough.)

When the highest reported SAR of an antenna is > 1.2 W/kg, holder perturbation verification (by Urethane form alone) is required by using the highest SAR configuration among all applicable frequency bands.

*. During SAR measurement the EUT was not placed on the device holder directly. The EUT was mounted in the device holder using Urethane form (low-permittivity and low-loss foam) to avoid changes of EUT performance by the holder material (Refer to Appendix 1-3, photographs of test setup). However, the "Device holder perturbation" was confirmed by the setup for which device holder was not used in highest SAR configuration.

EUT setup		Mode	Frequency [MHz]	Measured SAR [W/kg]			Device holder perturbation SAR Ratio	Remarks
Ear side	Position			SAR type	Device holder			
					Exist	None		
Left	Front	BR (1Mbps)	2402	1g	**1.06** (Reported: 1.48)	**1.09** (Reported: 1.52)	**2.8 %**	*. It was smaller than 3.6 % of uncertainty of the "H: Device holder uncertainty", so influence of a device holder was judged to be no problem.
				SAR plot #	Plot 1-1	Plot 3-1		
				Setup photo	Photo. P1	Photo. P14		

*. Calculating formula: Device holder perturbation SAR Ratio (%) = {{((Measured SAR-none (W/kg)) / Measured SAR-exist (W/kg))} - 1}*100

APPENDIX 2: SAR Measurement data

Appendix 2-1: Worst Reported (Scaled) SAR Plot

Plot 1-1: L side, Front & touch / BR (1Mbps) / 2402 MHz

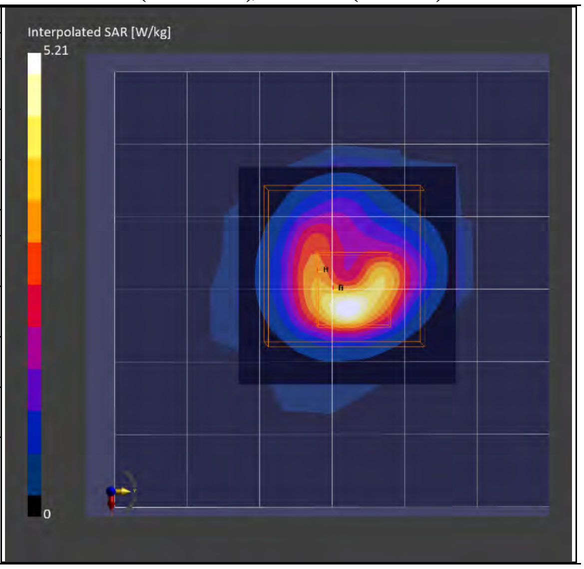
EUT: Wireless Noise Canceling Stereo Headset ; Model: YY2963 ; Serial:1300882

Mode: BR (DH5, 1Mbps) (UID: 0 (CW)) ; Frequency: 2402 MHz ; Test Distance: 0 mm

TSL parameters used: Head(v6) ; f= 2402 MHz; Conductivity: 1.795 S/m; Permittivity: 40.14

DASY8 Configuration: - Electronics: DAE4, S/N:554 (cal.2022-04-14)/ - Phantom: ELI V8.0 (20deg probe tilt) ; Serial: 2161 ; Phantom section: Flat
- Probe: EX3DV4, S/N:3745 (cal.2022-04-19) ; ConvF: (6.86, 6.86 , 6.86)@2402 MHz / - Software: 16.2.2.1588 (Measurement); 16.2.2.1588 (Evaluation)

Scan Setup			Measurement Results		
	Area Scan	Zoom Scan		Area Scan	Zoom Scan
Grid Extents [mm]	60.0×60.0	30.0× 30.0 ×30.0	psSAR1g [W/kg]	1.21	**1.06**
Grid Steps [mm]	10.0×10.0	5.0× 5.0 ×1.5	psSAR10g [W/kg]	0.469	**0.364**
Sensor Surface [mm]	3.0	1.4	Power Drift [dB]	0.07	0.15
Graded Grid	N/A	Yes	Power Scaling	Disabled	Disabled
Grading Ratio	N/A	1.5	Scaling Factor [dB]	N/A	N/A
MAIA	Not used	Not used	TSL Correction	No correction	No correction
Surface Detection	VMS + 6p	VMS + 6p	M2/M1 [%]	N/A	54.8
Scan Method	Measured	Measured	Dist 3dB Peak [mm]	N/A	5.1



Remarks: *. Date tested: 2023-01-23 ;Tested by: Hiroshi Naka; Tested place:No.7 shielded room; Ambient: (22~24) deg.C. / (60~70) %RH; Liquid depth: 150 mm;
*. Liquid temperature: 22.0 deg.C. ± 0.5 deg.C. (22.0 deg.C., in check); *. Red cubic: big=SAR(10g) / small=SAR(1g)

Plot 1-2: R side, Front & touch / BR (1Mbps) / 2402 MHz

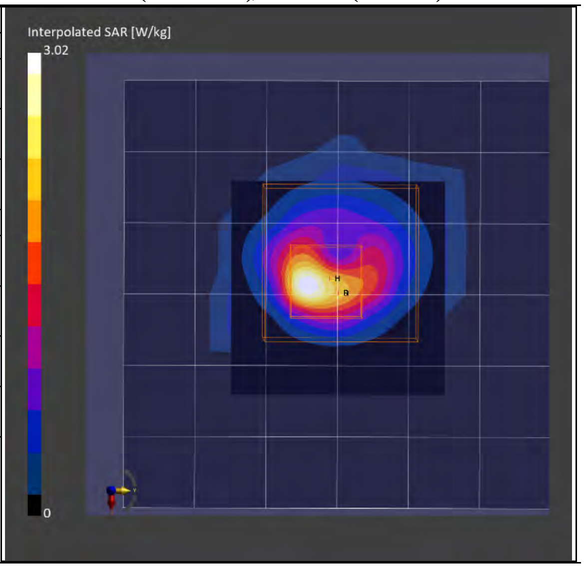
EUT: Wireless Noise Canceling Stereo Headset ; Model: YY2963 ; Serial:1300882

Mode: BR (DH5, 1Mbps) (UID: 0 (CW)) ; Frequency: 2402 MHz ; Test Distance: 0 mm

TSL parameters used: Head(v6) ; f= 2402 MHz; Conductivity: 1.795 S/m; Permittivity: 40.14

DASY8 Configuration: - Electronics: DAE4, S/N:554 (cal.2022-04-14)/ - Phantom: ELI V8.0 (20deg probe tilt) ; Serial: 2161 ; Phantom section: Flat
- Probe: EX3DV4, S/N:3745 (cal.2022-04-19) ; ConvF: (6.86, 6.86 , 6.86)@2402 MHz / - Software: 16.2.2.1588 (Measurement); 16.2.2.1588 (Evaluation)

Scan Setup			Measurement Results		
	Area Scan	Zoom Scan		Area Scan	Zoom Scan
Grid Extents [mm]	60.0×60.0	30.0× 30.0 ×30.0	psSAR1g [W/kg]	0.557	**0.546**
Grid Steps [mm]	10.0×10.0	5.0× 5.0 ×1.5	psSAR10g [W/kg]	0.205	**0.180**
Sensor Surface [mm]	3.0	1.4	Power Drift [dB]	0.03	0.02
Graded Grid	N/A	Yes	Power Scaling	Disabled	Disabled
Grading Ratio	N/A	1.5	Scaling Factor [dB]	N/A	N/A
MAIA	Not used	Not used	TSL Correction	No correction	No correction
Surface Detection	VMS + 6p	VMS + 6p	M2/M1 [%]	N/A	52.8
Scan Method	Measured	Measured	Dist 3dB Peak [mm]	N/A	5.1



