



Prüfbericht-Nr.: <i>Test report no.:</i>	CN25DJOX 001	Auftrags-Nr.: <i>Order no.:</i>	48283035	Seite 1 von 36 Page 1 of 36
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2025-10-13	
Auftraggeber: <i>Client:</i>	Sound Devices, LLC E7556 State Road 23 and 33 Reedsburg, WI, USA			
Prüfgegenstand: <i>Test item:</i>	Digital wireless handheld microphone transmitter			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	Astral HH			
Auftrags-Inhalt: <i>Order content:</i>	Test Report for FCC SAR			
Prüfgrundlage: <i>Test specification:</i>	FCC 47 CFR §2.1093 IEEE Std 1528-2013 IEC/IEEE 62209-1528:2020 Published RF exposure KDB procedures			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2025-07-25			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A004052546-002			
Prüfzeitraum: <i>Testing period:</i>	2025-11-07 - 2025-11-12			
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland Taiwan Ltd. New Taipei Branch			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland Taiwan Ltd. Taipei Testing Laboratories			
Prüfergebnis*: <i>Test result*:</i>	Pass			
überprüft von: <i>compiled by:</i>	Ginger Chiang		genehmigt von: <i>authorized by:</i>	Morrison Huang
Datum: <i>Date:</i>	2026-03-19	Ausstellungsdatum: <i>Issue date:</i>	2026-03-19	
Stellung / Position:	Ginger Chiang Project Engineer	Stellung / Position:	Morrison Huang Project Engineer	
Sonstiges / Other:				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>				
Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>				
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
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Prüfbericht-Nr.:
Test report no.:

CN25DJOX 001

Seite 2 von 36
Page 2 of 36

Anmerkungen
Remarks

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4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2023, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. <i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2023, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i>

CONTENTS

HISTORY OF THIS TEST REPORT	5
1. GENERAL INFORMATION	6
1.1 STATEMENT OF COMPLIANCE	6
1.2 EQUIPMENT UNDER TEST (EUT) INFORMATION	7
1.2.1 GENERAL INFORMATION	7
1.2.2 WIRELESS TECHNOLOGIES	7
1.3 MAXIMUM CONDUCTED POWER	8
2. TEST SITES	9
2.1 TEST LABORATORY	9
2.2 TEST FACILITIES	9
2.3 LIST OF TEST AND MEASUREMENT INSTRUMENTS	10
3. MEASUREMENT UNCERTAINTY	11
4. TEST SPECIFICATION, METHODS AND PROCEDURES.....	13
5. RF EXPOSURE LIMITS.....	14
5.1 UNCONTROLLED ENVIRONMENT.....	14
5.2 CONTROLLED ENVIRONMENT.....	14
6. SAR MEASUREMENT SYSTEM.....	15
6.1 DEFINITION OF SPECIFIC ABSORPTION RATE (SAR).....	15
6.2 SPEAG DASY SYSTEM.....	15
6.2.1 ROBOT.....	16
6.2.2 PROBES	17
6.2.3 DATA ACQUISITION ELECTRONICS (DAE).....	17
6.2.4 PHANTOMS.....	18
6.2.5 DEVICE HOLDER	19
6.2.6 SYSTEM VALIDATION DIPOLES	19
6.2.7 TISSUE SIMULATING LIQUIDS	20
7. SAR MEASUREMENT PROCEDURE	22
7.1 AREA & ZOOM SCAN PROCEDURE	22
7.2 VOLUME SCAN PROCEDURE.....	22
7.3 POWER DRIFT MONITORING	23
7.4 SPATIAL PEAK SAR EVALUATION.....	23
7.5 SAR AVERAGED METHODS	23
8. SAR MEASUREMENT EVALUATION	24
8.1 TECHNICAL SPECIFICATION	24
8.2 EUT TESTING POSITION.....	25
8.2.1 EXTREMITY EXPOSURE CONDITIONS.....	25
8.3 ANTENNA LOCATION	25

8.3.1	SAR TEST EXCLUSION EVALUATIONS	26
8.4	SIMULTANEOUS TRANSMISSION POSSIBILITIES	26
8.5	TISSUE VERIFICATION	27
8.6	SYSTEM VALIDATION.....	28
8.6.1	SYSTEM CHECK PROCEDURE.....	28
8.6.2	SYSTEM VERIFICATION	29
8.7	MAXIMUM OUTPUT POWER.....	30
8.7.1	MEASURED CONDUCTED POWER RESULT	30
8.8	SAR TESTING RESULTS.....	32
8.8.1	SAR TEST REDUCTION CONSIDERATIONS	32
8.8.2	SAR RESULTS FOR EXTREMITY EXPOSURE CONDITION (SEPARATION DISTANCE IS 0CM GAP)	33
8.8.3	SAR MEASUREMENT VARIABILITY	34
8.8.4	DUT HOLDER PERTURBATIONS.....	34
8.8.5	SIMULTANEOUS MULTI-BAND TRANSMISSION EVALUATION.....	35
9.	APPENDIXES	36

APPENDIX A – SAR PLOTS OF SYSTEM VERIFICATION

APPENDIX B – SAR PLOTS OF SAR MEASUREMENT

APPENDIX C – CALIBRATION CERTIFICATE FOR PROBE AND DIPOLE

APPENDIX D – PHOTOGRAPHS OF THE TEST SET-UP

Prüfbericht - Nr.: CN25DJOX 001
Test Report No.

