

FCC SAR Test Report

Applicant : MYLAPS BV

Address : Zuiderhoutlaan 4, 2012PJ, Haarlem,
Netherlands

Product Name : MYLAPS ProChipT2

Report Date : Apr.27, 2025

Shenzhen Anbotek Compliance Laboratory Limited



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TEST REPORT

Applicant : MYLAPS BV
Manufacturer : MYLAPS BV
Product Name : MYLAPS ProChipT2
Model No. : T2
Trade Mark : MYLAPS
Rating(s) : Input: 5V $\pm$ 0.25A(with DC 3.7V, 660mAh battery inside)

**Test Standard(s) : IEEE Std 1528TM-2013; FCC 47 CFR Part 2.1093;
ANSI/IEEE C95.1:2005; Reference FCC KDB 447498 D01 v06; KDB
941225 D05;**

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the IEEE Std 1528TM-2013, FCC 47 CFR Part 2.1093, IEEE Std C95.1-2005 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt Oct. 28, 2024
Date of Test Oct. 28, 2024 to Dec. 05, 2024

Prepared By

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Version

Version No.	Date	Description
R00	Apr. 27, 2025	Original



1. Statement of Compliance

<Highest SAR Summary>

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2.1093 and IEEE Std C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528™-2013. The maximum results of Specific Absorption Rate (SAR) found during testing are as follows.

<Highest SAR Summary>

Frequency Band	Highest 1g-SAR(W/Kg)	SAR Test Limit (W/Kg)
	Body&Limbs(0mm)	
Band 2	0.751	1.6
Band 4	0.759	
Band 5	0.660	
Band 7	0.580	
Band 12	0.641	
Band 38	0.559	
Band 41	0.778	
Band 66	0.725	
Band 2+BLE	0.762	
Band 4+BLE	0.770	
Band 5+BLE	0.671	
Band 7+BLE	0.591	
Band 12+BLE	0.652	
Band 38+BLE	0.570	
Band 41+BLE	0.789	
Band 66+BLE	0.736	
Test Result	PASS	

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2.1093 and IEEE Std C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528™-2013.



2. General Information

2.1. Client Information

Applicant	:	MYLAPS BV
Address	:	Zuiderhoutlaan 4, 2012PJ, Haarlem, Netherlands
Manufacturer	:	MYLAPS BV
Address	:	Zuiderhoutlaan 4, 2012PJ, Haarlem, Netherlands
Factory	:	MYLAPS BV
Address	:	Zuiderhoutlaan 4, 2012PJ, Haarlem, Netherlands

2.2. Description of Equipment Under Test (EUT)

Product Name	:	MYLAPS ProChipT2
Model No.	:	T2
Trade Mark	:	MYLAPS
Test Power Supply	:	3.7V,660mAh
Test Sample No.	:	1-2-1(Engineering Sample)
Tx Frequency	:	LTE: Band2:1850MHZ-1909.9MHZ Band 3:1710MHZ-1784.9MHZ Band 5:824MHZ-848.9MHZ Band 8:880MHZ-914.9MHZ Band 12:699MHZ-7151.9MHZ Band 38:2570MHZ-2619.9MHZ Band 41:2496MHZ-2689.9MHZ Band 66:1710MHZ-1779.9MHZ
Type of Modulation	:	LTE:QPSK,16QAM
Category of device	:	Portable device

Remark:

The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.



2.3. Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

2.4. Applied Standard

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2.1093
- IEEE Std C95.1-2005
- IEEE Std 1528™-2013
- KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- KDB 865664 D02 RF Exposure Reporting v01r02
- KDB 447498 D01 General RF Exposure Guidance v06
- KDB 941225 D05

2.5. Environment of Test Site

Items	Required	Actual
Temperature (°C)	18-25	22~23
Humidity (%RH)	30-70	55~65



2.6. Test Configuration

For LTE SAR testing, LTE engineering testing software installed on the EUT can provide continuous transmitting RF signal.

2.7. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.:434132

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 434132.

ISED-Registration No.: 8058A

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.

Sogood Industrial Zone Laboratory & 1/F. of Building D, Sogood Science and Technology Park, Sanwei Community, Hangcheng Subdistrict, Bao'an District, Shenzhen, Guangdong, China.

2.8. Disclaimer

- 1.The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- 2.The test report is invalid if there is any evidence and/or falsification.
- 3.The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- 4.This document may not be altered or revised in any way unless done so by Anbotek and all revisions are duly noted in the revisions section.
- 5.Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
- 6.The authenticity of the information provided by the customer is the responsibility of the customer and the laboratory is not responsible for its authenticity.

The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.



3. Specific Absorption Rate (SAR)

3.1. Introduction

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

3.2. SAR Definition

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

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

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

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

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

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

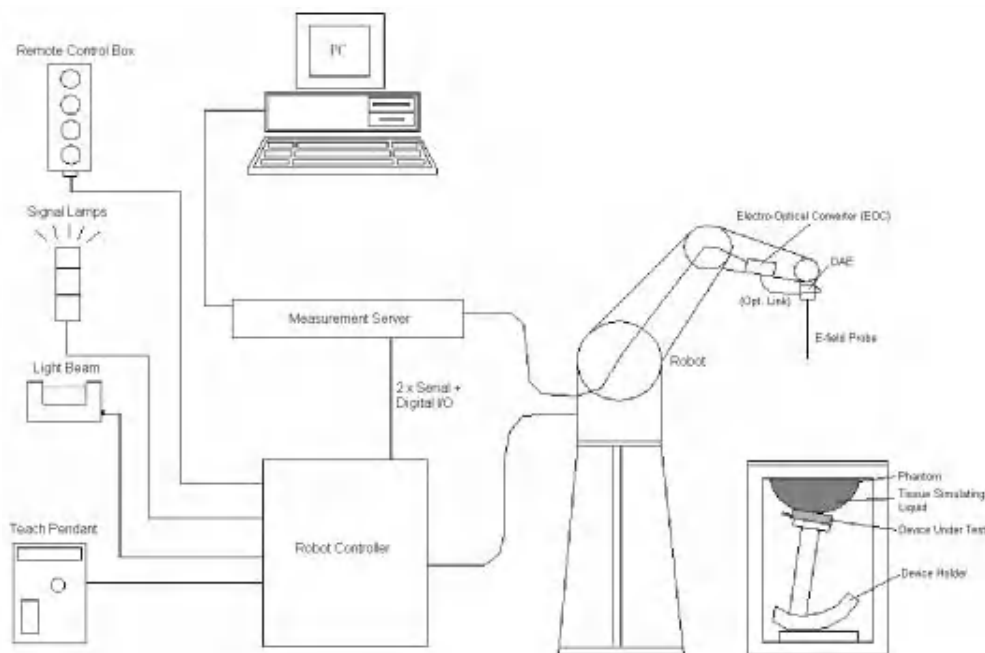
$$SAR = \frac{\sigma |E|^2}{\rho}$$

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

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



4. SAR Measurement System



DASY System Configurations

The DASYsystem for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (EOC) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY software
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom and ELI4 phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

components are described in details in the following sub-sections.

4.1. E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG).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. This probe has a built in optical surface detection system to prevent from collision with phantom.

➤ **E-Field Probe Specification**

<EX3DV4 Probe>

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	 Photo of EX3DV4
Frequency	10 MHz to 6 GHz; Linearity: ± 0.2 dB	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 μ W/g to 100 W/kg; Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)	
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

➤ **E-Field Probe Calibration**

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than $\pm 10\%$. The spherical isotropy shall be evaluated and within ± 0.25 dB. The sensitivity parameters (NormX, NormY, and NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data can be referred to appendix C of this report.

4.2. Data Acquisition Electronics (DAE)

The data acquisition electronics (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 and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

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





Photo of DAE

4.3. Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX60) type from Stäubli SA (France). For the 6-axis controllersystem, the robot controller version (DASY5: CS8c) from Stäubli is used. The Stäublirobot 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)



Photo of DASY5



4.4. Measurement Server

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

The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.



Photo of Server for DASY5

4.5. Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
Measurement Areas	Left Hand, Right Hand, Flat Phantom	

Photo of SAM Phantom

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.



<ELI4 Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)	 Photo of ELI4 Phantom
Filling Volume	Approx. 30 liters	
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm	

The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

4.6. Device Holder

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

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the 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 $\epsilon = 3$ and loss tangent $\delta = 0.02$. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.



Device Holder



4.7. Data Storage and Evaluation

➤ Data Storage

The DASY software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files. The post-processing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type (e.g., [V/m], [A/m], [W/kg]). Some of these units are not available in certain situations or give meaningless results, e.g., a SAR-output in a non-lossy media, will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

➤ Data Evaluation

The DASY post-processing software (SEMCAD X) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	- Sensitivity	$\text{Norm}_i, a_{i0}, a_{i1}, a_{i2}$
	- Conversion factor	ConvF_i
	- Diode compression point	dcp_i
Device parameters:	- Frequency	f
	- Crest factor	cf
Media parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power.

The formula for each channel can be given as:



$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

with V_i = compensated signal of channel i, (i = x, y, z)
 U_i = input signal of channel i, (i = x, y, z)
 cf = crest factor of exciting field (DASY parameter)
 dcp_i = diode compression point (DASY parameter)

From the compensated input signals, the primary field data for each channel can be evaluated:

$$\text{E-field Probes: } E_i = \sqrt{\frac{V_i}{\text{Norm}_i \cdot \text{ConvF}}}$$

$$\text{H-field Probes: } H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1}f + a_{i2}f^2}{f}$$

with V_i = compensated signal of channel i, (i = x, y, z)
 Norm_i = sensor sensitivity of channel i, (i = x, y, z), $\mu\text{V}/(\text{V/m})^2$ for E-field Probes
 ConvF = sensitivity enhancement in solution
 a_{ij} = sensor sensitivity factors for H-field probes
 f = carrier frequency [GHz]
 E_i = electric field strength of channel i in V/m
 H_i = magnetic field strength of channel i in A/m

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

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

The primary field data are used to calculate the derived field units.

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

with SAR = local specific absorption rate in W/kg
 E_{tot} = total field strength in V/m
 σ = conductivity in [mho/m] or [Siemens/m]
 ρ = equivalent tissue density in g/cm³

Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.



5. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1118	Jun. 04,2024	Jun. 03,2027
SPEAG	835MHz System Validation Kit	D835V2	4d154	Jun. 11,2024	Jun. 10,2027
SPEAG	1750MHz System Validation Kit	D1750V2	1021	Jun. 11,2024	Jun. 10,2027
SPEAG	1900MHz System Validation Kit	D1900V2	5d175	Jun. 11,2024	Jun. 10,2027
SPEAG	2600MHz System Validation Kit	D2600V2	1058	Jun. 11,2024	Jun. 10,2027
SPEAG	Data Acquisition Electronics	DAE4	387	Sept.02,2024	Sept.01,2025
SPEAG	Dosimetric E-Field Probe	EX3DV4	7396	May 06,2024	May 05,2025
Agilent	ENA Series Network Analyzer	E5071C	MY46317418	Oct.26, 2024	Oct.25, 2025
SPEAG	DAK	DAK-3.5	1226	NCR	NCR
SPEAG	SAM Twin Phantom	QD000P40CD	1802	NCR	NCR
SPEAG	ELI Phantom	QDOVA004AA	2058	NCR	NCR
Mini-Circuits	Amplifier	ZVA-183W-S+	932502132	NCR	NCR
Agilent	Power Meter	N1914A	MY50001102	Oct.26, 2024	Oct.25, 2025
Agilent	Power Sensor	E9323A	US40410647	Jan. 23, 2024	Jan. 22, 2025
Agilent	Power Sensor	E9323A	MY53100007	Jan. 23, 2024	Jan. 22, 2025
CDKMV	Attenuator	6610	6610-1	Oct.20, 2024	Oct.19, 2025
CDKMV	Attenuator	6606	6606-1	Oct.20, 2024	Oct.19, 2025
Agilent	Spectrum Analyzer	N9020A	MY51170037	Oct.26, 2024	Oct.25, 2025
Agilent	Signal Generation	N5182A	MY48180656	Oct.26, 2024	Oct.25, 2025
Worken	Directional Coupler	0110A05601O-10	COM5BNW1A2	Oct.26, 2024	Oct.25, 2025

Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. The dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
4. The dielectric probe kit was calibrated via the network analyzer, with the specified procedure (calibrated in pure water) and calibration kit (standard) short circuit, before the dielectric measurement. The specific procedure and calibration kit are provided by Agilent.
5. In system check we need to monitor the level on the power meter, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1W input power according to the ratio of 1W to the input power to the dipole. For system check, the calibration of the power amplifier is deemed not critically required for correct measurement; the power meter is critical and we do have calibration for it.



6. Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. 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, which is shown in Fig. 6.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown as followed:

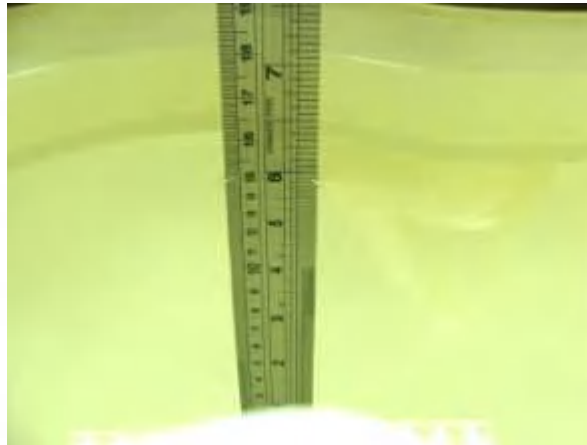


Photo of Liquid Height for Head SAR

The following table gives the recipes for tissue simulating liquid.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ϵ_r)
For Head								
750	50.8	48.2	0	0.9	0.1	0	0.86	42.0
835	50.8	48.2	0	0.9	0.1	0	0.90	41.5
1750	70.2	0	0	0.4	0	29.4	1.37	40.1
1800,1900,2000	70.2	0	0	0.4	0	29.4	1.40	40.0
2450	68.6	0	0	0	0	31.4	1.96	39.0



The following table shows the measuring results for simulating liquid.