Remarks: *. Date tested: 2023-01-23 ;Tested by: Hiroshi Naka; Tested place:No.7 shielded room; Ambient: (22~24) deg.C. / (60~70) %RH; Liquid depth: 150 mm;
*. Liquid temperature: 22.0 deg.C. ± 0.5 deg.C. (22.0 deg.C., in check); *. Red cubic: big=SAR(10g) / small=SAR(1g)

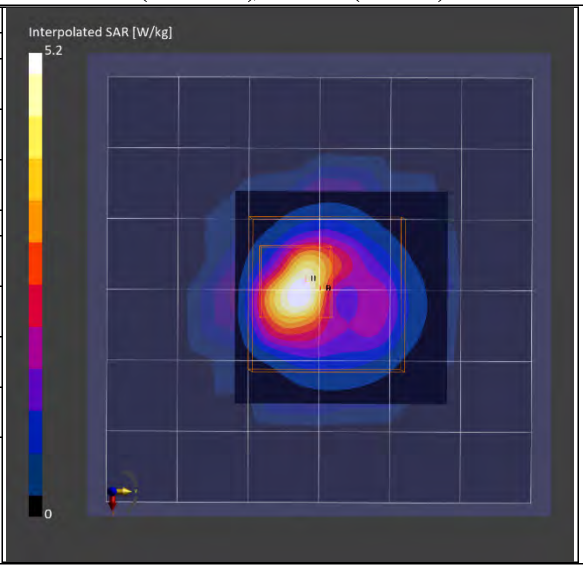
APPENDIX 2: SAR Measurement data (cont'd)

Appendix 2-2: SAR Plot for SAR Measurement Variability (Repeated measurement requirement) (Clause 6.4)

Plot 2-1: L side, Repeat, Front & touch / BR (DH5) / 2402 MHz
EUT: Wireless Noise Canceling Stereo Headset ; Model: YY2963 ; Serial:1300882
Mode: BR (DH5, 1Mbps) (UID: 0 (CW)) ; Frequency: 2402 MHz ; Test Distance: 0 mm
TSL parameters used: Head(v6) ; f= 2402 MHz; Conductivity: 1.795 S/m; Permittivity: 40.14

DASY8 Configuration: - Electronics: DAE4, S/N:554 (cal.2022-04-14)/ - Phantom: ELI V8.0 (20deg probe tilt) ; Serial: 2161 ; Phantom section: Flat
- Probe: EX3DV4, S/N:3745 (cal.2022-04-19) ; ConvF: (6.86, 6.86 , 6.86)@2402 MHz / - Software: 16.2.2.1588 (Measurement); 16.2.2.1588 (Evaluation)

Scan Setup			Measurement Results		
	Area Scan	Zoom Scan		Area Scan	Zoom Scan
Grid Extents [mm]	60.0×60.0	30.0× 30.0 ×30.0	psSAR1g [W/kg]	0.830	**1.09**
Grid Steps [mm]	10.0×10.0	5.0× 5.0 ×1.5	psSAR10g [W/kg]	0.355	**0.355**
Sensor Surface [mm]	3.0	1.4	Power Drift [dB]	-0.04	-0.02
Graded Grid	N/A	Yes	Power Scaling	Disabled	Disabled
Grading Ratio	N/A	1.5	Scaling Factor [dB]	N/A	N/A
MAIA	Not used	Not used	TSL Correction	No correction	No correction
Surface Detection	VMS + 6p	VMS + 6p	M2/M1 [%]	N/A	53.8
Scan Method	Measured	Measured	Dist 3dB Peak [mm]	N/A	5.1



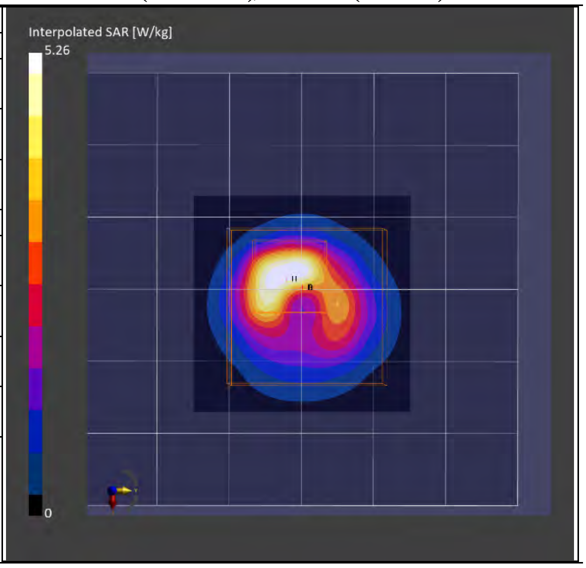
Remarks: *. Date tested: 2023-01-24 ;Tested by: Hiroshi Naka; Tested place:No.7 shielded room; Ambient: (22~23) deg.C. / (50~75) %RH; Liquid depth: 150 mm;
*. Liquid temperature: 22.0 deg.C. ± 0.5 deg.C. (22.0 deg.C., in check); *. Red cubic: big=SAR(10g) / small=SAR(1g)

Appendix 2-3: SAR Plot for Device holder perturbation verification (Clause 6.5)

Plot 3-1: L side, no-D/H, Front & touch / BR (DH5) / 2402 MHz
EUT: Wireless Noise Canceling Stereo Headset ; Model: YY2963 ; Serial:1300882
Mode: BR (DH5, 1Mbps) (UID: 0 (CW)) ; Frequency: 2402 MHz ; Test Distance: 0 mm
TSL parameters used: Head(v6) ; f= 2402 MHz; Conductivity: 1.795 S/m; Permittivity: 40.14

DASY8 Configuration: - Electronics: DAE4, S/N:554 (cal.2022-04-14)/ - Phantom: ELI V8.0 (20deg probe tilt) ; Serial: 2161 ; Phantom section: Flat
- Probe: EX3DV4, S/N:3745 (cal.2022-04-19) ; ConvF: (6.86, 6.86 , 6.86)@2402 MHz / - Software: 16.2.2.1588 (Measurement); 16.2.2.1588 (Evaluation)

Scan Setup			Measurement Results		
	Area Scan	Zoom Scan		Area Scan	Zoom Scan
Grid Extents [mm]	60.0×60.0	30.0× 30.0 ×30.0	psSAR1g [W/kg]	0.944	**1.09**
Grid Steps [mm]	10.0×10.0	5.0× 5.0 ×1.5	psSAR10g [W/kg]	0.399	**0.368**
Sensor Surface [mm]	3.0	1.4	Power Drift [dB]	-0.03	-0.03
Graded Grid	N/A	Yes	Power Scaling	Disabled	Disabled
Grading Ratio	N/A	1.5	Scaling Factor [dB]	N/A	N/A
MAIA	Not used	Not used	TSL Correction	No correction	No correction
Surface Detection	VMS + 6p	VMS + 6p	M2/M1 [%]	N/A	54.0
Scan Method	Measured	Measured	Dist 3dB Peak [mm]	N/A	5.1