Seite 5 von 36
Page 5 of 36

HISTORY OF THIS TEST REPORT

Revision	Description	Date Issued
R01	Original Release	2025-11-18
R02	Revise the equipment class for LoRa to DSS on page 6	2026-03-19

1. General Information

1.1 Statement of Compliance

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

Equipment Class	Operating Mode	Highest Reported Extremity SAR _{10g} (0 cm Gap) (W/kg)
Assigned Bands	470MHz-608MHz	0.054
	902MHz-928MHz	0.088
	941.5MHz-952MHz	0.064
	952.85MHz-956.25MHz	0.060
	956.45MHz-959.85MHz	0.058
	1435MHz-1525MHz	0.078
DSS	LoRa	0.010
DTS	BLE	0.014
Highest Simultaneous Transmission SAR		Extremity (W/Kg)
Assigned Bands + DTS		0.102
Assigned Bands + DSS		0.098

Note:

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6W/kg as averaged over any 1 gram of tissue; 10-gram SAR for Product Specific 10g SAR, limit: 4.0W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEC IEEE 62209-1528_2020 and FCC KDB publications.

Prüfbericht - Nr.: CN25DJOX 001
Test Report No.

Seite 7 von 36
 Page 7 of 36

1.2 Equipment Under Test (EUT) Information

1.2.1 General Information

EUT Type	Digital wireless handheld microphone transmitter
Model Name	Astral HH
FCC ID	2AKLX-28297
Antenna Type	Integral Antenna
Antenna Gain	Bluetooth: -5.54 dBi LoRa: -5.54 dBi Assigned bands: 2.46 dBi (470 MHz ~ 608 MHz), 0.28 dBi (614 MHz ~ 616 MHz), 0.28 dBi (653 MHz ~ 657 MHz), 0.28 dBi (657 MHz ~ 663 MHz), 2.11 dBi (902 MHz ~ 928 MHz), 2.11 dBi (941.5 MHz ~ 952 MHz), 2.11 dBi (952.85 MHz ~ 956.25 MHz), 2.11 dBi (956.45 MHz ~ 959.85 MHz), 1.64 dBi (1435 MHz ~ 1525 MHz)

1.2.2 Wireless Technologies

Tx Frequency Bands (Unit: MHz)	Bluetooth: 2400 MHz ~ 2483.5 MHz LoRa: 2400.8 MHz ~ 2481.6 MHz Assigned bands: 470 MHz ~ 608 MHz, 614 MHz ~ 616 MHz, 653 MHz ~ 657 MHz, 657 MHz ~ 663 MHz, 902 MHz ~ 928 MHz, 941.5 MHz ~ 952 MHz, 952.85 MHz ~ 956.25 MHz, 956.45 MHz ~ 959.85 MHz, 1435 MHz ~ 1525 MHz
Uplink Modulations	Bluetooth: GFSK LoRa: FSK Assigned bands: COFDM

1.3 Maximum Conducted Power

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

Mode		Tune-up
Assigned bands	470-608 MHz	20.0
	614-616 MHz	10.0
	653-657 MHz	11.0
	657-663 MHz	11.0
	902-928 MHz	18.0
	941.5-952 MHz	20.0
	952.85-956.25 MHz	20.0
	956.45-959.85 MHz	20.0
	1435-1525 MHz	18.0
BLE		4.5
LoRa		5.5

Prüfbericht - Nr.: CN25DJOX 001
Test Report No.

Seite 9 von 36
Page 9 of 36

2. Test Sites

2.1 Test Laboratory

TÜV Rheinland Taiwan Ltd. Taipei Testing Laboratories

11F., No. 758, Sec. 4, Bade Rd., Songshan Dist., Taipei City 105 Taiwan (R.O.C.)

2.2 Test Facilities

TÜV Rheinland Taiwan Ltd. Taipei Testing Laboratories

No. 458-18, Sec. 2, Fenliao Rd., Linkou Dist., New Taipei City 244 Taiwan (R.O.C.)

The tests at the test sites have been conducted under the supervision of a TÜV engineer.

2.3 List of Test and Measurement Instruments

Equipment	Manufacturer	Model	SN	Cal. Date	Cal. Interval
E-field probes	SPEAG	EX3DV4	7400	2025/5/21	1 Year
E-field probes	SPEAG	EX3DV4	3804	2025/9/24	1 Year
Data Acquisition Electronics	SPEAG	DAE4	855	2025/4/23	1 Year
System Validation Dipole	SPEAG	D450V3	1129	2025/1/7	1 Year
System Validation Dipole	SPEAG	D600V3	1025	2025/8/7	1 Year
System Validation Dipole	SPEAG	D900V2	1d062	2025/3/12	1 Year
System Validation Dipole	SPEAG	D1450V2	1081	2025/3/12	1 Year
System Validation Dipole	SPEAG	D2450V2	804	2025/3/13	1 Year
Dielectric Assessment Kit	SPEAG	DAK-3.5	1292	2025/4/22	1 Year
ENA	Agilent	E5080A	MY55200677	2025/1/17	1 Year
Power Meter	Anritsu	ML2495A	1901008	2025/2/26	1 Year
Power Sensor	Anritsu	MA2411B	1725269	2025/2/26	1 Year
Power Sensor	R&S	NRP33S	101623	2025/3/13	1 Year
Signal Analyzer	R&S	FSV40	101512	2025/2/26	1 Year
Signal Generator	R&S	SMB100A03	181334	2025/2/12	1 Year
Digital Thermometer	Testo	608-H1	45207430	2024/11/22	1 Year
Directional coupler	Fairview Microwave	FMCP1025-20	A000553136-001	N/A	N/A
Power Amplifier	EMCI	EMC2830P	980352	N/A	N/A
Power Amplifier	mini-circuits	ZHL-42W	SN002101809	N/A	N/A
ELI Phantom	SPEAG	QDOVA002AA	TP-1153	N/A	N/A

3. Measurement Uncertainty

The component of uncertainty may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainty by the statistical analysis of a series of observations is termed a Type A evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in table below.

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor(a)	$1/k(b)$	$1/\sqrt{3}$	$1/\sqrt{6}$	$1/\sqrt{2}$

- (a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity
- (b) k is the coverage factor

Standard Uncertainty for Assumed Distribution

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual "root-sum-squares" (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables.