Measured Frequency (MHz)	Target Tissue		Measured Tissue				Liquid Temp.	Test Data
	ϵ_r	σ	ϵ_r	Dev. (%)	σ	Dev. (%)		
707.5	42.0	0.81	42.2	0.48	0.79	-2.47	22.4	Dec/03/2024
750	41.7	0.86	41.8	0.24	0.84	-2.33	22.4	Dec/03/2024
835	41.5	0.90	41.3	-0.48	0.93	3.33	22.4	Dec/03/2024
836.5	41.5	0.91	41.2	-0.72	0.89	-2.20	22.4	Dec/03/2024
840	41.4	0.92	41.2	-0.48	0.94	2.17	22.4	Dec/03/2024
1710.7	40.6	1.30	40.5	-0.25	1.33	2.31	22.4	Dec/04/2024
1720	40.5	1.31	40.2	-0.74	1.30	-0.76	22.4	Dec/04/2024
1750	40.1	1.37	40.3	0.50	1.36	-0.73	22.4	Dec/04/2024
1860	40.0	1.38	40.2	0.50	1.37	-0.72	22.4	Dec/04/2024
1900	40.0	1.40	40.2	0.50	1.39	-0.71	22.4	Dec/04/2024
2506	39.7	1.84	39.5	-0.50	1.82	-1.09	22.4	Dec/05/2024
2510	39.6	1.85	39.7	0.25	1.83	-1.08	22.4	Dec/05/2024
2580	39.3	1.93	39.5	0.51	1.92	-0.52	22.4	Dec/05/2024
2600	39.0	1.96	39.3	0.77	2.00	2.04	22.4	Dec/05/2024
2450	39.20	1.80	39.15	-0.13	1.86	3.33	22.5	Apr/03/2025
2475	39.16	1.83	39.11	-0.13	1.89	3.28	22.5	Apr/03/2025



7. System Verification Procedures

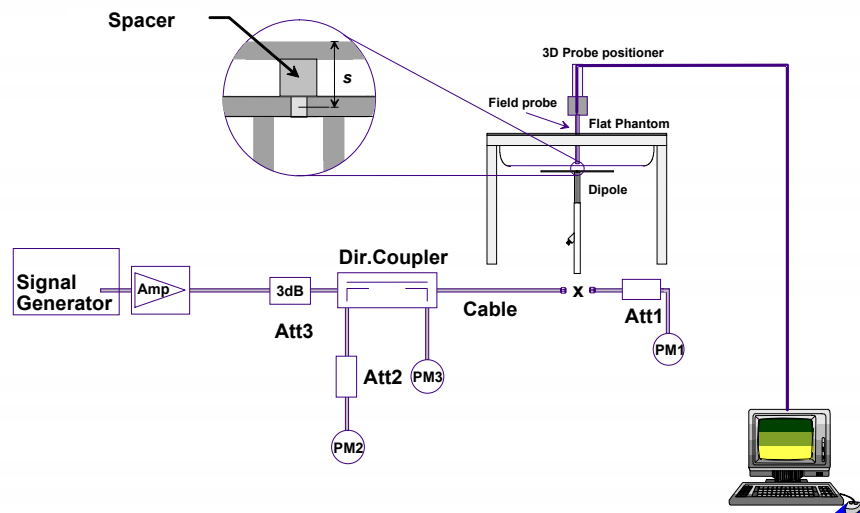
Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

➤ Purpose of System Performance check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

➤ System Setup

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



System Setup for System Evaluation



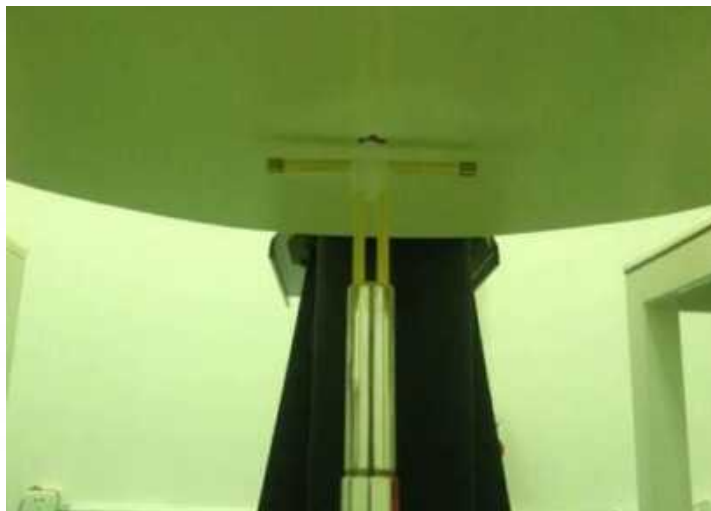


Photo of Dipole Setup

➤ **Validation Results**

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10%. The table below shows the target SAR and measured SAR after normalized to 1W input power. It indicates that the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Frequency (MHz)	Power fed onto reference dipole (mW)	Targeted SAR (W/kg)	Measured SAR (W/kg)	Normalized SAR (W/kg)	Deviation (%)	Test Date
750	250	5.55	1.38	5.50	-0.90	Dec/03/2024
835	250	6.22	1.54	6.15	-1.13	Dec/03/2024
1750	250	19.30	4.81	19.24	-0.31	Dec/04/2024
1900	250	20.90	5.21	20.85	-0.24	Dec/04/2024
2600	250	24.60	6.14	24.56	-0.16	Dec/05/2024
2450	250	52.4	12.68	50.72	-3.21	Apr/03/2024

Target and Measurement SAR after Normalized

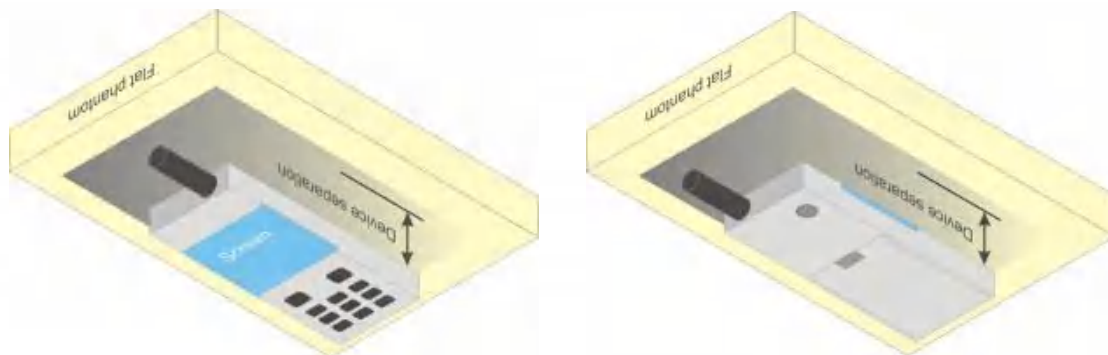


8. EUT Testing Position

8.1. Body Position

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. Per KDB 648474 D04, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01 v06, 2015 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is $< 1.2 \text{ W/kg}$, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.

Accessories for body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are test with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.



Body Worn Position



9. Measurement Procedures

The measurement procedures are as follows:

- (a) Use base station simulator (if applicable) or engineering software to transmit RF power continuously (continuous Tx) in the middle channel.
- (b) Keep EUT to radiate maximum output power or 100% duty factor (if applicable)
- (c) Measure output power through RF cable and power meter.
- (d) Place the EUT in the positions as setup photos demonstrates.
- (e) Set scan area, grid size and other setting on the DASY software.
- (f) Measure SAR transmitting at the middle channel for all applicable exposure positions.
- (g) Identify the exposure position and device configuration resulting the highest SAR
- (h) Measure SAR at the lowest and highest channels at the worst exposure position and device configuration if applicable.

According to the 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

9.1. 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



9.2. Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

9.3. Area Scan Procedures

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area}	≤ 2 GHz: ≤ 15 mm $2 - 3$ GHz: ≤ 12 mm	$3 - 4$ GHz: ≤ 12 mm $4 - 6$ GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	



9.4. Zoom Scan Procedures

Zoom scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10gram 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. When the measurement is done, the zoom scan evaluates the averaged SAR for 1 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$			≤ 2 GHz: ≤ 8 mm $2 - 3$ GHz: ≤ 5 mm*	$3 - 4$ GHz: ≤ 5 mm* $4 - 6$ GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{\text{Zoom}}(n)$		≤ 5 mm	$3 - 4$ GHz: ≤ 4 mm $4 - 5$ GHz: ≤ 3 mm $5 - 6$ GHz: ≤ 2 mm
	graded grid	$\Delta z_{\text{Zoom}}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	$3 - 4$ GHz: ≤ 3 mm $4 - 5$ GHz: ≤ 2.5 mm $5 - 6$ GHz: ≤ 2 mm
		$\Delta z_{\text{Zoom}}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	$3 - 4$ GHz: ≥ 28 mm $4 - 5$ GHz: ≥ 25 mm $5 - 6$ GHz: ≥ 22 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.				
* When zoom scan is required and the <u>reported</u> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				



9.5. Volume Scan Procedures

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.

9.6. 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.



10. Conducted Power

<LTE>

Band 2

Condition	Band	Channel Bandwidth	Channel	Frequency (MHz)	Modulation	Result (dBm)	Tune-Up
NTNV	Band2	1.4MHz	18607	1850.7	QPSK	22.47	22.50±1
NTNV	Band2	1.4MHz	18900	1880.0	QPSK	22.79	22.50±1
NTNV	Band2	1.4MHz	19193	1908.3	QPSK	21.89	22.50±1
NTNV	Band2	1.4MHz	18607	1850.7	16QAM	22.5	23.00±1
NTNV	Band2	1.4MHz	18900	1880.0	16QAM	22.74	23.00±1
NTNV	Band2	1.4MHz	19193	1908.3	16QAM	22.02	23.00±1
NTNV	Band2	3MHz	18615	1851.5	QPSK	21.9	22.50±1
NTNV	Band2	3MHz	18900	1880.0	QPSK	22.52	22.50±1
NTNV	Band2	3MHz	19185	1908.5	QPSK	21.74	22.50±1
NTNV	Band2	3MHz	18615	1851.5	16QAM	22.03	23.00±1
NTNV	Band2	3MHz	18900	1880.0	16QAM	22.6	23.00±1
NTNV	Band2	3MHz	19185	1908.5	16QAM	22.01	23.00±1
NTNV	Band2	5MHz	18625	1852.5	QPSK	21.89	22.50±1
NTNV	Band2	5MHz	18900	1880.0	QPSK	22.48	22.50±1
NTNV	Band2	5MHz	19175	1907.5	QPSK	22.09	22.50±1
NTNV	Band2	5MHz	18625	1852.5	16QAM	22.11	23.00±1
NTNV	Band2	5MHz	18900	1880.0	16QAM	22.37	23.00±1
NTNV	Band2	5MHz	19175	1907.5	16QAM	22.02	23.00±1
NTNV	Band2	10MHz	18650	1855.0	QPSK	21.49	22.50±1
NTNV	Band2	10MHz	18900	1880.0	QPSK	22.54	22.50±1
NTNV	Band2	10MHz	19150	1905.0	QPSK	22.25	22.50±1
NTNV	Band2	10MHz	18650	1855.0	16QAM	22.01	23.00±1
NTNV	Band2	10MHz	18900	1880.0	16QAM	22.64	23.00±1
NTNV	Band2	10MHz	19150	1905.0	16QAM	22.29	23.00±1
NTNV	Band2	15MHz	18675	1857.5	QPSK	22.67	22.50±1
NTNV	Band2	15MHz	18900	1880.0	QPSK	22.07	22.50±1
NTNV	Band2	15MHz	19125	1902.5	QPSK	22.12	22.50±1



NTNV	Band2	15MHz	18675	1857.5	16QAM	22.51	23.00 ± 1
NTNV	Band2	15MHz	18900	1880.0	16QAM	22.08	23.00 ± 1
NTNV	Band2	15MHz	19125	1902.5	16QAM	22.57	23.00 ± 1
NTNV	Band2	20MHz	18700	1860	QPSK	22.75	22.50 ± 1
NTNV	Band2	20MHz	18900	1880	QPSK	22.57	22.50 ± 1
NTNV	Band2	20MHz	19100	1900	QPSK	23.12	22.50 ± 1
NTNV	Band2	20MHz	18700	1860	16QAM	23.23	23.00 ± 1
NTNV	Band2	20MHz	18900	1880	16QAM	22.69	23.00 ± 1
NTNV	Band2	20MHz	19100	1900	16QAM	23.21	23.00 ± 1