Remarks: *. Date tested: 2023-01-24 ;Tested by: Hiroshi Naka; Tested place:No.7 shielded room; Ambient: (22~23) deg.C. / (50~75) %RH; Liquid depth: 150 mm;
*. Liquid temperature: 22.0 deg.C. ± 0.5 deg.C. (22.0 deg.C., in check); *. Red cubic: big=SAR(10g) / small=SAR(1g)

APPENDIX 3: Test instruments

Appendix 3-1: Equipment used

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Calibration Last Date	Calibration Interval (Month)
AT	SAT10-SARP1	160520	Attenuator	Weinschel - API Technologies Corp	4M-10	-	2022/12/12	12
AT	SCC-G14	145175	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	2022/12/01	12
AT	SOS-26	191844	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2022/08/06	12
AT	SPM-06	146267	Power Meter	Anritsu Corporation	ML2495A	850009	2022/05/24	12
AT	SPSS-03	146309	Power sensor	Anritsu Corporation	MA2411B	917063	2022/05/24	12
AT	SRENT-09	150461	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46186392	2022/03/14	12

*. AT (antenna terminal conducted power measurement) was measured January 17, 2023. (Refer to Section 5 in this report.)

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Calibration Last Date	Calibration Interval (Month)
SAR	COTS-SAR-03	224031	DASY8 Module SAR/APD	Schmid&Partner Engineering AG	DASY8 module SAR V16.2.2.1588	9-2506F07D	-	-
SAR	COTS-SSEP-02	144886	Dielectric assessment kit	Schmid&Partner Engineering AG	DAK v3.0.6.14	9-0EE103A4	-	-
SAR	KAT10-P1	144882	Attenuator	Weinschel - API Technologies Corp	24-10-34	BY5927	2022/12/12	12
SAR	KCPL-07	146100	Directional Coupler	Pulsar Microwave Corp.	CCS30-B26	621	-	-
SAR	KDAE-R01	144945	Data Acquisition Electronics	Schmid&Partner Engineering AG	DAE4	554	2022/04/14	12
SAR	KIU-08	145059	Power sensor	Rohde & Schwarz	NRV-Z4	100372	2022/09/06	12
SAR	KIU-09	145099	Power sensor	Rohde & Schwarz	NRV-Z4	100371	2022/09/06	12
SAR	KOS-14	144986	Thermo-Hygrometer data logger	SATO KEIRYOKI	SK-L200THIIα/SK-LTHIIα-2	015246/08169	2022/08/06	12
SAR	KPA-12	145359	RF Power Amplifier	Milmega	AS2560-50	1018582	-	-
SAR	KPM-06	144989	Power Meter	Rohde & Schwarz	NRVD	101599	2022/09/06	12
SAR	KPM-08	145105	Power meter	Anritsu Corporation	ML2495A	6K00003356	2022/11/08	12
SAR	KPSS-04	144991	Power sensor	Anritsu Corporation	MA2411B	12088	2022/11/08	12
SAR	KRU-04	145086	Ruler(300mm)	SHINWA	13134	-	2022/02/16	12
SAR	KRU-05	145087	Ruler(100x50mm,L)	SHINWA	12101	-	2022/02/16	12
SAR	KSG-08	145109	Signal Generator	Rohde & Schwarz	SMT06	100763	2022/09/06	12
SAR	SALC-01	146112	Primepure Ethanol	Kanto Chemical Co., Inc.	14032-79	-	-	-
SAR	SAT20-SAR2	215438	Attenuator	To-Conne Co., Ltd.	SA-PJ-20	-	2022/12/12	12
SAR	SCC-EP01	177868	Coaxial Cable	Junkosha	MWX241-01000KFSKFS/B	1901Q063	2022/12/12	12
SAR	SCC-SAR2	145405	Coaxial Cable	Huber+Suhner	SF104A/11PC3542/11N451/4M	MY699/4A	2022/12/12	12
SAR	SEPP-02	145500	Dielectric probe	Schmid&Partner Engineering AG	DAK3.5	1129	2022/04/19	12
SAR	SOS-26	191844	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2022/08/06	12
SAR	SOS-SAR2	201967	Digital thermomoter	HANNA	Checktemp-4	A01440226111	2022/08/06	12
SAR	SOS-SAR3	201968	Digital thermomoter	HANNA	Checktemp-4	A01310946111	2022/08/06	12
SAR	SPB-R05	226380	Dosimetric E-Field Probe	Schmid & Partner Engineering AG	EX3DV4	3745	2022/04/19	12
SAR	SPC-SAR4	224020	DASY8 PC	Hewlett Packard	HP Z4 G4 Workstation	CZC1198G21	-	-
SAR	SPFL-02	224034	Flat Phantom	Schmid&Partner Engineering AG	ELI V8.0	2161	2022/10/20	12
SAR	SRU-06	150560	Measuring Tool, Ruler	SHINWA	14001	--	2022/02/16	12
SAR	SSA-04	146176	Spectrum Analyzer	ADVANTEST	R3272	101100994	-	-
SAR	SSDA-R01	145558	Dipole Antenna	Schmid&Partner Engineering AG	D2450V2	765	2022/05/09	12
SAR	SSEOC-03	224026	Electro-Optical Converter	Schmid & Partner Engineering AG	EOC8-60	1027	-	-
SAR	SSLB-03	224027	Light Beam Unit	Schmid & Partner Engineering AG	LIGHTBEAM-85	2069	-	-
SAR	SSLHV6-01	207714	Head Tissue Simulating Liquid	Schmid&Partner Engineering AG	HBBL600-10000V6	SL AAH U16 BC	-	-
SAR	SSMCP-02	227155	SP2 Manual Control Pendant	Schmid&Partner Engineering AG	D21144507 C	22066839	-	-
SAR	SSMP-03	225155	Mounting Platform	Schmid & Partner Engineering AG	MP8E-TX2-60L Basic	-	-	-
SAR	SSMS-03	224025	Measurement Server	Schmid & Partner Engineering AG	DASY8 Measurement Server	10042	-	-
SAR	SSNA-01	146258	Network Analyzer	Keysight Technologies Inc	8753ES	US39171777	2022/10/03	12
SAR	SSRBT-03	224032	6-axis Robot	Schmid&Partner Engineering AG	TX2-60L spe	F/22/0033789/A/001	2022/10/28	12
SAR	SSRC-03	224023	Robot Controller	Schmid & Partner Engineering AG	CS9spe-TX2-60	F/22/0033789/C/001	-	-
SAR	SWTR-03	146185	DI water	MonotaRo	34557433	-	-	-