SAR Uncertainty Budget According to IEC/IEEE 62209-1528 (Frequency band: 4MHz - 10GHz range)								
Symbol	Input quantity X_i (source of uncertainty)	Unc. Value	Prob. Dist.	Div.	ci (1g)	ci (10g)	Std.Unc. (1g) (±%)	Std.Unc. (10g) (±%)
Measurement system errors								
CF	Probe calibration (±%)	9.3	N	2	1	1	4.65	4.65
CF_{drift}	Probe calibration drift (±%)	1.0	N	1	1	1	1.0	1.0
LIN	Probe linearity and detection limit (±%)	4.7	R	1.732	1	1	2.7	2.7
BBS	Broadband signal (±%)	3.0	N	1	1	1	3.0	3.0
ISO	Probe isotropy (±%)	7.6	R	2	1	1	3.8	3.8
DAE	Other probe and data acquisition errors (±%)	0.3	N	1.732	1	1	0.17	0.17
AMB	RF ambient and noise (±%)	1.8	N	1	1	1	1.8	1.8
Δ_{xyz}	Probe positioning errors (± mm)	0.20	N	1	0.33	0.33	0.07	0.07
DAT	Data processing errors (±%)	3.5	N	1	1	1	3.5	3.5
Phantom and device (DUT or validation antenna) errors								
$LIQ(\sigma)$	Conductivity (meas.) DAK (±%)	3.5	N	1	0.78	0.71	2.73	2.49
$LIQ(T_c)$	Conductivity (temp.)(±%)	3	R	1	0.78	0.71	1.35	1.23
EPS	Phantom Permittivity (±%)	14	R	1.732	0.5	0.5	4.0	4.0
DIS	Distance DUT – TSL (±%)	2	N	1	2	2	4.0	4.0
D_{xyz}	Device Positioning (±%)	2	N	1	1	1	2.2	2.2
H	Device Holder (±%)	3.4	N	1	1	1	3.2	3.2
MOD	DUT Modulation (±%)	2.4	R	1.732	1	1	1.39	1.39
TAS	Time-average SAR (±%)	2.4	R	1.732	1	1	1.39	1.39
RF_{drift}	DUT drift (±%)	5	N	1	1	1	5.0	5.0
VAL	Val Antenna Unc. (±%)	0	N	1	1	1	0.0	0.0
Pin	Unc. Input Power (±%)	0	N	1	1	1	0.0	0.0
Corrections to the SAR result								
$C(\varepsilon, \sigma)$	Deviation to Target (±%)	1.9	N	1	1	0.84	1.9	1.6
$C(R)$	SAR scaling (±%)	0	R	$\sqrt{3}$	1	1	0.0	0.0
$u(\Delta SAR)$	Combined uncertainty						12.57	12.47
	Coverage Factor for 95%						K=2	K=2
U	Expanded uncertainty					U =	±25.14	±24.94

Uncertainty budget for frequency range 4 MHz to 10 GHz

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEC IEEE 62209-1528_2020 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

4. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR §2.1093, IEC IEEE 62209-1528_2020, the following FCC Published RF exposure KDB procedures & manufacturer KDB inquiries:

- KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- KDB 865664 D02 RF Exposure Reporting v01r02
- KDB 447498 D04 Interim General RF Exposure Guidance v01

5. RF Exposure Limits

5.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

5.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is average over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

6. SAR Measurement System

6.1 Definition of Specific Absorption Rate (SAR)

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

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

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

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

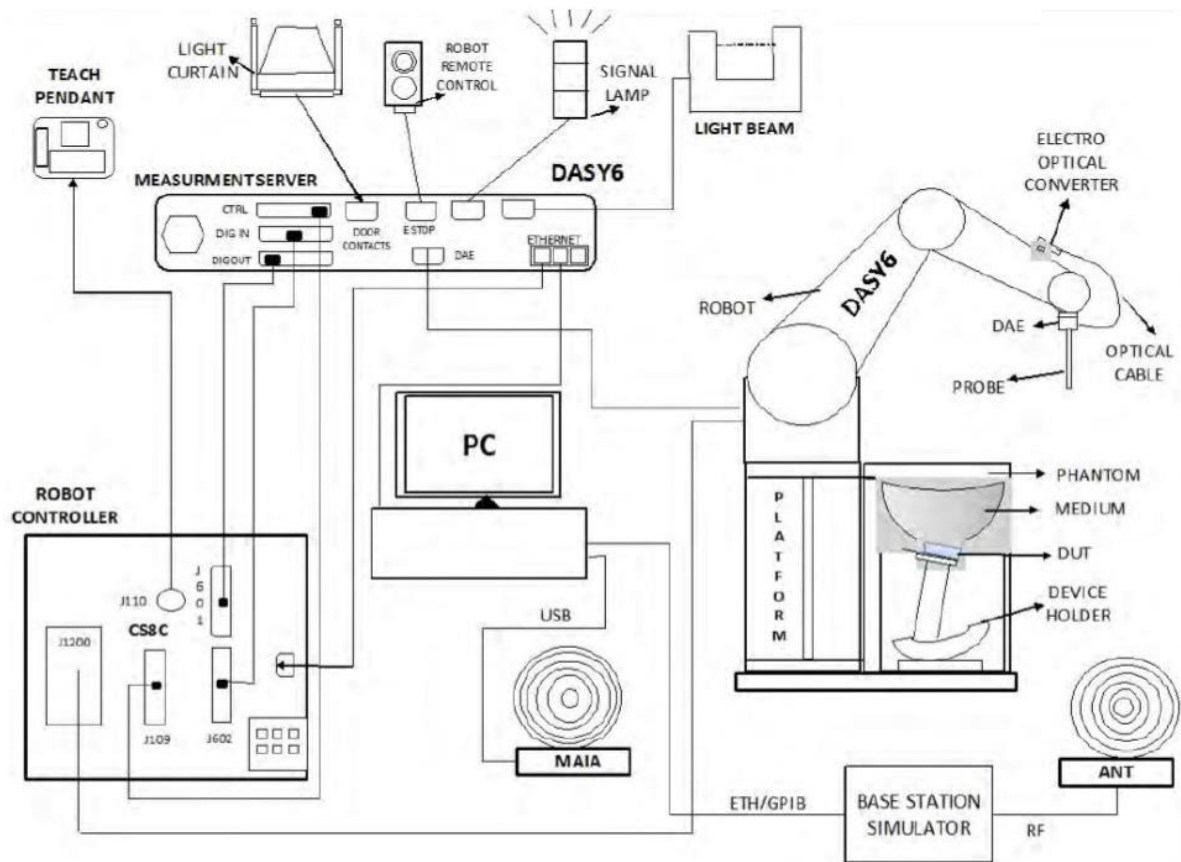
SAR measurement can be related to the electrical field in the tissue by

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

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

6.2 SPEAG DASY System

DASY system consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY6 software defined. The DASY software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC.