Band 4

Condition	Band	Channel Bandwidth	Channel	Frequency (MHz)	Modulation	Result (dBm)	Tune-Up
NTNV	Band4	1.4MHz	19957	1710.7	QPSK	22.17	22.50 ± 1
NTNV	Band4	1.4MHz	20175	1732.5	QPSK	22.57	22.50 ± 1
NTNV	Band4	1.4MHz	20393	1754.3	QPSK	21.96	22.50 ± 1
NTNV	Band4	1.4MHz	19957	1710.7	16QAM	22.17	23.00 ± 1
NTNV	Band4	1.4MHz	20175	1732.5	16QAM	22.59	23.00 ± 1
NTNV	Band4	1.4MHz	20393	1754.3	16QAM	22.02	23.00 ± 1
NTNV	Band4	3MHz	19965	1711.5	QPSK	22.41	22.50 ± 1
NTNV	Band4	3MHz	20175	1732.5	QPSK	22.77	22.50 ± 1
NTNV	Band4	3MHz	20385	1753.5	QPSK	22.19	22.50 ± 1
NTNV	Band4	3MHz	19965	1711.5	16QAM	22.60	23.00 ± 1
NTNV	Band4	3MHz	20175	1732.5	16QAM	22.83	23.00 ± 1
NTNV	Band4	3MHz	20385	1753.5	16QAM	22.00	23.00 ± 1
NTNV	Band4	5MHz	19975	1712.5	QPSK	22.9	22.50 ± 1
NTNV	Band4	5MHz	20175	1732.5	QPSK	22.79	22.50 ± 1
NTNV	Band4	5MHz	20375	1752.5	QPSK	21.97	22.50 ± 1
NTNV	Band4	5MHz	19975	1712.5	16QAM	22.62	23.00 ± 1
NTNV	Band4	5MHz	20175	1732.5	16QAM	22.7	23.00 ± 1
NTNV	Band4	5MHz	20375	1752.5	16QAM	22.04	23.00 ± 1
NTNV	Band4	10MHz	20000	1715	QPSK	22.42	22.50 ± 1



NTNV	Band4	10MHz	20175	1732.5	QPSK	22.25	22.50±1
NTNV	Band4	10MHz	20350	1750	QPSK	22.08	22.50±1
NTNV	Band4	10MHz	20000	1715	16QAM	23.01	23.00±1
NTNV	Band4	10MHz	20175	1732.5	16QAM	22.41	23.00±1
NTNV	Band4	10MHz	20350	1750	16QAM	23.17	23.00±1
NTNV	Band4	15MHz	20025	1717.5	QPSK	22.9	22.50±1
NTNV	Band4	15MHz	20175	1732.5	QPSK	22.13	22.50±1
NTNV	Band4	15MHz	20325	1747.5	QPSK	22.39	22.50±1
NTNV	Band4	15MHz	20025	1717.5	16QAM	23.34	23.00±1
NTNV	Band4	15MHz	20175	1732.5	16QAM	22.43	23.00±1
NTNV	Band4	15MHz	20325	1747.5	16QAM	22.53	23.00±1
NTNV	Band4	20MHz	20050	1720	QPSK	23.47	22.50±1
NTNV	Band4	20MHz	20175	1732.5	QPSK	23.07	22.50±1
NTNV	Band4	20MHz	20300	1745	QPSK	23.08	22.50±1
NTNV	Band4	20MHz	20050	1720	16QAM	23.74	23.00±1
NTNV	Band4	20MHz	20175	1732.5	16QAM	23.25	23.00±1
NTNV	Band4	20MHz	20300	1745	16QAM	23.19	23.00±1

Band 5

Condition	Band	Channel Bandwidth	Channel	Frequency (MHz)	Modulation	Result (dBm)	Tune-Up
NTNV	Band5	1.4MHz	20407	824.7	QPSK	22.49	22.50±1
NTNV	Band5	1.4MHz	20525	836.5	QPSK	22.88	22.50±1
NTNV	Band5	1.4MHz	20643	848.3	QPSK	22.15	22.50±1
NTNV	Band5	1.4MHz	20407	824.7	16QAM	22.56	23.00±1
NTNV	Band5	1.4MHz	20525	836.5	16QAM	23.04	23.00±1
NTNV	Band5	1.4MHz	20643	848.3	16QAM	22.27	23.00±1
NTNV	Band5	3MHz	20415	825.5	QPSK	22.95	22.50±1
NTNV	Band5	3MHz	20525	836.5	QPSK	23.23	22.50±1
NTNV	Band5	3MHz	20635	847.5	QPSK	22.56	22.50±1
NTNV	Band5	3MHz	20415	825.5	16QAM	23.06	23.00±1
NTNV	Band5	3MHz	20525	836.5	16QAM	23.27	23.00±1



NTNV	Band5	3MHz	20635	847.5	16QAM	22.67	23.00 ± 1
NTNV	Band5	5MHz	20425	826.5	QPSK	22.68	22.50 ± 1
NTNV	Band5	5MHz	20525	836.5	QPSK	22.88	22.50 ± 1
NTNV	Band5	5MHz	20625	846.5	QPSK	22.55	22.50 ± 1
NTNV	Band5	5MHz	20425	826.5	16QAM	22.57	23.00 ± 1
NTNV	Band5	5MHz	20525	836.5	16QAM	22.98	23.00 ± 1
NTNV	Band5	5MHz	20625	846.5	16QAM	22.5	23.00 ± 1
NTNV	Band5	10MHz	20450	829.0	QPSK	21.85	22.50 ± 1
NTNV	Band5	10MHz	20525	836.5	QPSK	22.2	22.50 ± 1
NTNV	Band5	10MHz	20600	844.0	QPSK	21.68	22.50 ± 1
NTNV	Band5	10MHz	20450	829.0	16QAM	22.07	23.00 ± 1
NTNV	Band5	10MHz	20525	836.5	16QAM	22.35	23.00 ± 1
NTNV	Band5	10MHz	20600	844.0	16QAM	22.11	23.00 ± 1

Band 7

Condition	Band	Channel Bandwidth	Channel	Frequency (MHz)	Modulation	Result (dBm)	Tune-Up
NTNV	Band7	5MHz	20775	2502.5	QPSK	21.05	22.00 ± 1
NTNV	Band7	5MHz	21100	2535.0	QPSK	22.88	22.00 ± 1
NTNV	Band7	5MHz	21425	2567.5	QPSK	21.92	22.00 ± 1
NTNV	Band7	5MHz	20775	2502.5	16QAM	22.01	23.00 ± 1
NTNV	Band7	5MHz	21100	2535.0	16QAM	22.87	23.00 ± 1
NTNV	Band7	5MHz	21425	2567.5	16QAM	22.01	23.00 ± 1
NTNV	Band7	10MHz	20800	2505.0	QPSK	22.09	22.00 ± 1
NTNV	Band7	10MHz	21100	2535.0	QPSK	23.32	22.00 ± 1
NTNV	Band7	10MHz	21400	2565.0	QPSK	22.08	22.00 ± 1
NTNV	Band7	10MHz	20800	2505.0	16QAM	22.17	23.00 ± 1
NTNV	Band7	10MHz	21100	2535.0	16QAM	23.52	23.00 ± 1
NTNV	Band7	10MHz	21400	2565.0	16QAM	22.63	23.00 ± 1
NTNV	Band7	15MHz	20825	2507.5	QPSK	21.35	22.00 ± 1
NTNV	Band7	15MHz	21100	2535.0	QPSK	21.58	22.00 ± 1
NTNV	Band7	15MHz	21375	2562.5	QPSK	22.6	22.00 ± 1



NTNV	Band7	15MHz	20825	2507.5	16QAM	22.02	23.00±1
NTNV	Band7	15MHz	21100	2535.0	16QAM	22.05	23.00±1
NTNV	Band7	15MHz	21375	2562.5	16QAM	22.92	23.00±1
NTNV	Band7	20MHz	20850	2510.0	QPSK	23.41	22.00±1
NTNV	Band7	20MHz	21100	2535.0	QPSK	23.4	22.00±1
NTNV	Band7	20MHz	21350	2560.0	QPSK	23.45	22.00±1
NTNV	Band7	20MHz	20850	2510.0	16QAM	23.74	23.00±1
NTNV	Band7	20MHz	21100	2535.0	16QAM	23.6	23.00±1
NTNV	Band7	20MHz	21350	2560.0	16QAM	23.58	23.00±1

Band 12

Condition	Band	Channel Bandwidth	Channel	Frequency (MHz)	Modulation	Result (dBm)	Tune-Up
NTNV	Band12	1.4MHz	23017	699.7	QPSK	22.46	22.50±1
NTNV	Band12	1.4MHz	23095	707.5	QPSK	23.17	22.50±1
NTNV	Band12	1.4MHz	23173	715.3	QPSK	22.21	22.50±1
NTNV	Band12	1.4MHz	23017	699.7	16QAM	22.52	23.00±1
NTNV	Band12	1.4MHz	23095	707.5	16QAM	23.22	23.00±1
NTNV	Band12	1.4MHz	23173	715.3	16QAM	22.3	23.00±1
NTNV	Band12	3MHz	23025	700.5	QPSK	22.69	22.50±1
NTNV	Band12	3MHz	23095	707.5	QPSK	23.41	22.50±1
NTNV	Band12	3MHz	23165	714.5	QPSK	22.65	22.50±1
NTNV	Band12	3MHz	23025	700.5	16QAM	22.83	23.00±1
NTNV	Band12	3MHz	23095	707.5	16QAM	23.46	23.00±1
NTNV	Band12	3MHz	23165	714.5	16QAM	22.54	23.00±1
NTNV	Band12	5MHz	23035	701.5	QPSK	22.39	22.50±1
NTNV	Band12	5MHz	23095	707.5	QPSK	23.04	22.50±1
NTNV	Band12	5MHz	23155	713.5	QPSK	22.38	22.50±1
NTNV	Band12	5MHz	23035	701.5	16QAM	22.34	23.00±1
NTNV	Band12	5MHz	23095	707.5	16QAM	23.16	23.00±1
NTNV	Band12	5MHz	23155	713.5	16QAM	22.3	23.00±1
NTNV	Band12	10MHz	23060	704	QPSK	22.84	22.50±1



NTNV	Band12	10MHz	23095	707.5	QPSK	22.25	22.50±1
NTNV	Band12	10MHz	23130	711	QPSK	22.03	22.50±1
NTNV	Band12	10MHz	23060	704	16QAM	23.01	23.00±1
NTNV	Band12	10MHz	23095	707.5	16QAM	23.19	23.00±1
NTNV	Band12	10MHz	23130	711	16QAM	22.29	23.00±1

Band 38

Condition	Band	Channel Bandwidth	Channel	Frequency (MHz)	Modulation	Result (dBm)	Tune-Up
NTNV	Band38	5MHz	37775	2572.5	QPSK	21.77	22.00±1
NTNV	Band38	5MHz	38000	2595.0	QPSK	21.89	22.00±1
NTNV	Band38	5MHz	38225	2617.5	QPSK	21.65	22.00±1
NTNV	Band38	5MHz	37775	2572.5	16QAM	22.06	23.00±1
NTNV	Band38	5MHz	38000	2595.0	16QAM	22.01	23.00±1
NTNV	Band38	5MHz	38225	2617.5	16QAM	22.19	23.00±1
NTNV	Band38	10MHz	37800	2575.0	QPSK	22.5	22.00±1
NTNV	Band38	10MHz	38000	2595.0	QPSK	22.2	22.00±1
NTNV	Band38	10MHz	38200	2615.0	QPSK	21.62	22.00±1
NTNV	Band38	10MHz	37800	2575.0	16QAM	22.55	23.00±1
NTNV	Band38	10MHz	38000	2595.0	16QAM	22.25	23.00±1
NTNV	Band38	10MHz	38200	2615.0	16QAM	22.01	23.00±1
NTNV	Band38	15MHz	37825	2577.5	QPSK	22.51	22.00±1
NTNV	Band38	15MHz	38000	2595.0	QPSK	22.19	22.00±1
NTNV	Band38	15MHz	38175	2612.5	QPSK	21.62	22.00±1
NTNV	Band38	15MHz	37825	2577.5	16QAM	22.56	23.00±1
NTNV	Band38	15MHz	38000	2595.0	16QAM	22.22	23.00±1
NTNV	Band38	15MHz	38175	2612.5	16QAM	22.13	23.00±1
NTNV	Band38	20MHz	37850	2580.0	QPSK	22.54	22.00±1
NTNV	Band38	20MHz	38000	2595.0	QPSK	22.25	22.00±1
NTNV	Band38	20MHz	38150	2610.0	QPSK	21.67	22.00±1
NTNV	Band38	20MHz	37850	2580.0	16QAM	22.62	23.00±1
NTNV	Band38	20MHz	38000	2595.0	16QAM	22.3	23.00±1



NTNV	Band38	20MHz	38150	2610.0	16QAM	22.14	23.00 ± 1
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Band 41