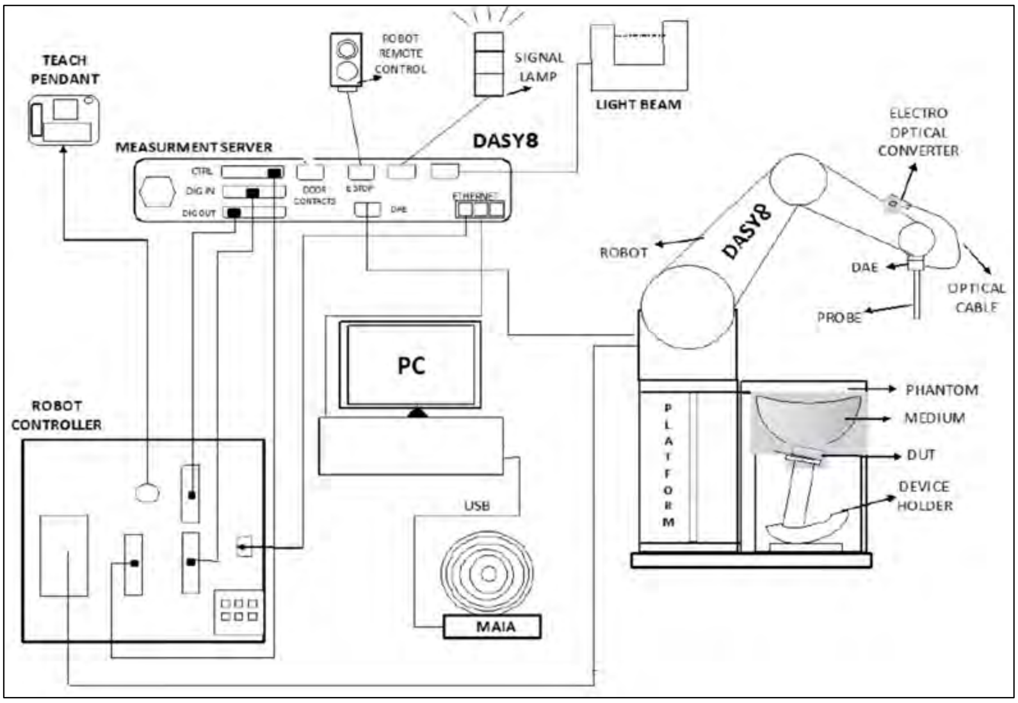
*. Local ID: SALC-01, the parameters of primepure Ethanol (as reference liquid) used for the simulated tissue parameter confirmation was defined the NPL Report MAT23 (http://www.npl.co.uk/content/conpublication/4295)

The expiration date of calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chain of calibrations.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.
*. Hyphens for Last Calibration Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.

[Test Item] SAR: Specific Absorption Rate, AT: Antenna terminal conducted power

Appendix 3-2: Configuration and peripherals

These measurements were performed with the automated near-field scanning system DASY8 from Schmid & Partner Engineering AG (SPEAG). The system is based on a high precision robot), which positions the probes with a positional repeatability of better than ± 0.03 mm. Special E- and H-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines to the data acquisition unit. The SAR measurements were conducted with the dosimetry probes EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.



The DASY8 system for performing compliance tests consist of the following items:

- 6-axis robotic arm (Stäubli TX2-60L) for positioning the probe
- Mounting Platform for keeping the phantoms at a fixed location relative to the robot
- Measurement Server for handling all time-critical tasks, such as measurement data acquisition and supervision of safety features
- EOC (Electrical to Optical Converter) for converting the optical signal from the DAE to electrical before being transmitted to the measurement server
- LB (Light-Beam unit) for probe alignment (measurement of the exact probe length and eccentricity)
- SAR probe (EX3D probes) for measuring the E-field distribution in the phantom. The SAR distribution and the psSAR (peak spatial averaged SAR) are derived from the E-field measurement.
- SAR phantom that represents a physical model with an equivalent human anatomy. A Specific Anthropomorphic Mannequin (SAM) head is usually used for handheld devices, and a Flat phantom is used for body-worn devices.
- TSL (Tissue Simulating Liquid) representing the dielectric properties of used tissue, e.g. Head Simulating Liquid, HSL.
- DAE (Data Acquisition Electronics) for reading the probe voltages and transmitting it to the DASY8 PC.
- Device Holder for positioning the DUT beneath the phantom.
- MAIA (Modulation and Interference Analyzer) for confirming the accuracy of the probe linearization parameters
- Operator PC for running the DASY8 software to define/execute the measurements
- System validation kits for system check/validation purposes.

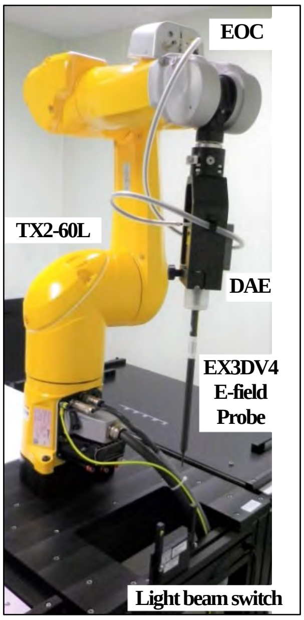
Appendix 3-3: Test system specification

Platforms

The platform is a multi-phantom support structure made of a wood and epoxy composite ($\varepsilon = 3.3$ and loss tangent $\delta < 0.07$). It is a strong and rigid structure transparent to electric and magnetic fields (nonmetallic components).

TX2-60L robot, CS9 robot controller

•Number of Axes : 6 •Repeatability : ±0.03 mm •Manufacture : Stäubli



DASY8 Measurement server

The DASY8 Measurement Server handles all time critical tasks such as acquisition of measurement data, detection of phantom surface, control of robot movements, supervision of safety features.
•Manufacture : Schmid & Partner Engineering AG

Data Acquisition Electronic (DAE)

The DAE is used to acquire the probe sensor voltages and transfer them to the DASY8 Measurement Server, and to report mechanical surface detection and probe collisions. The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter, and a command decoder with a control logic unit. Transmission to the DASY8 Measurement Server is accomplished through an optical downlink for data and status information and an optical uplink for commands and the clock. The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts used for mechanical surface detection and probe collision detection.
•Measurement Range : 1 μV to > 200 mV (2 range settings: 4 mV (low), 400 mV (high))
•Input Offset voltage : < 1 μV (with auto zero) •Input Resistance : 200 MΩ
•Battery operation : > 10 hrs. (with two rechargeable 9 V battery)
•Manufacture : Schmid & Partner Engineering AG

Electro-Optical Converter (EOC8-TX2-60L)

The Electrical to Optical Converter (EOC8) supports as data exchange between the DAE and the measurement server (optical connector) and data acquisition based on Ethernet protocol.
•Manufacture : Schmid & Partner Engineering AG

Light Beam Switch

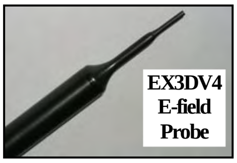
The light beam unit allows automatic "tooling" of the probe. During the process, the actual position of the probe tip with respect to the robot arm, as well as the probe length and the horizontal probe offset, are measured. The software then corrects all movements within the measurement jobs, such that the robot coordinates are valid for the probe tip. The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.
•Manufacture : Schmid & Partner Engineering AG

SAR measurement software

•Software version : Refer to Appendix 3-1 (Equipment used) •Manufacture : Schmid & Partner Engineering AG

E-Field Probe

•Model : EX3DV4 •Frequency : 4 MHz to 10 GHz, Linearity: ±0.2 dB (30 MHz to 10 GHz)
•Construction : Symmetrical design with triangular core, Built-in shielding against static charges, PEEK enclosure material (resistant to organic solvents, e.g., DGBE).
•Conversion Factors (CF) : Refer to calibration data of Appendix.
•Directivity : ±0.1 dB in TSL (rotation around probe axis) / ±0.3 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)
•Dimension : Overall length: 330 mm (Tip: 20 mm) / Tip diameter: 2.5 mm (Body: 12 mm)
Typical distance from probe tip to dipole centers: 1mm
•Application : High precision dosimetric measurement in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6GHz with precision of better 30%.
•Manufacture : Schmid & Partner Engineering AG