DASY System Setup

6.2.1 Robot

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

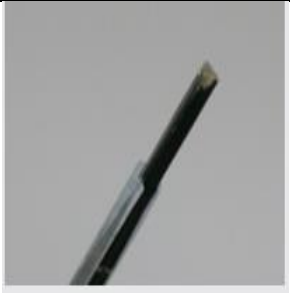
- High precision (repeatability ± 0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)



DASY6

6.2.2 Probes

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

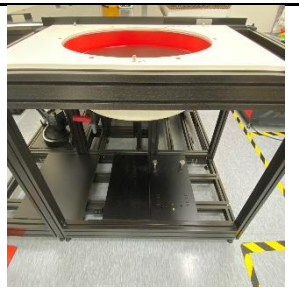
Model	EX3DV4	
Construction	Symmetrical design with triangular core. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE).	
Frequency	4 MHz to 10 GHz Linearity: ± 0.2 dB	
Directivity	± 0.1 dB in TSL (rotation around probe axis) ± 0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	10 μ W/g to 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)	
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	

6.2.3 Data Acquisition Electronics (DAE)

Model	DAE4	
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.	
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV, 400mV)	
Input Offset Voltage	< 5 μ V (with auto zero)	
Input Bias Current	< 50 fA	
Dimensions	60 x 60 x 68 mm	

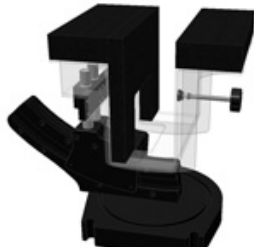
6.2.4 Phantoms

Model	Twin SAM	
Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEC/IEEE 62209-1528. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.	
Material	Vinylester, glass fiber reinforced (VE-GF)	
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)	
Dimensions	Length: 1000 mm Width: 500 mm Height: adjustable feet	
Filling Volume	approx. 25 liters	

Model	ELI	
Construction	Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 4 MHz to 10 GHz. ELI is fully compatible with the IEC/IEEE 62209-1528 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.	
Material	Vinylester, glass fiber reinforced (VE-GF)	
Shell Thickness	2.0 ± 0.2 mm (bottom plate)	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	
Filling Volume	approx. 30 liters	

6.2.5 Device Holder

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

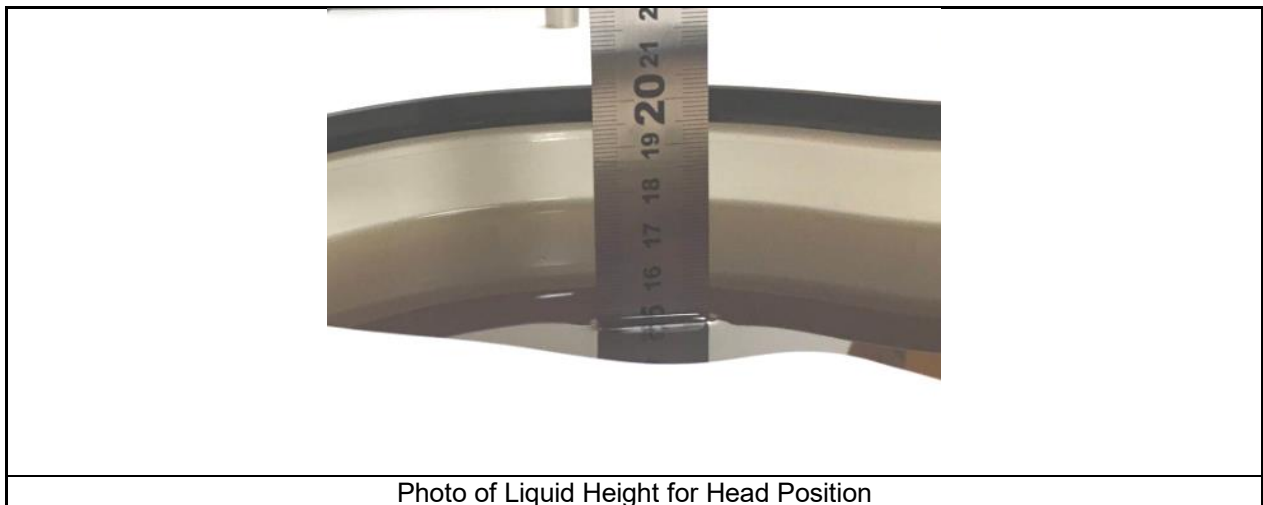
Model	Laptop Extensions Kit	
Construction	Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices according to IEC/IEEE 62209-1528 (e.g., laptops, cameras, etc.). It is lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner.	
Material	POM, Acrylic glass, Foam	

6.2.6 System Validation Dipoles

Model	D-Serial	
Construction	Symmetrical dipole with 1/4 balun. Enables measurement of feed point impedance with NWA. Matched for use near flat phantoms filled with tissue simulating solutions.	
Frequency	300 MHz to 10 GHz	
Return Loss	> 20 dB	
Power Capability	> 100 W (f < 1GHz), > 40 W (f > 1GHz)	

6.2.7 Tissue Simulating Liquids

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



The dielectric properties of the head tissue simulating liquids are defined in IEC/IEEE 62209-1528:2020 Table 2.