Condition	Band	Channel Bandwidth	Channel	Frequency (MHz)	Modulation	Result (dBm)	Tune-Up
NTNV	Band41	5MHz	39675	2498.5	QPSK	22.1	22.50 ± 1
NTNV	Band41	5MHz	40620	2593.0	QPSK	22.39	22.50 ± 1
NTNV	Band41	5MHz	41565	2687.5	QPSK	21.84	22.50 ± 1
NTNV	Band41	5MHz	39675	2498.5	16QAM	22.17	23.00 ± 1
NTNV	Band41	5MHz	40620	2593.0	16QAM	22.61	23.00 ± 1
NTNV	Band41	5MHz	41565	2687.5	16QAM	22.06	23.00 ± 1
NTNV	Band41	10MHz	39700	2501.0	QPSK	22.67	22.50 ± 1
NTNV	Band41	10MHz	40620	2593.0	QPSK	22.04	22.50 ± 1
NTNV	Band41	10MHz	41540	2685.0	QPSK	21.89	22.50 ± 1
NTNV	Band41	10MHz	39700	2501.0	16QAM	22.61	23.00 ± 1
NTNV	Band41	10MHz	40620	2593.0	16QAM	22.11	23.00 ± 1
NTNV	Band41	10MHz	41540	2685.0	16QAM	22.01	23.00 ± 1
NTNV	Band41	15MHz	39725	2503.5.0	QPSK	22.66	22.50 ± 1
NTNV	Band41	15MHz	40620	2593.0	QPSK	22.05	22.50 ± 1
NTNV	Band41	15MHz	41515	2682.5.0	QPSK	21.92	22.50 ± 1
NTNV	Band41	15MHz	39725	2503.5	16QAM	22.57	23.00 ± 1
NTNV	Band41	15MHz	40620	2593.0	16QAM	22.13	23.00 ± 1
NTNV	Band41	15MHz	41515	2682.5	16QAM	22.15	23.00 ± 1
NTNV	Band41	20MHz	39750	2506.0	QPSK	22.69	22.50 ± 1
NTNV	Band41	20MHz	40620	2593.0	QPSK	22.11	22.50 ± 1
NTNV	Band41	20MHz	41490	2680.0	QPSK	21.94	22.50 ± 1
NTNV	Band41	20MHz	39750	2506.0	16QAM	22.63	23.00 ± 1
NTNV	Band41	20MHz	40620	2593.0	16QAM	22.17	23.00 ± 1
NTNV	Band41	20MHz	41490	2680.0	16QAM	22.02	23.00 ± 1



Band 66

Condition	Band	Channel Bandwidth	Channel	Frequency (MHz)	Modulation	Result (dBm)	Tune-Up
NTNV	Band66	1.4MHz	131979	1710.7	QPSK	23.84	23.50 ± 1
NTNV	Band66	1.4MHz	132322	1745	QPSK	23.00	23.50 ± 1
NTNV	Band66	1.4MHz	132665	1779.3	QPSK	23.25	23.50 ± 1
NTNV	Band66	1.4MHz	131979	1710.7	16QAM	23.83	24.00 ± 1
NTNV	Band66	1.4MHz	132322	1745	16QAM	23.4	24.00 ± 1
NTNV	Band66	1.4MHz	132665	1779.3	16QAM	23.8	24.00 ± 1
NTNV	Band66	3MHz	131987	1711.5	QPSK	23.25	23.50 ± 1
NTNV	Band66	3MHz	132322	1745	QPSK	23.02	23.50 ± 1
NTNV	Band66	3MHz	132657	1778.5	QPSK	22.93	23.50 ± 1
NTNV	Band66	3MHz	131987	1711.5	16QAM	23.14	24.00 ± 1
NTNV	Band66	3MHz	132322	1745	16QAM	23.01	24.00 ± 1
NTNV	Band66	3MHz	132657	1778.5	16QAM	23.42	24.00 ± 1
NTNV	Band66	5MHz	131997	1712.5	QPSK	23.3	23.50 ± 1
NTNV	Band66	5MHz	132322	1745	QPSK	22.97	23.50 ± 1
NTNV	Band66	5MHz	132647	1777.5	QPSK	22.93	23.50 ± 1
NTNV	Band66	5MHz	131997	1712.5	16QAM	23.11	24.00 ± 1
NTNV	Band66	5MHz	132322	1745	16QAM	23.01	24.00 ± 1
NTNV	Band66	5MHz	132647	1777.5	16QAM	23.41	24.00 ± 1
NTNV	Band66	10MHz	132022	1715	QPSK	23.30	23.50 ± 1
NTNV	Band66	10MHz	132322	1745	QPSK	23.00	23.50 ± 1
NTNV	Band66	10MHz	132622	1775	QPSK	22.94	23.50 ± 1
NTNV	Band66	10MHz	132022	1715	16QAM	23.16	24.00 ± 1
NTNV	Band66	10MHz	132322	1745	16QAM	23.02	24.00 ± 1
NTNV	Band66	10MHz	132622	1775	16QAM	23.44	24.00 ± 1
NTNV	Band66	15MHz	132047	1717.5	QPSK	23.28	23.50 ± 1
NTNV	Band66	15MHz	132322	1745	QPSK	23.00	23.50 ± 1
NTNV	Band66	15MHz	132597	1772.5	QPSK	22.89	23.50 ± 1
NTNV	Band66	15MHz	132047	1717.5	16QAM	23.15	24.00 ± 1
NTNV	Band66	15MHz	132322	1745	16QAM	23.01	24.00 ± 1



NTNV	Band66	15MHz	132597	1772.5	16QAM	23.44	24.00±1
NTNV	Band66	20MHz	132072	1720	QPSK	23.32	23.50±1
NTNV	Band66	20MHz	132322	1745	QPSK	23.04	23.50±1
NTNV	Band66	20MHz	132572	1770	QPSK	22.95	23.50±1
NTNV	Band66	20MHz	132072	1720	16QAM	23.19	24.00±1
NTNV	Band66	20MHz	132322	1745	16QAM	23.02	24.00±1
NTNV	Band66	20MHz	132572	1770	16QAM	23.46	24.00±1

<BLE>

Test Mode	Test Channel(MHz)	Peak Power(dBm)	Tune-up Power(dBm)
O-QPSK	2405	7.14	7.50
	2440	7.25	7.50
	2475	7.34	7.50

<SRD6.78MHz>

Test Mode	Test Channel(MHz)	Peak Power(dBm)	Tune-up Power(dBm)
SRD6.78MHz	6.78MHz	1.061	1.50

Note:

1. Per KDB 447498 D01, the 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

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

$f(\text{GHz})$ is the RF channel transmit frequency in GHz

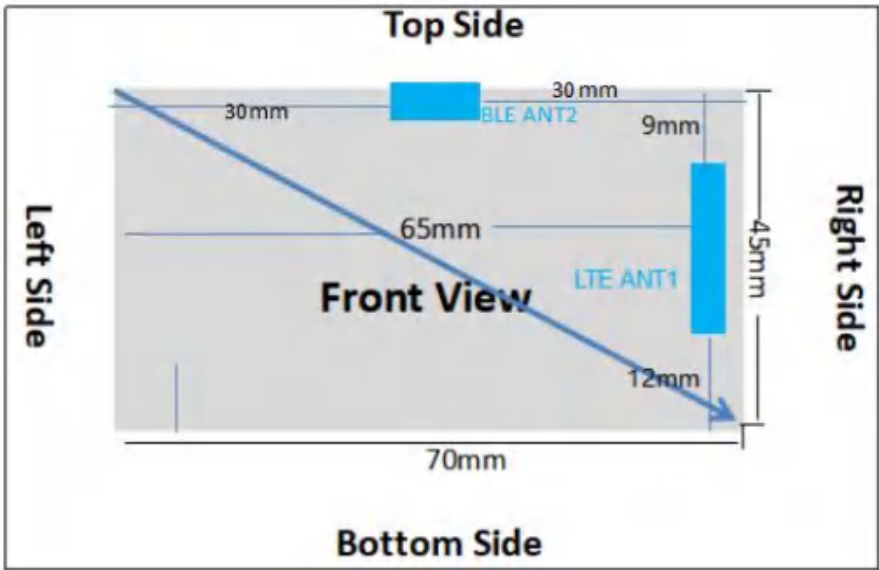
Power and distance are rounded to the nearest mW and mm before calculation

The result is rounded to one decimal place for comparison

2. Base on the result of note, RF exposure evaluation of LTE mode is required,SRD6.78MHz is not.required.



11. Antenna Location



Positions for SAR tests; Body mode						
Antennas	Front	Back	Top Side	Bottom Side	Left Side	Right Side
LTE/BLE ANT	Yes	Yes	Yes	Yes	Yes	Yes

Per KDB 447498 D01, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.



12. SAR Test Results Summary

General Note:

1.Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.

Scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.

Reported SAR(W/kg)= Measured SAR(W/kg) Scaling Factor*

2.Per KDB 447498 D01v06, for each exposure position, if the highest output channel reported SAR≤0.8W/kg, other channels SAR testing are not necessary

12.1. Body-worn SAR Results

<LTE>

Band 2

Band	Test Position	Gap (mm)	Channel	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR1g (W/kg)	Reported SAR1g (W/kg)	Plot
Band 2	Front	0	18700	1860	23.23	23.50	1.064	0.11	0.706	0.751	#1
Band 2	Back	0	18700	1860	23.23	23.50	1.064	0.06	0.621	0.661	
Band 2	Left	0	18700	1860	23.23	23.50	1.064	0.03	0.016	0.017	
Band 2	Right	0	18700	1860	23.23	23.50	1.064	-0.05	0.568	0.604	
Band 2	Top	0	18700	1860	23.23	23.50	1.064	0.08	0.613	0.652	
Band 2	Bottom	0	18700	1860	23.23	23.50	1.064	0.04	0.543	0.578	

Band 4

Band	Test Position	Gap (mm)	Channel	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR1g (W/kg)	Reported SAR1g (W/kg)	Plot
Band 4	Front	0	20050	1720	23.74	24.00	1.062	0.02	0.715	0.759	#2
Band 4	Back	0	20050	1720	23.74	24.00	1.062	0.03	0.613	0.651	
Band 4	Left	0	20050	1720	23.74	24.00	1.062	0.08	0.056	0.059	
Band 4	Right	0	20050	1720	23.74	24.00	1.062	-0.03	0.626	0.665	
Band 4	Top	0	20050	1720	23.74	24.00	1.062	0.05	0.465	0.494	
Band 4	Bottom	0	20050	1720	23.74	24.00	1.062	0.01	0.413	0.438	



Band 5

Band	Test Position	Gap (mm)	Channel	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR1g (W/kg)	Reported SAR1g (W/kg)	Plot
Band 5	Front	0	20525	836.5	23.27	23.50	1.054	0.13	0.626	0.660	#3
Band 5	Back	0	20525	836.5	23.27	23.50	1.054	0.05	0.547	0.577	
Band 5	Left	0	20525	836.5	23.27	23.50	1.054	0.03	0.063	0.066	
Band 5	Right	0	20525	836.5	23.27	23.50	1.054	-0.03	0.581	0.613	
Band 5	Top	0	20525	836.5	23.27	23.50	1.054	0.06	0.425	0.448	
Band 5	Bottom	0	20525	836.5	23.27	23.50	1.054	0.07	0.433	0.457	

Band 7

Band	Test Position	Gap (mm)	Channel	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR1g (W/kg)	Reported SAR1g (W/kg)	Plot
Band 7	Front	0	20850	2510.0	23.74	24.00	1.062	0.06	0.546	0.580	#4
Band 7	Back	0	20850	2510.0	23.74	24.00	1.062	0.01	0.502	0.533	
Band 7	Left	0	20850	2510.0	23.74	24.00	1.062	0.05	0.082	0.087	
Band 7	Right	0	20850	2510.0	23.74	24.00	1.062	-0.04	0.511	0.543	
Band 7	Top	0	20850	2510.0	23.74	24.00	1.062	0.03	0.321	0.341	
Band 7	Bottom	0	20850	2510.0	23.74	24.00	1.062	0.02	0.332	0.352	

Band 12

Band	Test Position	Gap (mm)	Channel	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR1g (W/kg)	Reported SAR1g (W/kg)	Plot
Band 12	Front	0	23095	707.5	23.46	23.50	1.009	0.05	0.635	0.641	#5
Band 12	Back	0	23095	707.5	23.46	23.50	1.009	0.03	0.546	0.551	
Band 12	Left	0	23095	707.5	23.46	23.50	1.009	-0.11	0.038	0.038	
Band 12	Right	0	23095	707.5	23.46	23.50	1.009	-0.03	0.550	0.555	
Band 12	Top	0	23095	707.5	23.46	23.50	1.009	0.02	0.243	0.245	
Band 12	Bottom	0	23095	707.5	23.46	23.50	1.009	0.07	0.269	0.271	



Band 38

Band	Test Position	Gap (mm)	Channel	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR1g (W/kg)	Reported SAR1g (W/kg)	Plot
Band 38	Front	0	37850	2580	22.62	23.00	1.091	0.02	0.512	0.559	#6
Band 38	Back	0	37850	2580	22.62	23.00	1.091	0.03	0.423	0.462	
Band 38	Left	0	37850	2580	22.62	23.00	1.091	0.08	0.002	0.002	
Band 38	Right	0	37850	2580	22.62	23.00	1.091	-0.01	0.465	0.508	
Band 38	Top	0	37850	2580	22.62	23.00	1.091	0.02	0.301	0.329	
Band 38	Bottom	0	37850	2580	22.62	23.00	1.091	0.06	0.298	0.325	

Band 41

Band	Test Position	Gap (mm)	Channel	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR1g (W/kg)	Reported SAR1g (W/kg)	Plot
Band 41	Front	0	39750	2506	22.69	23.50	1.205	0.12	0.646	0.778	#7
Band 41	Back	0	39750	2506	22.69	23.50	1.205	0.05	0.554	0.668	
Band 41	Left	0	39750	2506	22.69	23.50	1.205	0.08	0.028	0.034	
Band 41	Right	0	39750	2506	22.69	23.50	1.205	-0.06	0.568	0.684	
Band 41	Top	0	39750	2506	22.69	23.50	1.205	0.04	0.473	0.570	
Band 41	Bottom	0	39750	2506	22.69	23.50	1.205	0.02	0.435	0.524	

Band 66

Band	Test Position	Gap (mm)	Channel	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR1g (W/kg)	Reported SAR1g (W/kg)	Plot
Band 66	Front	0	131979	1710.7	23.84	24.50	1.164	0.04	0.623	0.725	#8
Band 66	Back	0	131979	1710.7	23.84	24.50	1.164	0.03	0.546	0.636	
Band 66	Left	0	131979	1710.7	23.84	24.50	1.164	0.07	0.064	0.075	
Band 66	Right	0	131979	1710.7	23.84	24.50	1.164	-0.02	0.478	0.556	
Band 66	Top	0	131979	1710.7	23.84	24.50	1.164	0.02	0.488	0.568	
Band 66	Bottom	0	131979	1710.7	23.84	24.50	1.164	0.03	0.532	0.619	

Note:

1. Per the Standard KDB 9412225 D05, When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation. The reported SAR values for each 4G band mentioned above are all less than 0.8 W/kg. Therefore, only the 1 RB needs to be tested, and there is no need to test the remaining RB offsets and required test channels.