ELI Phantom

The ELI phantom is used for compliance testing of handheld and body-mounted wireless devices in the frequency range of 4 MHz to 10 GHz. ELI is fully compatible with the IEC/IEEE 62209-1528 standard and all known tissue simulating liquids. ELI V8.0 phantom shell has optimized pretension in the bottom surface during production, such that the phantom is more robust and with reduced sagging.
•Model Number : ELI V8.0 flat phantom •Shell Material : Vinyl ester, fiberglass reinforced (VE-GF)
•Shell Thickness : 2.0 ± 0.2 mm (bottom plate:) •Dimensions : 600 mm × 400 mm (oval), (volume: Approx. 30 liters)
•Manufacture : Schmid & Partner Engineering AG

Device Holder, Laptop holder, support material

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

☒ Device holder: In combination with the ELI phantom, the Mounting Device enables the rotation of the mounted transmitter device in spherical coordinates. Transmitter devices can be easily and accurately positioned. The low-loss dielectric urethane foam was used for the mounting section of device holder.
•Material : Polyoxymethylene (POM) •Manufacture : Schmid & Partner Engineering AG

☐ Laptop holder: A simple but effective and easy-to-use extension for the Mounting Device; facilitates testing of larger devices (e.g., laptops, cameras, etc.) according to IEC 62209-2.
•Material : Polyoxymethylene (POM), PET-G, Foam •Manufacture : Schmid & Partner Engineering AG

☒ Support form: Urethane foam

Data storage and evaluation (post processing)

The uplink signal transmitted by the DUT is measured inside the TSL by the probe, which is accurately positioned at a precisely known distance and with a normal orientation with respect to the phantom surface. The dipole / loop sensors at the probe tips pick up the signal and generate a voltage, which is measured by the voltmeter inside the DAE. The DAE returns digital values, which are converted to an optical signal and transmitted via the EOC to the measurement server. The data is finally transferred to the DASY8 software for further post processing. In addition, the DASY8 software periodically requests a measurement with short-circuited inputs from the DAE to compensate the amplifier offset and drift. This procedure is called DAE zeroing.
The operator has access to the following low level measurement settings:

- the integration time is the voltage acquisition time at each measurement point. It is typically 0.5 s.
- the zeroing period indicates how often the DAE zeroing is performed.

In parallel, the MAIA measures the characteristics of the uplink signal via the air interface and sends this information to the DASY8 software, which compares them to the communication system defined by the operator. A warning is issued if any difference is detected.

The measurement data is now acquired and can be post processed to compute the psSAR1g /8g /10g.
The measured voltages are not directly proportional to SAR and must be linearized. The formulas below are based on [1] (*1).
The measured voltage is first linearized using the (a, b, c, d) set of parameters specific to the communication system and sensor:

$$V_{compi} = U_i + U_i^2 \cdot \frac{10^{\frac{d}{10}}}{d_{cp_i}}$$

with	V_{compi}	= compensated voltage of channel i (μV)	(i = x,y,z)
	U_i	= input voltage of channel i (μV)	(i = x,y,z)
	d	= PMR factor d (dB)	(Probe parameter)
	dcp_i	= diode compression point of channel i (μV)	(Probe parameter, i = x,y,z)

$$V_{compi_{dB\sqrt{\mu V}}} = 10 \cdot \log_{10}(V_{compi})$$

$$corr_i = a_i \cdot e^{-\left(\frac{b_i - 10\log_{10}(V_{compi})}{c_i}\right)^2}$$

with	$corr_i$	= correction factor of channel i (dB)	(i = x,y,z)
	$V_{compi_{dB\sqrt{\mu V}}}$	= compensated voltage of channel i (dB$\sqrt{\mu V}$)	(i = x,y,z)
	a_i	= PMR factor a of channel *i* (dB)	(Probe parameter, i = x,y,z)
	b_i	= PMR factor b of channel *i* (dB$\sqrt{\mu V}$)	(Probe parameter, i = x,y,z)
	c_i	= PMR factor c of channel *i* (-)	(Probe parameter, i = x,y,z)

The voltage $V_{i_{dB\sqrt{\mu V}}}$ is the linearized voltage in dB$\sqrt{\mu V}$):

$$V_{i_{dB\sqrt{\mu V}}} = V_{compi_{dB\sqrt{\mu V}}} - corr_i$$

with	$V_{i_{dB\sqrt{\mu V}}}$	= linearized voltage of channel i (dB$\sqrt{\mu V}$)	(i = x,y,z)
	$V_{compi_{dB\sqrt{\mu V}}}$	= compensated voltage of channel i (dB$\sqrt{\mu V}$)	(i = x,y,z)
	$Corr_i$	= PMR factor a of channel *i* (dB)	(i = x,y,z)

Finally, the linearized voltage is converted in μV :

$$V_i = 10^{\frac{V_{i_{dB\sqrt{\mu V}}}}{10}}$$

with	V_i	= linearized voltage of channel i (μV)	(i = x,y,z)
	$V_{compi_{dB\sqrt{\mu V}}}$	= linearized voltage of channel i (dB$\sqrt{\mu V}$)	(i = x,y,z)

The Field data for each channel are calculated using the linearized voltage:

E-filedprobes: $$E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

with	V_i	= linearized voltage of channel i in μV	(i = x,y,z)
	$Norm_i$	= sensor sensitivity of channel i in μV/(V/m)2 for E-field Probes	(i = x,y,z)
	$ConvF$	= sensitivity enhancement in solution	
	E_i	= electric field strength of channel i in V/m	(i = x,y,z)

The RMS value of the field components gives the total field strength (Hermitian magnitude) :

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The E-field data value is used to calculate SAR :

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

with	SAR	= local specific absorption rate in mW/g
	Etot	= total field strength in V/m
	σ	= conductivity in [Ω/m] or [S/m]
	ρ	= equivalent tissue density in g/cm3

Note: The resulting linearized voltage is only approximated because the probe UID is used 0 (CW) for the test signal in this test report.

(*1) [1] Jagadish Nadakuduti, Sven Kuehn, Marcel Fehr, Mark Douglas Katja Pokovic and Niels Kuster, "The Effect of Diode Response of electromagnetic Field Probes for the Measurements of Complex Signals." IEEE Transactions on Electromagnetic Compatibility, vol. 54, pp. 1195–1204, Dec. 2012.

Appendix 3-4: Simulated tissue composition and parameter confirmation

Liquid type	Head	Control No.	SSLHV6-01	Model No. / Product No.	HBBL600-10000V6 / SL AAH U16 BC
Ingredient: Mixture [%]	Water: >77, Ethanediol: <5.2, Sodium petroleum sulfonate:<2.9, Hexylene Glycol: <2.9, alkoxylated alcohol (>C_{16}):<2.0				
Tolerance specification	± 10%				
Temperature gradients [% / deg.C]	permittivity: -0.19 / conductivity: -0.57 (at 2.6 GHz), permittivity: +0.31 / conductivity: -1.43 (at 5.5 GHz) (*1)				
Manufacture	Schmid & Partner Engineering AG	Note: *1. speag_920-SLAAxyy-E_1.12.15CL (Maintenance of tissue simulating liquid)			

*. The dielectric parameters were checked prior to assessment using the DAK-3.5 dielectric probe kit.