The workshop effective February 19, 2019, FCC has permitted the use of single head tissue simulating liquid specified in IEC 62209 1 for all SAR tests.

The dielectric properties of the tissue simulating liquids were verified prior to the SAR evaluation using a dielectric assessment kit and a network analyzer.

Targets of Tissue Simulating Liquid

Frequency (MHz)	Target Permittivity	Range of ±5%	Target Conductivity	Range of ±5%
For Head				
4	55	52.3 ~ 57.8	0.75	0.71 ~ 0.79
13	55	52.3 ~ 57.8	0.75	0.71 ~ 0.79
30	55	52.3 ~ 57.8	0.75	0.71 ~ 0.79
150	52.3	49.7 ~ 54.9	0.76	0.72 ~ 0.80
300	45.3	43.0 ~ 47.6	0.87	0.83 ~ 0.91
450	43.5	41.3 ~ 45.7	0.87	0.83 ~ 0.91
750	41.9	39.8 ~ 44.0	0.89	0.85 ~ 0.93
835	41.5	39.4 ~ 43.6	0.90	0.86 ~ 0.95
900	41.5	39.4 ~ 43.6	0.97	0.92 ~ 1.02
1450	40.5	38.5 ~ 42.5	1.20	1.14 ~ 1.26
1800	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
1900	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
1950	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2000	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2100	39.8	37.5 ~ 41.5	1.49	1.42 ~ 1.56
2450	39.2	37.2 ~ 41.2	1.80	1.71 ~ 1.89
2600	39.0	37.1 ~ 41.0	1.96	1.86 ~ 2.06
3000	38.5	36.6 ~ 40.4	2.40	2.28 ~ 2.52
3500	37.9	36.0 ~ 39.8	2.91	2.76 ~ 3.06
4000	37.4	35.5 ~ 39.3	3.43	3.26 ~ 3.60
4500	36.8	35.0 ~ 38.6	3.94	3.74 ~ 4.14
5000	36.2	34.4 ~ 38.0	4.45	4.23 ~ 4.67
5200	36.0	34.2 ~ 37.8	4.66	4.43 ~ 4.89
5400	35.8	34.0 ~ 37.6	4.86	4.62 ~ 5.10
5600	35.5	33.7 ~ 37.3	5.07	4.82 ~ 5.32
5800	35.3	33.5 ~ 37.1	5.27	5.01 ~ 5.53
6000	35.1	33.3 ~ 36.9	5.48	5.21 ~ 5.75
6500	34.5	32.8 ~ 36.2	6.07	5.77 ~ 6.37
7000	33.9	32.2 ~ 35.6	6.65	6.32 ~ 6.98
7500	33.3	31.6 ~ 35	7.24	6.88 ~ 7.6
8000	32.7	31.1 ~ 34.3	7.84	7.45 ~ 8.23
8500	32.1	30.5 ~ 33.7	8.46	8.04 ~ 8.88
9000	31.6	30 ~ 33.2	9.08	8.63 ~ 9.53
9500	31.0	29.5 ~ 32.6	9.71	9.22 ~ 10.2
10000	30.4	28.9 ~ 31.9	10.40	9.88 ~ 10.92

7. SAR Measurement Procedure

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

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

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

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

7.1 Area & Zoom Scan Procedure

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

Items	≤ 2GHz	2-3 GHz	3-4 GHz	4-5 GHz	5-6 GHz
Area Scan ($\Delta x, \Delta y$)	≤ 15mm	≤ 12 mm	≤ 12 mm	≤ 10 mm	≤ 10 mm
Zoom Scan ($\Delta x, \Delta y$)	≤ 8 mm	≤ 5 mm	≤ 5 mm	≤ 4 mm	≤ 4 mm
Zoom Scan (Δz)	≤ 5 mm	≤ 5 mm	≤ 4 mm	≤ 3 mm	≤ 2 mm
Zoom Scan Volume	≥ 30 mm	≥ 30 mm	≥ 28 mm	≥ 25 mm	≥ 22 mm

Note:

When zoom scan is required and report SAR is ≤ 1.4 W/kg, the zoom scan resolution of $\Delta x / \Delta y$ (2-3 GHz): ≤ 8 mm, 3-4 GHz: ≤ 7 mm, 4-6 GHz: ≤ 5 mm) may be applied.

7.2 Volume Scan Procedure

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

7.3 Power Drift Monitoring

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

7.4 Spatial Peak SAR Evaluation

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

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

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

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

7.5 SAR Averaged Methods

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

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

8. SAR Measurement Evaluation

8.1 Technical Specification

<Considerations Related to Bluetooth/LoRa for Setup and Testing>

This device has installed Bluetooth/LoRa and other assigned bands engineering testing software which can provide continuous transmitting RF signal.

During Bluetooth SAR testing, this device was operated to transmit continuously at the 48% transmission duty with specified transmission mode, operating frequency, lowest data rate, and maximum output power.

During LoRa SAR testing, this device was operated to transmit continuously at the 98% transmission duty with specified transmission mode, operating frequency, lowest data rate, and maximum output power.

8.2 EUT Testing Position

According to technical standards, EUT are tested for SAR compliance in the use configurations described in the following subsections.

8.2.1 Extremity Exposure Conditions

EUT was tested for the surface as Bottom Side and Handheld Side. The separation distance between the EUT and phantom is 0 mm.

8.3 Antenna Location



8.3.1 SAR Test Exclusion Evaluations

According to KDB 447498 D01, the SAR test exclusion condition is based on source-based SAR-based thresholds 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 ERP, whichever is greater.