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BLE

Band	Test Position	Gap (mm)	Channel	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR1g (W/kg)	Reported SAR1g (W/kg)	Plot
BLE	Front	0	73	2475	7.34	7.50	1.038	0.01	0.011	0.011	#9
BLE	Back	0	73	2475	7.34	7.50	1.038	0.02	0.016	0.017	
BLE	Left	0	73	2475	7.34	7.50	1.038	0.07	0.002	0.002	
BLE	Right	0	73	2475	7.34	7.50	1.038	-0.09	0.006	0.006	
BLE	Top	0	73	2475	7.34	7.50	1.038	0.11	0.056	0.058	
BLE	Bottom	0	73	2475	7.34	7.50	1.038	-0.01	0.003	0.003	

Note:

1. Per KDB 865664 D01V01,for each frequency band ,repeated SAR measurement is required only when the measured SAR is $\geq 0.8W/Kg$.
2. Per KDB 865664 D01V01,if the ratio of largest to smallest SAR for the original and first repeated measurement is ≤ 1.2 and the measured SAR $< 1.45W/Kg$, only one repeated measurement is required.
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 $\geq 1.45W/Kg$
4. The ratio is the difference in percentage between original and repeated measured SAR.



13. Simultaneous Transmission Analysis

Simultaneous TX SAR Considerations

No. Applicable Simultaneous Transmission

1. LTE+BEL
- 2.

Simultaneous transmission SAR for LTE ANT1+BLE ANT2

Test Position	LTE Band2 ANT1 SAR _{1g} (W/Kg)	BLE ANT2 SAR _{1g} (W/Kg)	MAX. Σ SAR _{1g} (W/Kg)	SAR _{1g} Limit (W/Kg)
Left	0.751	0.011	0.762	1.6
Right	0.661	0.017	0.678	1.6
Top	0.017	0.002	0.019	1.6
Bottom	0.604	0.006	0.610	1.6
Front	0.652	0.058	0.710	1.6
Back	0.578	0.003	0.581	1.6

Test Position	LTE Band4 ANT1 SAR _{1g} (W/Kg)	BLE ANT2 SAR _{1g} (W/Kg)	MAX. Σ SAR _{1g} (W/Kg)	SAR _{1g} Limit (W/Kg)
Left	0.759	0.011	0.770	1.6
Right	0.651	0.017	0.668	1.6
Top	0.059	0.002	0.061	1.6
Bottom	0.665	0.006	0.671	1.6
Front	0.494	0.058	0.552	1.6
Back	0.438	0.003	0.441	1.6

Test Position	LTE Band5 ANT1 SAR _{1g} (W/Kg)	BLE ANT2 SAR _{1g} (W/Kg)	MAX. Σ SAR _{1g} (W/Kg)	SAR _{1g} Limit (W/Kg)
Left	0.660	0.011	0.671	1.6
Right	0.577	0.017	0.594	1.6
Top	0.066	0.002	0.068	1.6
Bottom	0.613	0.006	0.619	1.6
Front	0.448	0.058	0.506	1.6
Back	0.457	0.003	0.460	1.6



Test Position	LTE Band7 ANT1 SAR _{1g} (W/Kg)	BLE ANT2 SAR _{1g} (W/Kg)	MAX. Σ SAR _{1g} (W/Kg)	SAR _{1g} Limit (W/Kg)
Left	0.580	0.011	0.591	1.6
Right	0.533	0.017	0.550	1.6
Top	0.087	0.002	0.089	1.6
Bottom	0.543	0.006	0.549	1.6
Front	0.341	0.058	0.399	1.6
Back	0.352	0.003	0.355	1.6

Test Position	LTE Band12 ANT1 SAR _{1g} (W/Kg)	BLE ANT2 SAR _{1g} (W/Kg)	MAX. Σ SAR _{1g} (W/Kg)	SAR _{1g} Limit (W/Kg)
Left	0.641	0.011	0.652	1.6
Right	0.551	0.017	0.568	1.6
Top	0.038	0.002	0.040	1.6
Bottom	0.555	0.006	0.561	1.6
Front	0.245	0.058	0.303	1.6
Back	0.271	0.003	0.274	1.6

Test Position	LTE Band38 ANT1 SAR _{1g} (W/Kg)	BLE ANT2 SAR _{1g} (W/Kg)	MAX. Σ SAR _{1g} (W/Kg)	SAR _{1g} Limit (W/Kg)
Left	0.559	0.011	0.570	1.6
Right	0.462	0.017	0.479	1.6
Top	0.002	0.002	0.004	1.6
Bottom	0.508	0.006	0.514	1.6
Front	0.329	0.058	0.387	1.6
Back	0.325	0.003	0.328	1.6

Test Position	LTE Band41 ANT1 SAR _{1g} (W/Kg)	BLE ANT2 SAR _{1g} (W/Kg)	MAX. Σ SAR _{1g} (W/Kg)	SAR _{1g} Limit (W/Kg)
Left	0.778	0.011	0.789	1.6
Right	0.668	0.017	0.685	1.6
Top	0.034	0.002	0.036	1.6
Bottom	0.684	0.006	0.69	1.6
Front	0.570	0.058	0.628	1.6
Back	0.524	0.003	0.527	1.6



Test Position	LTE Band66 ANT1 SAR _{1g} (W/Kg)	BLE ANT2 SAR _{1g} (W/Kg)	MAX. Σ SAR _{1g} (W/Kg)	SAR _{1g} Limit (W/Kg)
Left	0.725	0.011	0.736	1.6
Right	0.636	0.017	0.653	1.6
Top	0.075	0.002	0.077	1.6
Bottom	0.556	0.006	0.562	1.6
Front	0.568	0.058	0.626	1.6
Back	0.619	0.003	0.622	1.6



14. Measurement Uncertainty

NO	Source	Uncert. ai (%)	Pro b. Dist.	Div.	kci (1g)	ci (10g)	Stand.U ncert. ui (1g)	Stand.U ncert. ui (10g)	Veff
1	Repeat	0.4	N	1	1	1	0.4	0.4	9
Instrument									
2	Probe calibration	6.65	N	2	1	1	3.5	3.5	∞
3	Axial isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
4	Hemispherical isotropy	9.4	R	$\sqrt{3}$	0.7	0.7	3.9	3.9	∞
5	Boundary effect	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Linearity	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
7	Detection limits	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
8	Readout electronics	0.3	N	1	1	1	0.3	0.3	∞
9	Response time	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
10	Integration time	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
11	Ambient noise	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
12	Ambient reflections	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Probe positioner mech. restrictions	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
14	Probe positioning with respect to phantom shell	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
15	Max.SAR evaluation	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞



Test sample related									
16	Device positioning	3.8	N	1	1	1	3.8	3.8	99
17	Device holder	5.1	N	1	1	1	5.1	5.1	5
18	Drift of output power	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up									
19	Phantom uncertainty	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
20	Liquid conductivity (target)	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
21	Liquid conductivity (meas)	2.5	N	1	0.64	0.43	1.6	1.2	∞
22	Liquid Permittivity (target)	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.5	∞
23	Liquid Permittivity (meas)	2.5	N	1	0.6	0.49	1.5	1.2	∞
Combined standard			RSS	$U_c = \sqrt{\sum_{i=1}^n C_i^2 U_i^2}$			11.4%	11.3%	236
Expanded uncertainty(P=95%)		$U_c = k U$,k=2					22.8%	22.6%	
The measurement uncertainty and decision risk evaluated according to AB/WI-RF-F-032. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.									



Appendix A. Plots of SAR System Check



750MHz System Check

Date:Dec/03/2024

DUT: Dipole 750 MHz; Type: D750V2; Serial: 4d154

Communication System: CW; Frequency: 750 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 750$ MHz; $\sigma = 0.84$ S/m; $\epsilon_r = 41.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN7396; ConvF(9.82, 9.82, 9.82); Calibrated: May 06.2024;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.02,2024;

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (61x91x1):Measurement grid: $dx=15.00$ mm, $dy=15.00$ mm

Maximum value of SAR (interpolated) = 2.892 W/kg

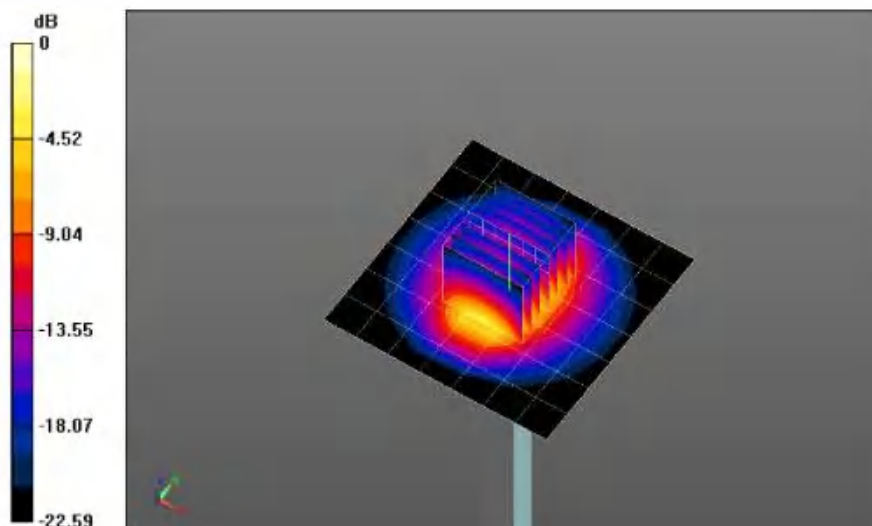
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 50.236 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 3.251 W/kg

SAR(1 g) = 3.52W/kg; SAR(10 g) = 1.38 W/kg

Maximum value of SAR (measured) = 2.879 W/kg



835MHz System Check

Date:Dec/03/2024

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d154

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 835 \text{ MHz}$; $\sigma = 0.93 \text{ S/m}$; $\epsilon_r = 41.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN7396; ConvF(9.71, 9.71, 9.71); Calibrated: May 06.2024;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.02,2024;

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (61x91x1):Measurement grid: $dx=15.00 \text{ mm}$, $dy=15.00 \text{ mm}$

Maximum value of SAR (interpolated) = 2.892 W/kg

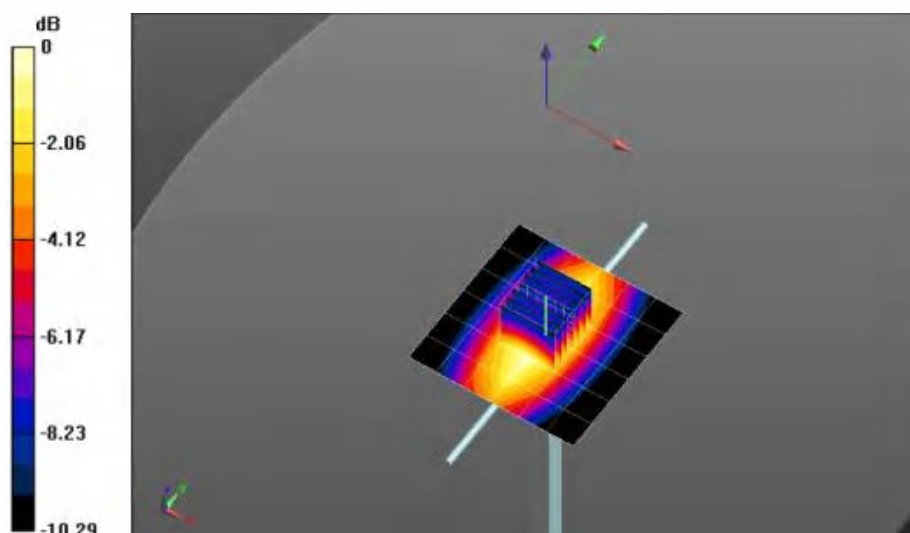
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 50.236 V/m ; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 3.251 W/kg

SAR(1 g) = 3.56 W/kg ; SAR(10 g) = 1.54 W/kg

Maximum value of SAR (measured) = 2.879 W/kg



1750MHz System Check

Date: Dec/04/2024

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1750$ MHz; $\sigma = 1.36$ S/m; $\epsilon_r = 40.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN7396; ConvF(8.61, 8.61, 8.61); Calibrated: May,06.2024;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.02.2024;

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x71x1): Interpolated grid: $dx = 1.500$ mm, $dy = 1.500$ mm