Date measured	Frequency [MHz]	Liquid type	Ambient/		Liquid temp.	Liquid depth of phantom	Liquid parameters (*a)										ΔSAR (*b)	
							Permittivity (εr) [-]					Conductivity [S/m]					1g	10g
							Target	Measured			Δend, >48hrs	Target	Measured			Δend, >48hrs		
			[deg.C.]	[%RH]	[deg.C.]	[mm]		Meas.	Δεr[%]	Limit			Meas.	Δσ[%]	Limit		[%]	[%]
January 23, 2023 (Used until January 24)	2450	Head	22	40	22.0	150	***39.2***	40.06	2.2	5%	-	***1.80***	1.832	1.8	5%	-	0.4	0.1

*. Calculating formula: Δend(>48 hrs.) (%) = {(dielectric properties, end of test series) / (dielectric properties, beginning of test series) -1} × 100

*a. The target values of (2000, 2450, 3000 and 5800) MHz are parameters defined in Appendix A of KDB 865664 D01. For other frequencies, the target nominal dielectric values shall be obtained by linear interpolation between the higher and lower tabulated figures.

Standard										*Interpolated & Extrapolated*									
f (MHz)	Head Tissue		Body Tissue		f	Head Tissue		Body Tissue		f	Head Tissue		Body Tissue		f	Head Tissue		Body Tissue	
	εr	σ [S/m]	εr	σ [S/m]	(MHz)	εr	σ [S/m]	εr	σ [S/m]	(MHz)	εr	σ [S/m]	εr	σ [S/m]	(MHz)	εr	σ [S/m]	εr	σ [S/m]
(1800-)2000	**40.0**	**1.40**	**53.3**	**1.52**	3000	**38.5**	**2.40**	**52.0**	**2.73**	*5250*	*35.93*	*4.706*	*48.95*	*5.358*	*5750*	*35.36*	*5.219*	*48.27*	*5.942*
2450	**39.2**	**1.80**	**52.7**	**1.95**	5800	**35.3**	**5.27**	**48.2**	**6.00**	*5600*	*35.53*	*5.065*	*48.47*	*5.766*					

*b. The coefficients are parameters defined in IEEE Std. 1528-2013.

$\Delta SAR(1g) = C\varepsilon r \times \Delta\varepsilon r + C\sigma \times \Delta\sigma$, $C\varepsilon r = -7.854E\text{-}4 \times f^3 + 9.402E\text{-}3 \times f^2 - 2.742E\text{-}2 \times f - 0.2026$ / $C\sigma = 9.804E\text{-}3 \times f^3 - 8.661E\text{-}2 \times f^2 + 2.981E\text{-}2 \times f + 0.7829$

$\Delta SAR(10g) = C\varepsilon r \times \Delta\varepsilon r + C\sigma \times \Delta\sigma$, $C\varepsilon r = 3.456\times10^{-3} \times f^3 - 3.531\times10^{-2} \times f^2 + 7.675\times10^{-2} \times f - 0.1860$ / $C\sigma = 4.479\times10^{-3} \times f^3 - 1.586\times10^{-2} \times f^2 - 0.1972 \times f + 0.7717$

Appendix 3-5: Daily check results

*. Prior to the SAR assessment of EUT, the Daily check was performed to test whether the SAR system was operating within its target of ±10%. The Daily check results are in the table below.

Date	Frequency [MHz]	ΔSAR			Daily check results (*. Meas.: Measured, Cal.: Calibration value, STD: Standard value)																	
					SAR (1g) [W/kg] (*d)									SAR (10g) [W/kg] (*d)								
		Liquid Type	1g [%]	10g [%]	Meas. (*c)	ΔSAR-correct	1W scaled	Target Cal. (*e)	Target STD (*f)	Deviation Cal. [%]	Deviation STD [%]	Limit [%]	Pass ?	Meas. (*c)	ΔSAR-correct	1W scaled	Target Cal. (*e)	Target STD (*f)	Deviation Cal. [%]	Deviation STD [%]	Limit [%]	Pass ?
January 23, 2023	2450	Head	0.4	0.1	13.8	13.74	54.96	52.2	52.4	5.3	4.9	±10	Pass	6.41	6.40	25.6	24.2	24	5.8	6.7	±10	Pass
January 24, 2023	2450	Head	0.4	0.1	13.4	13.35	53.40	52.2	52.4	2.3	1.9	±10	Pass	6.26	6.25	25.0	24.2	24	3.3	4.2	±10	Pass

*. Calculating formula:
ΔSAR corrected SAR (1g,10g) (W/kg) = (Measured SAR(1g,10g) (W/kg)) × (100 - (ΔSAR(%)) / 100

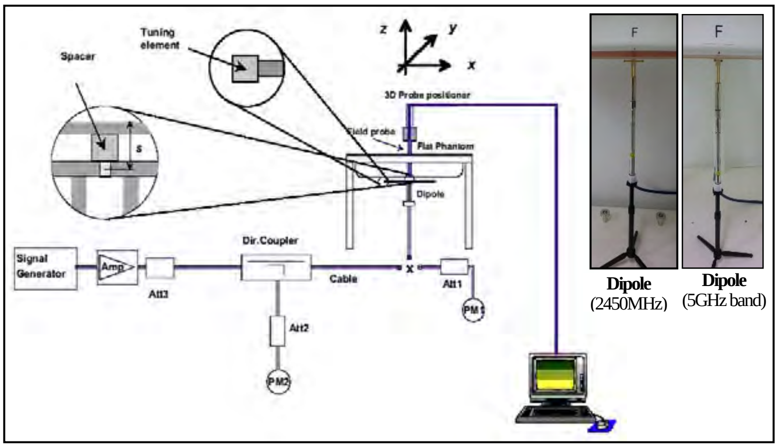
*c. The "Meas. (Measured)" SAR value is obtained at 250 mW for 2450MHz, 100 mW for (5250, 5600, 5800) MHz

*d. The measured SAR value of Daily check was compensated for tissue dielectric deviations (ΔSAR) and scaled to 1W of output power in order to compare with the manufacture's calibration target value which was normalized.

*e. The target value is a parameter defined in the calibration data sheet of D2450V2 (sn:765) dipole calibrated by Schmid & Partner Engineering AG (Certification No. D2450V2-765_May22, the data sheet was filed in this report).

*f. The target value (normalized to 1W) is defined in IEEE Std.1528.