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

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

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

Band	Freq.	Gain	Power		ERP	Separation Distances			Calculated Threshold Value Pth (mW)			Exempt		
	MHz	dBi	dBm	mW	mW	Top Side	Bottom Side	Handheld Side	Top Side	Bottom Side	Handheld Side	Top Side	Bottom Side	Handheld Side
470 - 608MHz	607.900	2.46	20	100	107.399	200	5	5	1240.12	14.43	14.43	v		
614 - 616MHz	615.900	0.28	10	10	6.501	200	5	5	1256.44	14.17	14.17	v	v	v
653 - 657MHz	656.900	0.28	11	12.589	8.185	200	5	5	1340.08	12.95	12.95	v	v	v
657 - 663MHz	662.900	0.28	11	12.589	8.185	200	5	5	1352.32	12.78	12.78	v	v	v
902 - 928MHz	927.600	2.11	18	63.096	62.517	200	5	5	1892.3	7.98	7.98	v		
941.5 - 952MHz	941.600	2.11	20	100	99.083	200	5	5	1920.86	7.81	7.81	v		
952.85 - 956.25MHz	952.950	2.11	20	100	99.083	200	5	5	1944.02	7.68	7.68	v		
956.45 - 959.85MHz	956.550	2.11	20	100	99.083	200	5	5	1951.36	7.64	7.64	v		
1435 - 1525MHz	1479.940	1.64	18	63.096	56.105	200	5	5	3019.08	4.14	4.14	v		
BLE	2440	-5.54	4.5	2.818	0.48	200	5	5	3060	2.75	2.75	v		
2.4G LoRa	2440.8	-5.54	5.5	3.548	0.604	200	5	5	3060	2.75	2.75	v		

8.4 Simultaneous Transmission Possibilities

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

Simultaneous TX Combination	Capable Transmit Configurations	Extremity Exposure Condition
1	Assigned Bands + Bluetooth	Yes
2	Assigned Bands + LoRa	Yes

8.5 Tissue Verification

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameters are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within $\pm 5\%$ of the target values.

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

Tissue Type	Frequency (MHz)	Measured Conductivity (σ)	Measured Permittivity (ϵ_r)	Target Conductivity (σ)	Target Permittivity (ϵ_r)	Conductivity Deviation (%)	Permittivity Deviation (%)	Test Date
Head	450	0.868	43.554	0.87	43.5	-0.23	0.12	2025/11/10
Head	600	0.845	43.982	0.88	42.7	-3.98	3.00	2025/11/10
Head	900	0.965	42.818	0.97	41.5	-0.52	3.18	2025/11/7
Head	1450	1.187	40.449	1.2	40.5	-1.08	-0.13	2025/11/10
Head	2450	1.811	39.935	1.8	39.2	0.61	1.88	2025/11/12

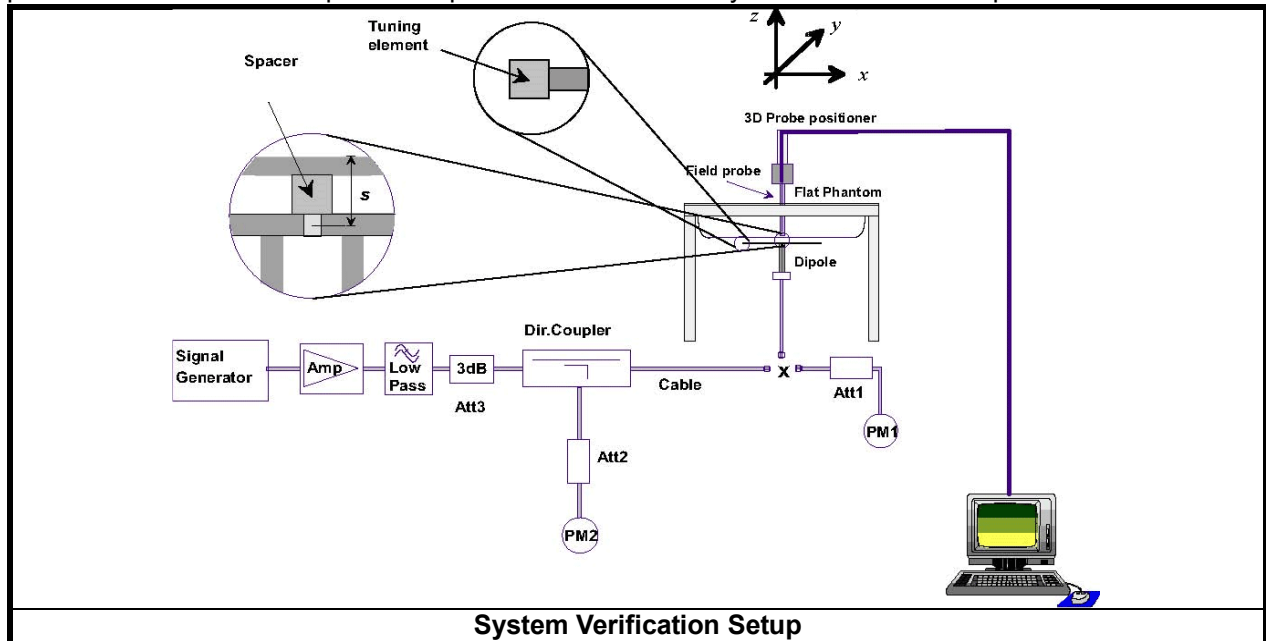
Note:

The dielectric properties of the tissue simulating liquid must be measured within 24 hours before the SAR testing and within $\pm 5\%$ of the target values. Liquid temperature during the SAR testing must be within $\pm 2^\circ\text{C}$.

8.6 System Validation

8.6.1 System check Procedure

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



The validation dipole is placed beneath the flat phantom with the specific spacer in place. The distance spacer is touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The spectrum analyzer measures the forward power at the location of the system check dipole connector. The signal generator is adjusted for the desired forward power (250 mW is used for 450 MHz to 3 GHz, 100 mW is used for 3.5 GHz to 6 GHz) at the dipole connector and the power meter is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter.

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

8.6.2 System Verification

The measuring results for system check are shown as below.