Maximum value of SAR (interpolated) = 12.1 W/kg

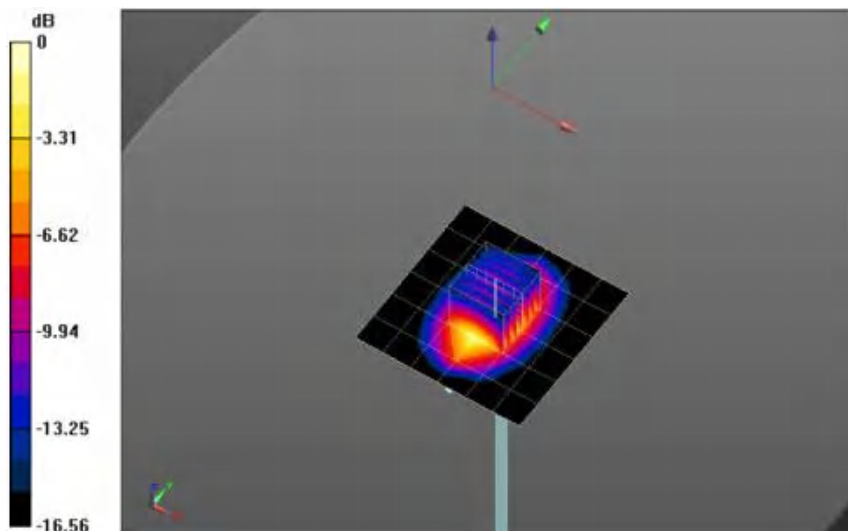
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx = 8$ mm, $dy = 8$ mm, $dz = 5$ mm

Reference Value = 92.55 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 16.828 W/kg

SAR(1 g) = 7.85 W/kg; SAR(10 g) = 4.81 W/kg

Maximum value of SAR (measured) = 12.0 W/kg



1900MHz System Check

Date: Dec/04/2024

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d175

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1900$ MHz; $\sigma = 1.39$ S/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN7396; ConvF(8.13, 8.13, 8.13); Calibrated: May 06.2024;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.02,2024;

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (61x91x1): Measurement grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 16.365 W/kg

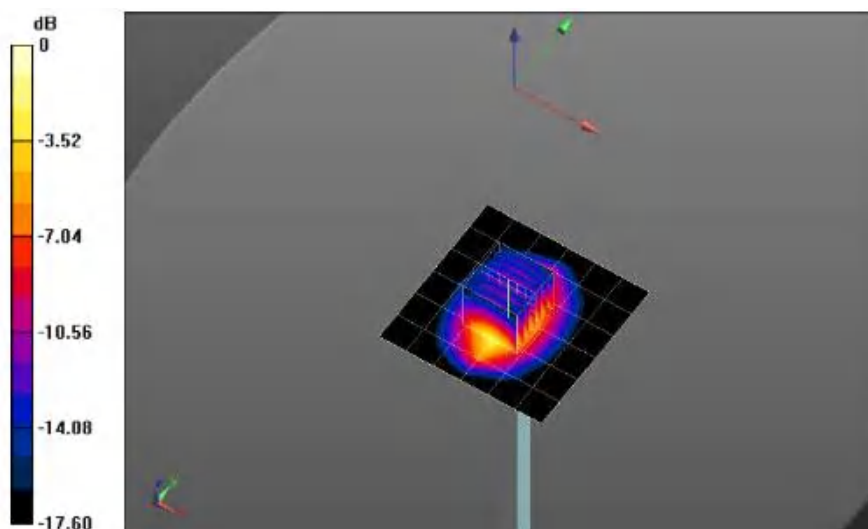
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 87.414 V/m; Power Drift = -0.12dB

Peak SAR (extrapolated) = 19.622 W/kg

SAR(1 g) = 9.62 W/kg; SAR(10 g) = 5.21 W/kg

Maximum value of SAR (measured) = 15.11 W/kg



2600MHz System Check

Date: Dec/05/2024

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN:1058

Communication System: CW; Frequency: 2600 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2600$ MHz; $\sigma = 2.00$ S/m; $\epsilon_r = 39.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN7396; ConvF(7.38, 7.38, 7.38); Calibrated: May 06, 2023;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.06.2023

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (61x91x1): Measurement grid: $dx=10.00$ mm, $dy=10.00$ mm

Maximum value of SAR (interpolated) = 19.225 W/kg

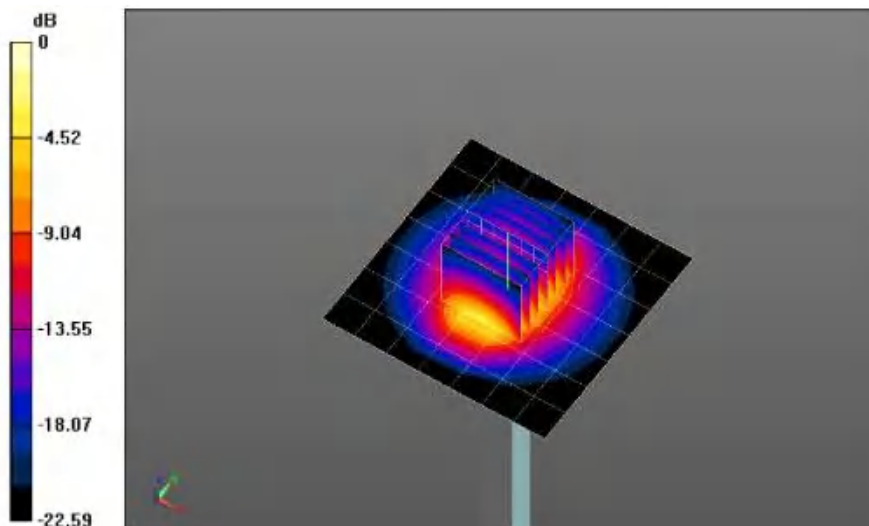
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 84.153 V/m; Power Drift = 0.05dB

Peak SAR (extrapolated) = 26.125 W/kg

SAR(1 g) = 11.26 W/kg; SAR(10 g) = 6.14 W/kg

Maximum value of SAR (measured) = 19.18W/kg



2450MHz System Check

Date: Apr/03/2025

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:910

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

Medium parameters used (interpolated): $f = 2450$ MHz; $\sigma = 1.86$ S/m; $\epsilon_r = 39.15$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN7396; ConvF(7.57, 7.57, 7.57); Calibrated: May 06, 2023;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.06.2023

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (61x91x1):Measurement grid: $dx=10.00$ mm, $dy=10.00$ mm

Maximum value of SAR (interpolated) = 20.331 W/kg

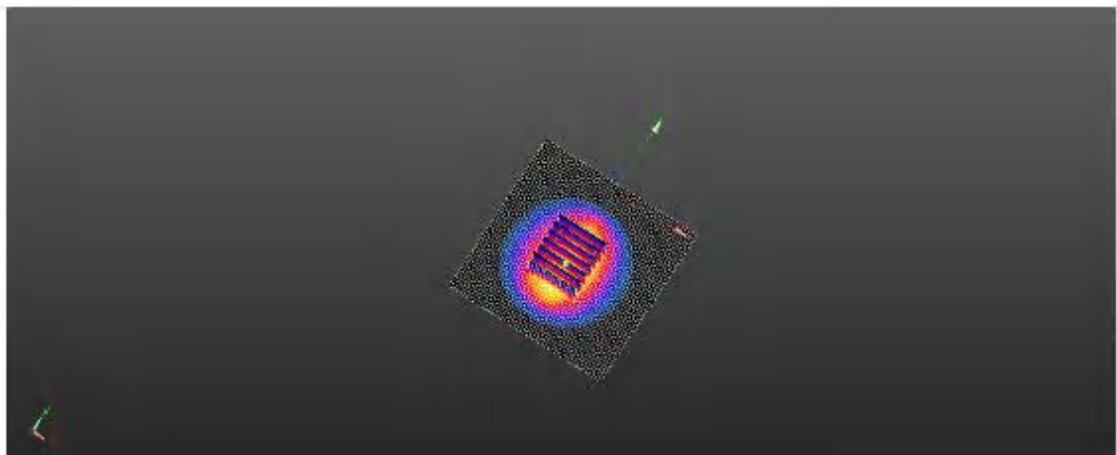
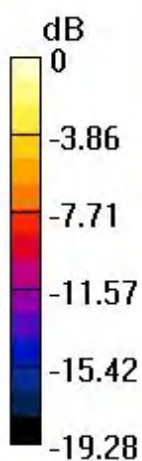
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 82.61 V/m; Power Drift = 0.06dB

Peak SAR (extrapolated) = 25.312 W/kg

SAR(1 g) = 12.68 W/kg; SAR(10 g) = 6.05 W/kg

Maximum value of SAR (measured) = 19.33W/kg



Appendix B. Plots of SAR Test Data

#1

Date: Dec/04/2024

LTE_Band 2_ Body Back _Ch18700

Communication System: UID 0; Frequency: 1860 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1860$ MHz; $\sigma = 1.37$ S/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 – SN7396; ConvF(8.13, 8.13, 8.13); Calibrated: May 06.2024;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.02,2024;

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (81x131x1): Measurement grid: dx=1.200mm, dy=1.200mm

Maximum value of SAR (measured) = 0.621 W/kg

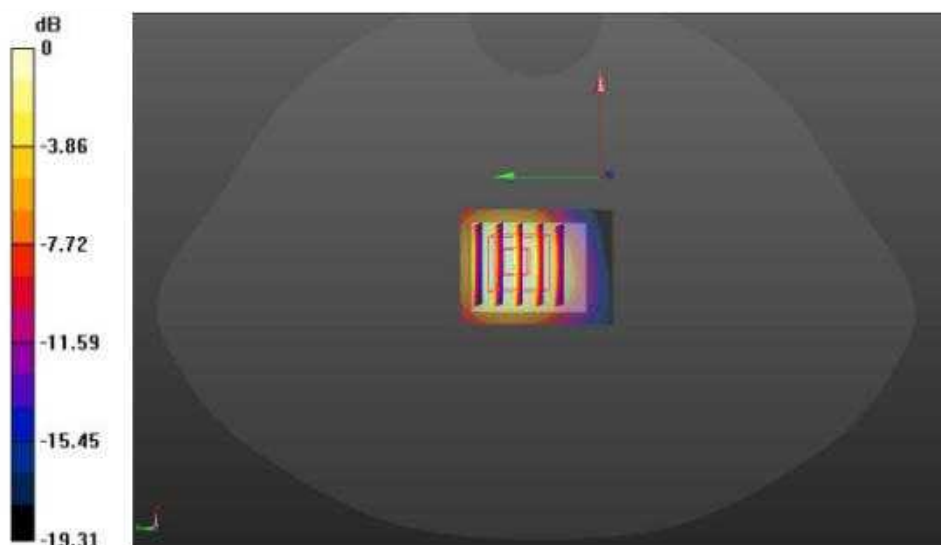
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.523 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.633 W/kg

SAR(1 g) = 0.706W/kg; SAR(10 g) = 0.223 W/kg

Maximum value of SAR (measured) = 0.801 W/kg



#2

Date: Dec/04/2024

LTE_Band 4_ Body Back _Ch20050

Communication System: UID 0; Frequency: 1720MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1720 \text{ MHz}$; $\sigma = 1.30 \text{ S/m}$; $\epsilon_r = 40.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 – SN7396; ConvF(8.61, 8.61, 8.61); Calibrated: May 06, 2024;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.02,2024;

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (81x131x1): Measurement grid: $dx=1.200\text{mm}$, $dy=1.200\text{mm}$

Maximum value of SAR (measured) = 0.753 W/kg

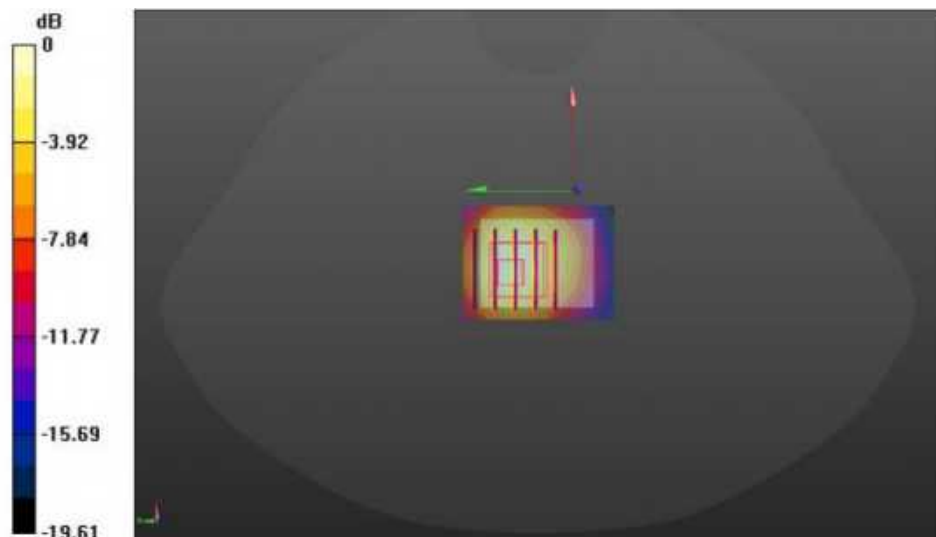
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 7.689 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.832 W/kg

SAR(1 g) = 0.715 W/kg; SAR(10 g) = 0.231 W/kg

Maximum value of SAR (measured) = 0.802 W/kg



#3

Date: Dec/03/2024

LTE_Band 5_Body Back _Ch20525

Communication System: UID 0; Frequency: 836.5 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.5\text{MHz}$; $\sigma = 0.89\text{ S/m}$; $\epsilon_r = 41.2$; $\rho = 1000\text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 – SN7396; ConvF(9.71, 9.71, 9.71); Calibrated: May 06, 2024;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.02,2024;

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (81x131x1): Measurement grid: $dx=1.00\text{mm}$, $dy=1.00\text{mm}$