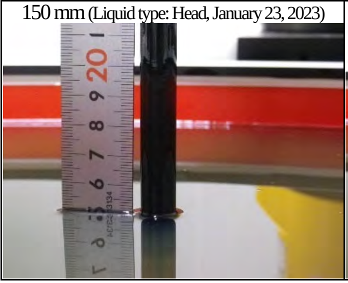
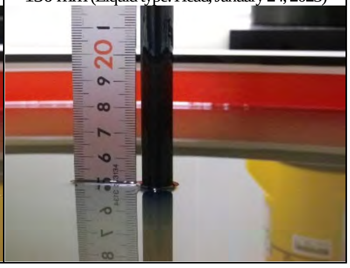
Test setup for the system performance check->



Dipole (2450MHz)

Dipole (5GHz band)

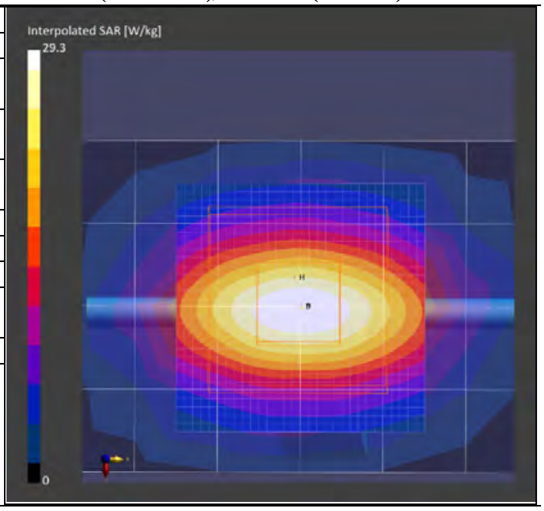
Appendix 3-6: Daily check measurement data

Photographs of Liquid depth	
150 mm (Liquid type: Head, January 23, 2023)	150 mm (Liquid type: Head, January 24, 2023)
	

(January 23, 2023) EUT: Diploe(2.4GHz); Type: D2450V2; Serial: 765; Power: 250 mW
Mode: CW (UID: 0 (CW)) ; Frequency: 2450 MHz ; Test Distance: 8 mm (*.10mm to liquid)
TSL parameters used: Head(v6) ; f= 2450 MHz; Conductivity: 1.832 S/m; Permittivity: 40.06

DASY8 Configuration: - Electronics: DAE4, S/N:554 (cal.2022-04-14)/ - Phantom: ELI V8.0 (20deg probe tilt) ; Serial: 2161 ; Phantom section: Flat
- Probe: EX3DV4, S/N:3745 (cal.2022-04-19) ; ConvF: (6.86, 6.86 , 6.86)@2450 MHz / - Software: 16.2.2.1588 (Measurement); 16.2.2.1588 (Evaluation)

Scan Setup			Measurement Results		
	Area Scan	Zoom Scan		Area Scan	Zoom Scan
Grid Extents [mm]	40.0×80.0	30.0× 30.0 ×30.0	psSAR1g [W/kg]	13.8	**13.8**
Grid Steps [mm]	10.0×10.0	5.0× 5.0 ×1.5	psSAR10g [W/kg]	6.36	**6.41**
Sensor Surface [mm]	3.0	1.4	Power Drift [dB]	0.02	0.02
Graded Grid	N/A	Yes	Power Scaling	Disabled	Disabled
Grading Ratio	N/A	1.5	Scaling Factor [dB]	N/A	N/A
MAIA	Not used	Not used	TSL Correction	No correction	No correction
Surface Detection	VMS + 6p	VMS + 6p	M2/M1 [%]	N/A	79.3
Scan Method	Measured	Measured	Dist 3dB Peak [mm]	N/A	9.0

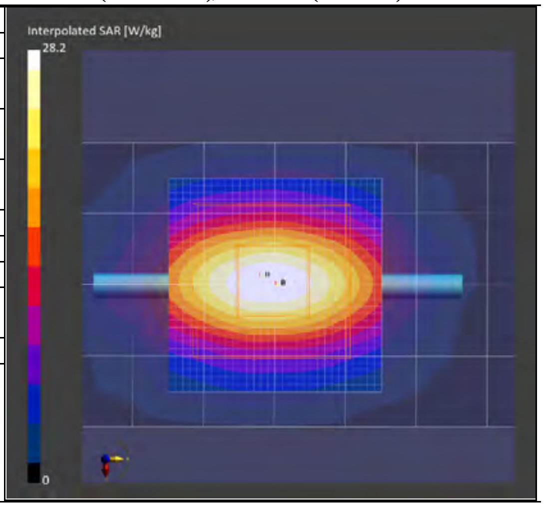


Remarks: *. Date tested: 2023-01-23 ;Tested by: Hiroshi Naka; Tested place:No.7 shielded room; Ambient: (22~24) deg.C. / (60~70) %RH; Liquid depth: 150 mm;
*. Liquid temperature: 22.0 deg.C. ± 0.5 deg.C. (22.0 deg.C., in check); *. Red cubic: big=SAR(10g) / small=SAR(1g)

(January 24, 2023) EUT: Diploe(2.4GHz); Type: D2450V2; Serial: 765; Power: 250 mW
Mode: CW (UID: 0 (CW)) ; Frequency: 2450 MHz ; Test Distance: 8 mm (*.10mm to liquid)
TSL parameters used: Head(v6) ; f= 2450 MHz; Conductivity: 1.832 S/m; Permittivity: 40.06

DASY8 Configuration: - Electronics: DAE4, S/N:554 (cal.2022-04-14)/ - Phantom: ELI V8.0 (20deg probe tilt) ; Serial: 2161 ; Phantom section: Flat
- Probe: EX3DV4, S/N:3745 (cal.2022-04-19) ; ConvF: (6.86, 6.86 , 6.86)@2450 MHz / - Software: 16.2.2.1588 (Measurement); 16.2.2.1588 (Evaluation)

Scan Setup			Measurement Results		
	Area Scan	Zoom Scan		Area Scan	Zoom Scan
Grid Extents [mm]	40.0×80.0	30.0× 30.0 ×30.0	psSAR1g [W/kg]	13.5	**13.4**
Grid Steps [mm]	10.0×10.0	5.0× 5.0 ×1.5	psSAR10g [W/kg]	6.21	**6.26**
Sensor Surface [mm]	3.0	1.4	Power Drift [dB]	0.01	0.02
Graded Grid	N/A	Yes	Power Scaling	Disabled	Disabled
Grading Ratio	N/A	1.5	Scaling Factor [dB]	N/A	N/A
MAIA	Not used	Not used	TSL Correction	No correction	No correction
Surface Detection	VMS + 6p	VMS + 6p	M2/M1 [%]	N/A	79.5
Scan Method	Measured	Measured	Dist 3dB Peak [mm]	N/A	9.0



Remarks: *. Date tested: 2023-01-24 ;Tested by: Hiroshi Naka; Tested place:No.7 shielded room; Ambient: 23 deg.C. / (60~70) %RH; Liquid depth: 150 mm;
*. Liquid temperature: 22.0 deg.C. ± 0.5 deg.C. (22.0 deg.C., in check); *. Red cubic: big=SAR(10g) / small=SAR(1g)

Appendix 3-7: Uncertainty Assessment (SAR measurement/Daily check)

*. Although this standard determines only the limit value of uncertainty, there is no applicable rule of uncertainty in this. Therefore, the following results are derived depending on whether or not laboratory uncertainty is applied.