Frequency (MHz)	Measured SAR 10g(W/kg)	normalized SAR 10g(W/kg)	Targeted SAR 10g(W/kg)	Deviation (%)	Dipole S/N	Probe S/N	DAE S/N
450	0.755	3.02	3.07	-1.63	1129	7400	855
600	1.07	4.28	4.22	1.42	1025	3804	855
900	1.77	7.08	6.93	2.16	1d062	7400	855
1450	4.24	16.96	16.4	3.41	1081	7400	855
2450	6.21	24.84	24.7	0.57	804	7400	855

Note:

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

8.7 Maximum Output Power

8.7.1 Measured Conducted Power Result

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

<Bluetooth>

Frequency (MHz)	Max. Tune up (dBm)	Average Conducted Power (dBm)
2402	4.5	3.04
2440	4.5	3.22
2480	4.5	2.89

<LoRa>

Frequency (MHz)	Max. Tune up (dBm)	Average Conducted Power (dBm)
2400.8	5.5	3.65
2440.8	5.5	4.82
2481.6	5.5	3.53

<470-608MHz>

Frequency (MHz)	Max. Tune up (dBm)	Average Conducted Power (dBm)
470.100	20.0	19.29
539.000	20.0	19.36
607.900	20.0	19.36

<614-616MHz>

Frequency (MHz)	Max. Tune up (dBm)	Average Conducted Power (dBm)
614.100	10.0	9.97
615.000	10.0	9.95
615.900	10.0	9.99

<653-657MHz>

Frequency (MHz)	Max. Tune up (dBm)	Average Conducted Power (dBm)
653.100	11.0	10.27
655.000	11.0	10.07
656.900	11.0	10.12

<657-663MHz>

Frequency (MHz)	Max. Tune up (dBm)	Average Conducted Power (dBm)
657.100	11.0	10.30
660.000	11.0	10.36
662.900	11.0	10.26

<902-928MHz>

Frequency (MHz)	Max. Tune up (dBm)	Average Conducted Power (dBm)
902.400	18.0	16.99
915.000	18.0	17.22
927.600	18.0	17.25

<941.5-952MHz>

Frequency (MHz)	Max. Tune up (dBm)	Average Conducted Power (dBm)
941.600	20.0	18.68
946.750	20.0	18.60
951.900	20.0	18.63

<952.85-956.25MHz>

Frequency (MHz)	Max. Tune up (dBm)	Average Conducted Power (dBm)
952.950	20.0	18.83
954.550	20.0	18.62
956.150	20.0	18.67

<956.45-959.85MHz>

Frequency (MHz)	Max. Tune up (dBm)	Average Conducted Power (dBm)
956.550	20.0	18.77
958.150	20.0	18.74
959.750	20.0	18.73

<1435-1525MHz>

Frequency (MHz)	Max. Tune up (dBm)	Average Conducted Power (dBm)
1435.135	18.0	17.04
1479.940	18.0	17.09
1524.815	18.0	16.91

8.8 SAR Testing Results

8.8.1 SAR Test Reduction Considerations

<KDB 447498 D01, General RF Exposure Guidance>

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

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

8.8.2 SAR Results for Extremity Exposure Condition (Separation Distance is 0cm Gap)

Plot No.	Assigned Bands	Mode	Test Position	Accessory	Operation Frequency (MHz)	Measured Conducted Power (dBm)	Max. Tune-up Power (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured SAR-10g (W/kg)	Reported SAR-10g (W/kg)
	470MHz-608MHz	200KG2E	Bottom Side	-	539.000	19.36	20	1.159	-0.12	0.010	0.012
	470MHz-608MHz	200KG2E	Handheld Side	-	539.000	19.36	20	1.159	-0.06	0.046	0.053
	470MHz-608MHz	200KG2E	Handheld Side	-	470.100	19.29	20	1.178	-0.01	0.045	0.053
30	470MHz-608MHz	200KG2E	Handheld Side	-	607.900	19.36	20	1.159	-0.05	0.047	0.054
	470MHz-608MHz	200KG2E	Handheld Side	Counterweight	607.900	19.36	20	1.159	-0.04	0.045	0.052
	902MHz-928MHz	200KG2E	Bottom Side	-	927.600	17.25	18	1.189	0.12	0.016	0.019
	902MHz-928MHz	200KG2E	Handheld Side	-	927.600	17.25	18	1.189	-0.04	0.053	0.063
1	902MHz-928MHz	200KG2E	Handheld Side	-	902.400	16.99	18	1.262	-0.14	0.070	0.088
	902MHz-928MHz	200KG2E	Handheld Side	-	915.000	17.22	18	1.197	-0.04	0.058	0.070
	902MHz-928MHz	200KG2E	Handheld Side	Counterweight	915.000	17.22	18	1.197	0.11	0.058	0.070
	941.5MHz-952MHz	200KG2E	Bottom Side	-	941.600	18.68	20	1.355	-0.11	0.013	0.018
	941.5MHz-952MHz	200KG2E	Handheld Side	-	941.600	18.68	20	1.355	-0.05	0.046	0.062
2	941.5MHz-952MHz	200KG2E	Handheld Side	-	946.750	18.60	20	1.380	-0.09	0.046	0.064
	941.5MHz-952MHz	200KG2E	Handheld Side	-	951.900	18.63	20	1.371	-0.05	0.044	0.060
	941.5MHz-952MHz	200KG2E	Handheld Side	Counterweight	951.900	18.63	20	1.371	0.14	0.042	0.058
	952.85MHz-956.25MHz	200KG2E	Bottom Side	-	952.950	18.83	20	1.309	-0.18	0.013	0.017
3	952.85MHz-956.25MHz	200KG2E	Handheld Side	-	952.950	18.83	20	1.309	-0.06	0.046	0.060
	952.85MHz-956.25MHz	200KG2E	Handheld Side	-	954.550	18.62	20	1.374	0.02	0.042	0.057
	952.85MHz-956.25MHz	200KG2E	Handheld Side	-	956.150	18.67	20	1.358	-0.12	0.042	0.057
	952.85MHz-956.25MHz	200KG2E	Handheld Side	Counterweight	956.150	18.67	20	1.358	0	0.041	0.056
	956.45MHz-959.85MHz	200KG2E	Bottom Side	-	956.550	18.77	20	1.327	-0.17	0.012	0.016
	956.45MHz-959.85MHz	200KG2E	Handheld Side	-	956.550	18.77	20	1.327	-0.15	0.039	0.052
	956.45MHz-959.85MHz	200KG2E	Handheld Side	-	958.150	18.74	20	1.337	-0.17	0.040	0.053
5	956.45MHz-959.85MHz	200KG2E	Handheld Side	-	959.750	18.73	20	1.340	-0.10	0.043	0.058
	956.45MHz-959.85MHz	200KG2E	Handheld Side	Counterweight	959.750	18.73	20	1.340	-0.01	0.040	0.054
	1435MHz-1525MHz	200KG2E	Bottom Side	-	1479.940	17.09	18	1.233	-0.17	0.014	0.017
	1435MHz-1525MHz	200KG2E	Handheld Side	-	1479.940	17.09	18	1.233	-0.12	0.051	0.063
	1435MHz-1525MHz	200KG2E	Handheld Side	-	1435.135	17.04	18	1.247	-0.13	0.047	0.059
10	1435MHz-1525MHz	200KG2E	Handheld Side	-	1524.815	16.91	18	1.285	-0.02	0.060	0.078
	1435MHz-1525MHz	200KG2E	Handheld Side	Counterweight	1524.815	16.91	18	1.285	0.18	0.055	0.071