Maximum value of SAR (measured) = 0.712 W/kg

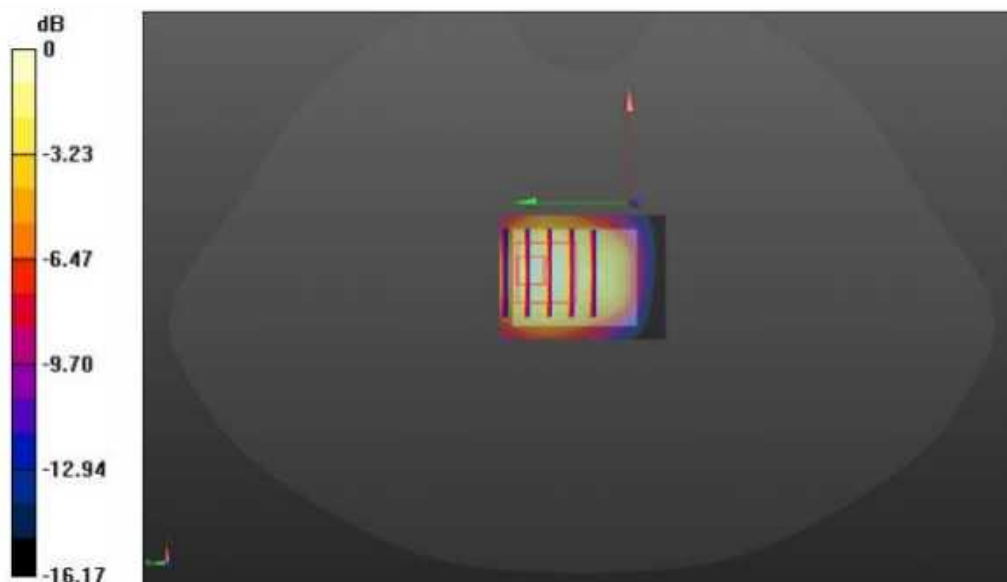
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$

Reference Value = 7.754 V/m ; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.766W/kg

SAR(1 g) = 0.626 W/kg ; SAR(10 g) = 0.233W/kg

Maximum value of SAR (measured) = 0.825 W/kg



#4

Date: Dec/05/2024

LTE_Band 7_ Body Back _Ch20850

Communication System: UID 0; Frequency: 2510 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2510 \text{ MHz}$; $\sigma = 1.83\text{S/m}$; $\epsilon_r = 39.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 – SN7396; ConvF(7.38, 7.38, 7.38); Calibrated: May 06, 2024;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.02,2024;

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (81x131x1): Measurement grid: $dx=1.200\text{mm}$, $dy=1.200\text{mm}$

Maximum value of SAR (measured) = 0.602 W/kg

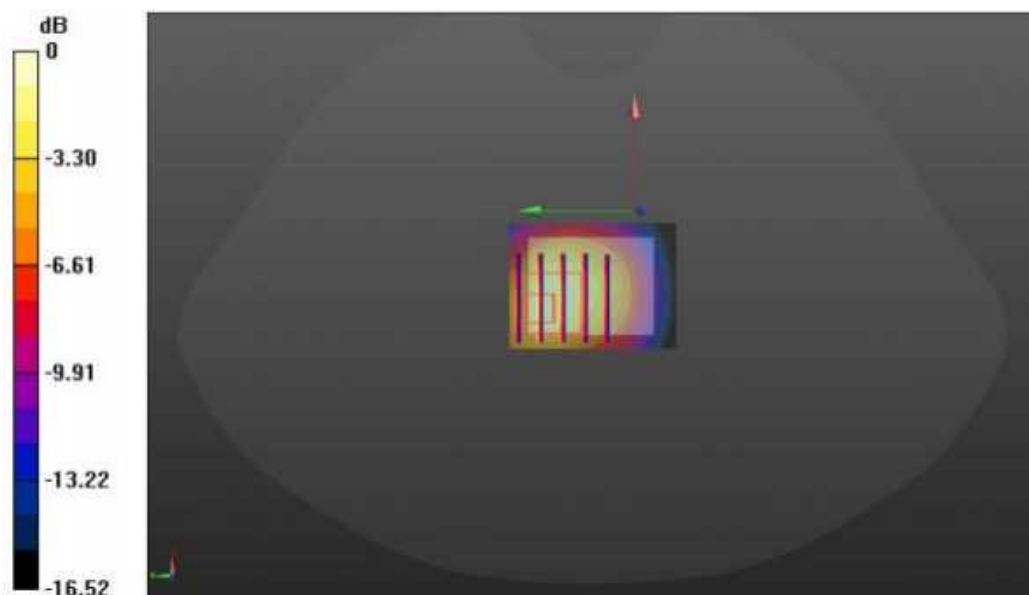
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 6.331 V/m ; Power Drift = 0.06dB

Peak SAR (extrapolated) = 0.651W/kg

SAR(1 g) = 0.546W/kg ; SAR(10 g) = 0.188W/kg

Maximum value of SAR (measured) = 0.962 W/kg



#5

Date: Dec/03/2024

LTE_Band 12_ Body Back _Ch23095

Communication System: UID 0; Frequency: 707.5 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 707.5 \text{ MHz}$; $\sigma = 0.79 \text{ S/m}$; $\epsilon_r = 42.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 – SN7396; ConvF(9.82, 9.82, 9.82); Calibrated: May 06, 2024;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.02,2024;

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (81x131x1): Measurement grid: $dx=1.200\text{mm}$, $dy=1.200\text{mm}$

Maximum value of SAR (measured) = 0.622 W/kg

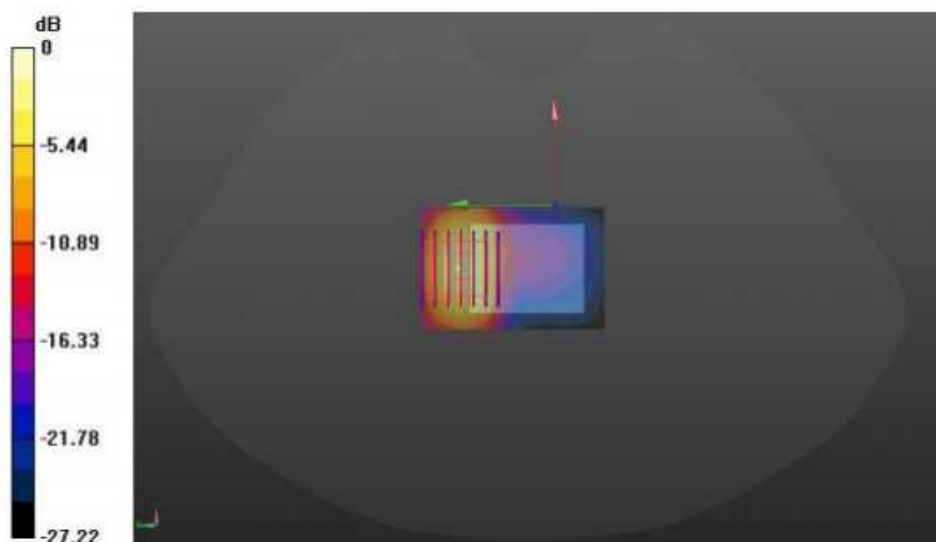
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 6.264 V/m ; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.679 W/kg

SAR(1 g) = 0.635 W/kg ; SAR(10 g) = 0.202 W/kg

Maximum value of SAR (measured) = 0.852 W/kg



#6

Date: Dec/05/2024

LTE_Band 38_ Body Back _Ch37850

Communication System: UID 0; Frequency: 2580 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2580$ MHz; $\sigma = 1.92$ S/m; $\epsilon_r = 39.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 – SN7396; ConvF(7.38, 7.38, 7.38); Calibrated: May 06, 2024;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.02,2024;

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (81x131x1): Measurement grid: dx=1.00mm, dy=1.00mm

Maximum value of SAR (measured) = 0.763 W/kg

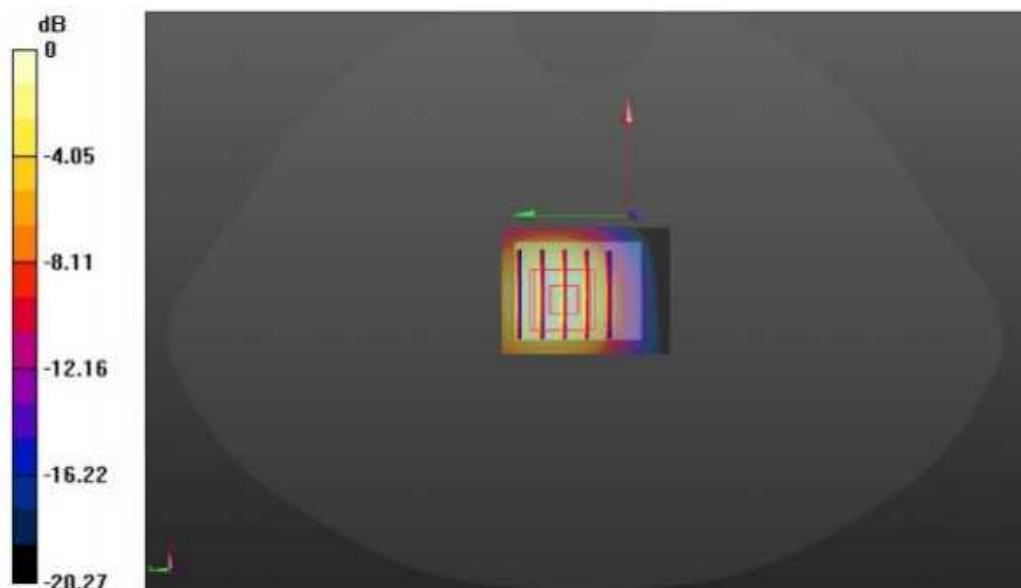
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 6.852V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.834 W/kg

SAR(1 g) = 0.512 W/kg; SAR(10 g) = 0.168 W/kg

Maximum value of SAR (measured) = 0.752W/kg



#7

Date: Dec/05/2024

LTE_Band 41_ Body Back _Ch39750

Communication System: UID 0; Frequency: 2506 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2506$ MHz; $\sigma = 1.82$ S/m; $\epsilon_r = 39.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 – SN7396; ConvF(7.38, 7.38, 7.38); Calibrated: May 06, 2024;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.02,2024;

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (81x131x1): Measurement grid: dx=1.00mm, dy=1.00mm

Maximum value of SAR (measured) = 0.732 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 7.615V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.765 W/kg

SAR(1 g) = 0.646 W/kg; SAR(10 g) = 0.168 W/kg

Maximum value of SAR (measured) = 0.726 W/kg



#8

Date: Dec/04/2024

LTE_Band 66_ Body Back _Ch131979

Communication System: UID 0; Frequency: 1710.7 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1710.7$ MHz; $\sigma = 1.33$ S/m; $\epsilon_r = 40.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 – SN7396; ConvF(8.61, 8.61, 8.61); Calibrated: May 06, 2024;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.02,2024;

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (81x131x1): Measurement grid: dx=1.00mm, dy=1.00mm

Maximum value of SAR (measured) = 0.725W/kg

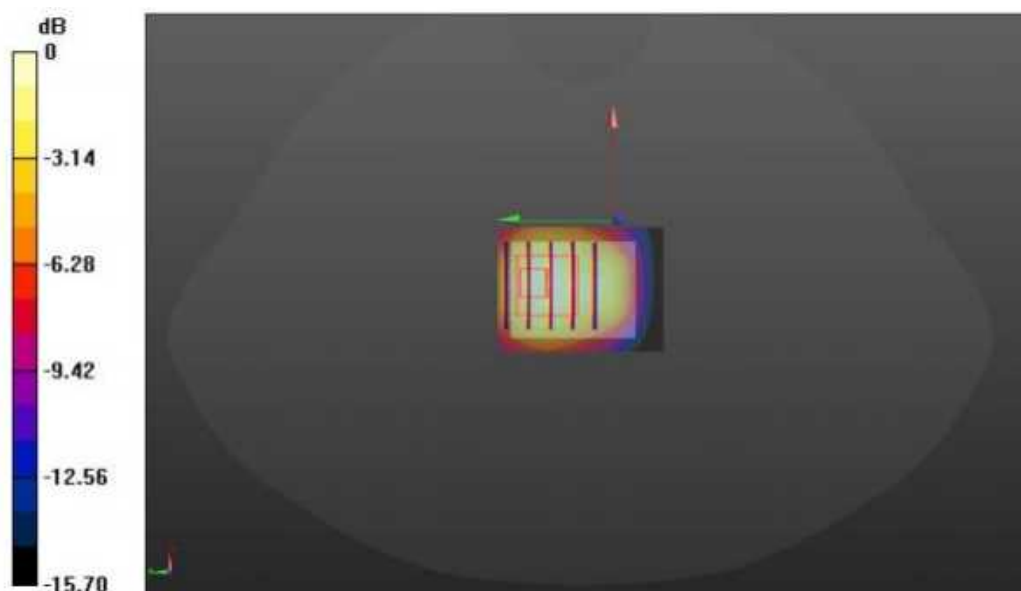
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 7.626V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.768 W/kg

SAR(1 g) = 0.623 W/kg; SAR(10 g) = 0.205 W/kg

Maximum value of SAR (measured) = 0.826 W/kg



#9

Date: Apr/03/2025

BIE_Body Back _CH73

Communication System: UID 0; Frequency: 2475 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2475$ MHz; $\sigma = 1.89$ S/m; $\epsilon_r = 39.11$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 – SN7396; ConvF(7.57,7.57, 7.57); Calibrated: May 06, 2024;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn387; Calibrated: Sep.02,2024;

Phantom: ELI4; Type: QDOVA004AA; Serial:2058

Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (81x131x1): Measurement grid: dx=1.00mm, dy=1.00mm