Uncertainty of SAR measurement (2.4GHz~6GHz) (*. liquid: head(v6), DAK3.5, Wi-Fi(BT)) (v11r02)							1g SAR	10g SAR
Combined measurement uncertainty of the measurement system (k=1)							± 13.25 %	± 13.15 %
Expanded uncertainty (k=2)							± 26.5 %	± 26.3 %
Symbol	Error Description	Uncertainty Value	Probability distribution	Divisor	ci (1g)	ci (10g)	ui (1g) (std. uncertainty)	ui (10g) (std. uncertainty)
Measurement System (DASY8)								
CF	Probe Calibration (EX3DV4)	± 13.1 %	Normal	2	1	1	± 6.55 %	± 6.55 %
CFdfift	Probe Calibration Drift	± 1.7 %	Rectangular	√3	1	1	± 1.0 %	± 1.0 %
LIN	Probe Linearity	± 4.7 %	Rectangular	√3	1	1	± 2.7 %	± 2.7 %
BBS	Broadband Signal	± 2.6 %	Rectangular	√3	1	1	± 1.5 %	± 1.5 %
ISO	Probe Isotropy	± 7.6 %	Rectangular	√3	1	1	± 4.4 %	± 4.4 %
DAE	Data Acquisition	± 1.2 %	Normal	1	1	1	± 1.2 %	± 1.2 %
AMB	RF Ambient (noise&refrection) (< 12μW/g)	± 1.0 %	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Δsys	Probe Positioning	± 0.5 %	Normal	1	0.33	0.33	± 0.2 %	± 0.2 %
DAT	Data Processing	± 2.3 %	Normal	1	1	1	± 2.3 %	± 2.3 %
Phantom and Device Error								
LIQ(σ)	Conductivity (measured) (DAK3.5)	± 5.0 %	Normal	2	0.78	0.71	± 2.0 %	± 1.8 %
LIQ(Tσ)	Conductivity (temperature) (≤ 2 deg.C.)	± 2.4 %	Rectangular	√3	0.78	0.71	± 1.1 %	± 1.0 %
EPS	Phantom Permittivity (liquid to antenna: ≥ 5 mm)	± 14.0 %	Rectangular	√3	0.25	0.25	± 2.0 %	± 2.0 %
DIS	Distance DUT-TSL	± 2.7 %	Normal	1	2	2	± 5.4 %	± 5.4 %
Dxyz	Test Sample positioning	± 5.0 %	Normal	1	1	1	± 5.0 %	± 5.0 %
H	Device holder uncertainty	± 3.6 %	Normal	1	1	1	± 3.6 %	± 3.6 %
MOD	DUT Modulation	± 3.2 %	Normal	1	1	1	± 3.2 %	± 3.2 %
TAS	Time-average SAR	± 0.0 %	Rectangular	√3	1	1	± 0.0 %	± 0.0 %
RFdrift	Drift of output power (measured, < 0.2 dB)	± 4.7 %	Normal	2	1	1	± 2.4 %	± 2.4 %
Correction to the SAR results								
C(e,σ)	Deviation to Target (e',σ: ≤ 10 %, IEC head)	± 1.9 %	Normal	1	1	0.84	± 1.9 %	± 1.6
C(R)	SAR Scaling	± 0 %	Rectangular	√3	1	1	± 0.0 %	± 0.0 %
u(ΔSAR)	**Combined Standard Uncertainty**						**± 13.25 %**	**± 13.15 %**
U	**Expanded Uncertainty (k=2)**						**± 26.5 %**	**± 26.3 %**

*. This measurement uncertainty budget is suggested by IEC/IEEE 62209-1528:2020 and determined by Schmid & Partner Engineering AG, DASY8 Module SAR Manual, August 2022 (Chapter 6.3, DASY8 Uncertainty Budget for Hand-held/Body-worn Devices, Frequency band: 300 MHz–3GHz range and 3 GHz–6GHz range). All listed error components have veff equal to ∞.

Uncertainty of daily check (2.4GHz~6GHz) (*. liquid: head(v6), DAK3.5, CW) (v11r02)							1g SAR	10g SAR
Combined measurement uncertainty of the measurement system (k=1)							± 10.45 %	± 10.35 %
Expanded uncertainty (k=2)							± 20.9 %	± 20.7 %
Symbol	Error Description	Uncertainty Value	Probability distribution	Divisor	ci (1g)	ci (10g)	ui (1g) (std. uncertainty)	ui (10g) (std. uncertainty)
Measurement System (DASY8)								
CF	Probe Calibration (EX3DV4)	± 13.1 %	Normal	2	1	1	± 6.55 %	± 6.55 %
CFdfift	Probe Calibration Drift	± 1.7 %	Rectangular	√3	1	1	± 1.0 %	± 1.0 %
LIN	Probe Linearity	± 4.7 %	Rectangular	√3	1	1	± 2.7 %	± 2.7 %
ISO	Probe Isotropy	± 4.7 %	Rectangular	√3	1	1	± 2.7 %	± 2.7 %
DAE	Data Acquisition	± 1.2 %	Normal	1	1	1	± 1.2 %	± 1.2 %
AMB	RF Ambient (noise&refrection) (<12uW/g)	± 1.0 %	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Δsys	Probe Positioning	± 0.5 %	Normal	1	0.33	0.33	± 0.2 %	± 0.2 %
DAT	Data Processing	± 2.3 %	Normal	1	1	1	± 2.3 %	± 2.3 %
Phantom and Device Error								
LIQ(σ)	Conductivity (measured) (DAK3.5)	± 5.0 %	Normal	2	0.78	0.71	± 2.0 %	± 1.8 %
LIQ(Tσ)	Conductivity (temperature) (≤ 2 deg.C.)	± 2.4 %	Rectangular	√3	0.78	0.71	± 1.1 %	± 1.0 %
EPS	Phantom Permittivity (liquid to antenna: ≥ 5 mm)	± 14.0 %	Rectangular	√3	0.25	0.25	± 2.0 %	± 2.0 %
VAL	Validation antenna uncertainty	± 5.5 %	Rectangular	√3	1	1	± 3.2 %	± 3.2 %
Pin	Uncertainty in accepted power	± 2.5 %	Normal	2	1	1	± 1.3 %	± 1.3 %
DIS	Distance DUT-TSL	± 2.0 %	Normal	1	2	2	± 4.0 %	± 4.0 %
Dxyz	Test Sample positioning	± 1.0 %	Normal	1	1	1	± 1.0 %	± 1.0 %
RFdrift	Drift of output power (measured, < 0.1 dB)	± 2.3 %	Rectangular	√3	1	1	± 1.3 %	± 1.3 %
Correction to the SAR results								
C(e,σ)	Deviation to Target (e',σ: ≤ 10 %. IEC head)	± 1.9 %	Normal	1	1	0.84	± 1.9 %	± 1.6 %
u(ΔSAR)	**Combined Standard Uncertainty**						**± 10.45 %**	**± 10.35 %**
U	**Expanded Uncertainty (k=2)**						**± 20.9 %**	**± 20.7 %**

*. This measurement uncertainty budget is suggested by IEC/IEEE 62209-1528:2020 and determined by Schmid & Partner Engineering AG, DASY8 Module SAR Manual, August 2022 (Chapter 6.2, DASY8 Uncertainty Budget for System Verification, Frequency band: 300 MHz–6GHz range). All listed error components have veff equal to ∞.

*. Table of uncertainties are listed for ISO/IEC 17025.

Appendix 3-8: Calibration certificates

Local ID	LIMS ID	Description	Type/Model	Serial Number	Manufacture	Calibration Certificate	Note
SPB-R05	226380	Dosimetric E-Field Probe	EX3DV4	3745	SPEAG		-
SSDA-R01	145558	Dipole Antenna (2.45 GHz)	D2450V2	765	SPEAG		*1

*1: As stated on page 2 of the certificate, the calibration was performed in accordance to the latest standard IEC/IEEE 62209-1528. Therefore, the reported SAR values are valid for any system that complies with IEC/IEEE 62209-1528 including all new versions of DASY such as DASY6 and DASY8.

-End of report-