Plot No.	Band	Mode	Test Position	Accessory	Operation Frequency (MHz)	Measured Conducted Power (dBm)	Max. Tune-up Power (dBm)	Tune-up Scaling Factor	Duty Cycle Scaling Factor	Power Drift (dB)	Measured SAR-10g (W/kg)	Reported SAR-10g (W/kg)
	BLE	1Mbps	Bottom Side	-	2440	3.22	4.5	1.343	2.083	0	0.001	0.003
37	BLE	1Mbps	Handheld Side	-	2440	3.22	4.5	1.343	2.083	-0.17	0.005	0.014
	BLE	1Mbps	Handheld Side	-	2402	3.04	4.5	1.400	2.083	-0.17	0.003	0.009
	BLE	1Mbps	Handheld Side	-	2480	2.89	4.5	1.449	2.083	-0.10	0.004	0.012
	BLE	1Mbps	Handheld Side	Counterweight	2440	3.22	4.5	1.343	2.083	-0.19	0.004	0.011
	2.4G LoRa	1.09 kbit/s	Bottom Side	-	2440.8	4.82	5.5	1.169	1.020	0	0.001	0.001
	2.4G LoRa	1.09 kbit/s	Handheld Side	-	2440.8	4.82	5.5	1.169	1.020	-0.12	0.007	0.008
	2.4G LoRa	1.09 kbit/s	Handheld Side	-	2400.8	3.65	5.5	1.531	1.020	0.06	0.004	0.006
42	2.4G LoRa	1.09 kbit/s	Handheld Side	-	2481.6	3.53	5.5	1.574	1.020	0.19	0.006	0.010
	2.4G LoRa	1.09 kbit/s	Handheld Side	Counterweight	2481.6	3.53	5.5	1.574	1.020	-0.19	0.004	0.006

Test Engineer: Ginger Chiang

8.8.3 SAR Measurement Variability

According to KDB 865664 D01, SAR measurement variability was assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. Alternatively, if the highest measured SAR for both head and body tissue-equivalent media are ≤ 1.45 W/kg and the ratio of these highest SAR values, i.e., largest divided by smallest value, is ≤ 1.10 , the highest SAR configuration for either head or body tissue-equivalent medium may be used to perform the repeated measurement. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is remounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

Since all the measured SAR are less than 0.8 W/kg, the repeated measurement is not required.

8.8.4 DUT Holder Perturbations

Depending on antenna locations, buttons locations on phones or device, form factor (e.g. dongles etc.), the measured SAR could be influenced by the relative positions of the test device and its holder.

When the highest reported SAR of an antenna is > 1.2 W/kg, holder perturbation verification is required, using the highest SAR configuration among all applicable frequency bands with and without the device holder.

All the measured SAR are less than 1.2 W/kg, so the holder perturbation verification is not required.

8.8.5 Simultaneous Multi-band Transmission Evaluation

<SAR Summation Analysis>

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

Body		Reported SAR (W/kg)			Summed 10g SAR (W/kg)	
Assigned Bands	Exposure Position	1	2	3	1+2	1+3
		Assigned Bands	BLE	2.4G LoRa		
470MHz-608MHz	Bottom Side	0.012	0.003	0.001	0.015	0.013
	Handheld Side	0.054	0.014	0.010	0.068	0.064
902MHz-928MHz	Bottom Side	0.019	0.003	0.001	0.022	0.020
	Handheld Side	0.088	0.014	0.010	0.102	0.098
941.5MHz-952MHz	Bottom Side	0.018	0.003	0.001	0.021	0.019
	Handheld Side	0.064	0.014	0.010	0.078	0.074
952.85MHz-956.25MHz	Bottom Side	0.017	0.003	0.001	0.020	0.018
	Handheld Side	0.060	0.014	0.010	0.074	0.070
956.45MHz-959.85MHz	Bottom Side	0.016	0.003	0.001	0.019	0.017
	Handheld Side	0.058	0.014	0.010	0.072	0.068
1435MHz-1525MHz	Bottom Side	0.017	0.003	0.001	0.020	0.018
	Handheld Side	0.078	0.014	0.010	0.092	0.088

Prüfbericht - Nr.: CN25DJOX 001
Test Report No.

Seite 36 von 36
Page 36 of 36

9. Appendixes

Appendix A – SAR Plots of System Verification

Appendix B – SAR Plots of SAR Measurement

Appendix C – Calibration Certificate for Probe and Dipole

Appendix D – Photographs of the Test Set-Up

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