Maximum value of SAR (measured) = 0.754W/kg

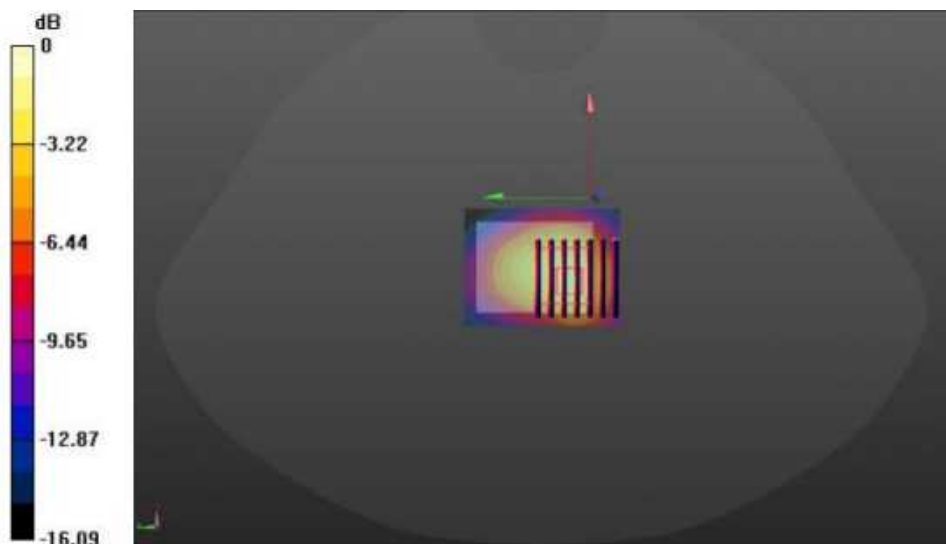
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 7.527V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.668 W/kg

SAR(1 g) = 0.056 W/kg; SAR(10 g) = 0.013 W/kg

Maximum value of SAR (measured) = 0.087 W/kg



Appendix C:DASY System Calibration Certificate

Shenzhen Anbotek Compliance Laboratory Limited

Address: Sogood Industrial Zone Laboratory & 1/F. of Building D, Sogood Science and Technology Park,
Sanwei Community, Hangcheng Subdistrict, Bao'an District, Shenzhen, Guangdong, China
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IMPORTANT NOTICE

USAGE OF THE DAE 4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE4 unit is closed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:

Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:

Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:

To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.

Schmid & Partner Engineering

TN_BR040315AD DAE4.doc

11.12.2009

Sher

Address: Sogood Industrial Zone Laboratory & 1/F. of Building D, Sogood Science and Technology Park,
Sanwei Community, Hangcheng Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Tel: (86) 0755-26066440 Email: service@anbotech.com



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Zeughausstrasse 43, 8004 Zurich, Switzerland



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

Accreditation No.: SCS 0108

Client **Anbotech (Auden)**

Certificate No: DAE4-387_Sep02

CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BM - SN: 387**

Calibration procedure(s) **QA CAL-06.v29
Calibration procedure for the data acquisition electronics (DAE)**

Calibration date: **September 02, 2024**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	15-Aug-24 (No:22092)	Aug-24
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Auto DAE Calibration Unit	SE UWS 053 AA 1001	05-Jan-24 (in house check)	In house check: Jan-24
Calibrator Box V2.1	SE UMS 006 AA 1002	05-Jan-24 (in house check)	In house check: Jan-24

Calibrated by:	Name Dominique Steffen	Function Laboratory Technician	Signature
Approved by:	Sven Kühn	Deputy Manager	

Issued: September 02, 2024

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**Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland



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Accreditation No.: **SCS 0108**

Glossary

DAE data acquisition electronics
Connector angle information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- **DC Voltage Measurement:** Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- **Connector angle:** The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
 - **DC Voltage Measurement Linearity:** Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
 - **Common mode sensitivity:** Influence of a positive or negative common mode voltage on the differential measurement.
 - **Channel separation:** Influence of a voltage on the neighbor channels not subject to an input voltage.
 - **AD Converter Values with inputs shorted:** Values on the internal AD converter corresponding to zero input voltage
 - **Input Offset Measurement:** Output voltage and statistical results over a large number of zero voltage measurements.
 - **Input Offset Current:** Typical value for information; Maximum channel input offset current, not considering the input resistance.
 - **Input resistance:** Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
 - **Low Battery Alarm Voltage:** Typical value for information. Below this voltage, a battery alarm signal is generated.
 - **Power consumption:** Typical value for information. Supply currents in various operating modes.



DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV, full range = -100...+300 mV

Low Range: 1LSB = 61nV, full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.489 ± 0.02% (k=2)	404.852 ± 0.02% (k=2)	404.862 ± 0.02% (k=2)
Low Range	3.97827 ± 1.50% (k=2)	3.95875 ± 1.50% (k=2)	3.97982 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	53.0 ° ± 1 °
---	--------------



Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	200032.85	-3.31	-0.00
Channel X + Input	20007.64	1.88	0.01
Channel X - Input	-20003.48	1.18	-0.01
Channel Y + Input	200034.23	-1.43	-0.00
Channel Y + Input	20006.60	0.91	0.00
Channel Y - Input	-20004.04	0.72	-0.00
Channel Z + Input	200035.38	-0.83	-0.00
Channel Z + Input	20003.69	-2.11	-0.01
Channel Z - Input	-20006.36	-1.59	0.01

Low Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	2001.63	0.08	0.00
Channel X + Input	202.29	0.70	0.35
Channel X - Input	-197.90	0.60	-0.30
Channel Y + Input	2001.33	-0.07	-0.00
Channel Y + Input	200.86	-0.60	-0.30
Channel Y - Input	-199.87	-1.23	0.62
Channel Z + Input	2001.61	0.27	0.01
Channel Z + Input	200.60	-0.70	-0.35
Channel Z - Input	-199.51	-0.85	0.43

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	13.50	11.56
	- 200	-8.64	-11.18
Channel Y	200	-0.81	-1.28
	- 200	1.05	0.09
Channel Z	200	7.17	6.91
	- 200	-9.46	-9.01

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	-1.70	0.33
Channel Y	200	10.70	-	-0.38
Channel Z	200	7.11	7.89	-



4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15969	17466
Channel Y	15661	16162
Channel Z	15990	16190

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.73	-2.58	3.29	0.62
Channel Y	0.41	-0.49	1.23	0.40
Channel Z	-0.80	-1.88	0.30	0.42

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9



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Client

Anbotech (Auden)

Certificate No: Z24-98671

CALIBRATION CERTIFICATE

Object EX3DV4 - SN:7396

Calibration Procedure(s) FF-Z12-006-08
Calibration Procedures for Dosimetric E-field Probes

Calibration date: May 06, 2024

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	20-Jun-23 (CTTL, No J23 X07447)	Jun-23
Power sensor NRP-Z91	101547	20-Jun-23 (CTTL, No J23 X07447)	Jun-23
Power sensor NRP-Z91	101548	20-Jun-23 (CTTL, No J23 X07447)	Jun-23
Reference10dBAttenuator	18N50W-10dB	13-Mar-24(CTTL, No J24X01547)	Mar-24
Reference20dBAttenuator	18N50W-20dB	13-Mar-24(CTTL, No J24X01548)	Mar-24
Reference Probe EX3DV4	SN 7433	26-Sep-23(SPEAG, No EX3-7433_Sep22)	Sep-23
DAE4	SN 549	13-Dec-23(SPEAG, No DAE4-549_Dec22)	Dec -23
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGeneratorMG3700A	6201052605	27-Jun-23 (CTTL, No J23X04776)	Jun-23
Network Analyzer E5071C	MY46110673	13-Jan-24 (CTTL, No J24X00285)	Jan -24

	Name	Function
Calibrated by:	Yu Zongying	SAR Test Engineer
Reviewed by:	Lin Hao	SAR Test Engineer
Approved by:	Qi Dianyuan	SAR Project Leader

Signature

Issued: May06, 2024

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Certificate No: Z24-98671

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Probe EX3DV4

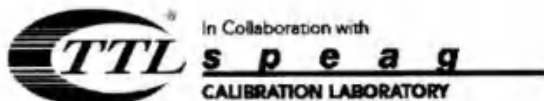
SN: 7396

Calibrated: May 06, 2024

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)





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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7396

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm($\mu\text{V}/(\text{V/m})^2$) ^A	0.54	0.53	0.50	$\pm 10.0\%$
DCP(mV) ^B	97.8	104.5	102.5	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB· μV	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	199.9	$\pm 2.4\%$
		Y	0.0	0.0	1.0		203.3	
		Z	0.0	0.0	1.0		195.0	

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

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

^B Numerical linearization parameter: uncertainty not required.

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





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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7396

Calibration Parameter Determined in Head Tissue Simulating Media

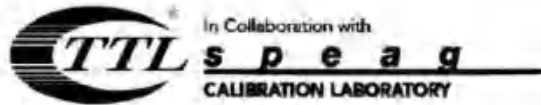
f [MHz] ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	41.9	0.89	9.82	9.82	9.82	0.30	0.85	±12.1%
835	41.5	0.90	9.71	9.71	9.71	0.15	1.36	±12.1%
900	41.5	0.97	9.87	9.87	9.87	0.16	1.37	±12.1%
1750	40.1	1.37	8.61	8.61	8.61	0.25	1.04	±12.1%
1900	40.0	1.40	8.13	8.13	8.13	0.24	1.01	±12.1%
2100	39.8	1.49	8.14	8.14	8.14	0.24	1.04	±12.1%
2300	39.5	1.67	7.85	7.85	7.85	0.40	0.75	±12.1%
2450	39.2	1.80	7.57	7.57	7.57	0.50	0.75	±12.1%
2600	39.0	1.96	7.38	7.38	7.38	0.64	0.68	±12.1%
5250	35.9	4.71	5.33	5.33	5.33	0.45	1.30	±13.3%
5600	35.5	5.07	4.89	4.89	4.89	0.45	1.35	±13.3%
5750	35.4	5.22	4.92	4.92	4.92	0.45	1.45	±13.3%

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

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

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





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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7396

Calibration Parameter Determined in Body Tissue Simulating Media

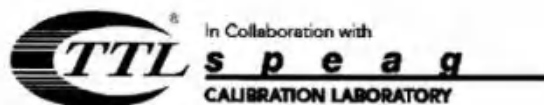
f [MHz] ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	55.5	0.96	10.09	10.09	10.09	0.30	0.90	±12.1%
835	55.2	0.97	9.88	9.88	9.88	0.19	1.32	±12.1%
900	55.0	1.05	9.82	9.82	9.82	0.23	1.15	±12.1%
1750	53.4	1.49	8.24	8.24	8.24	0.24	1.06	±12.1%
1900	53.3	1.52	7.97	7.97	7.97	0.19	1.24	±12.1%
2100	53.2	1.62	8.18	8.18	8.18	0.19	1.39	±12.1%
2300	52.9	1.81	7.88	7.88	7.88	0.55	0.80	±12.1%
2450	52.7	1.95	7.53	7.53	7.53	0.46	0.89	±12.1%
2600	52.5	2.16	7.38	7.38	7.38	0.52	0.80	±12.1%
5250	48.9	5.36	4.93	4.93	4.93	0.45	1.80	±13.3%
5600	48.5	5.77	4.19	4.19	4.19	0.48	1.90	±13.3%
5750	48.3	5.94	4.52	4.52	4.52	0.48	1.95	±13.3%

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

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

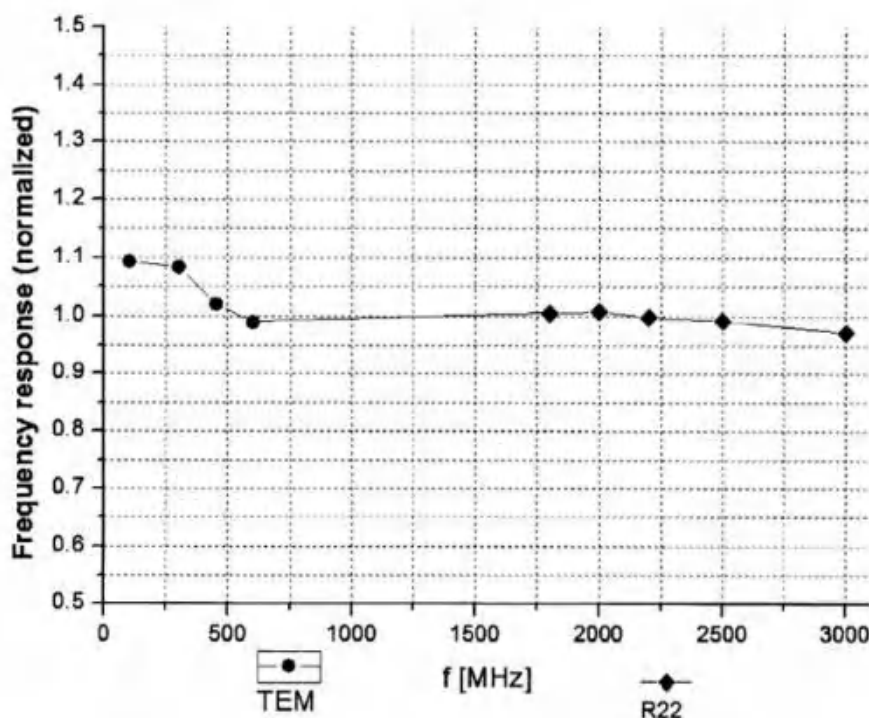
^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ±1% for frequencies below 3 GHz and below ±2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from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





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Frequency Response of E-Field (TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: $\pm 7.4\%$ (k=2)



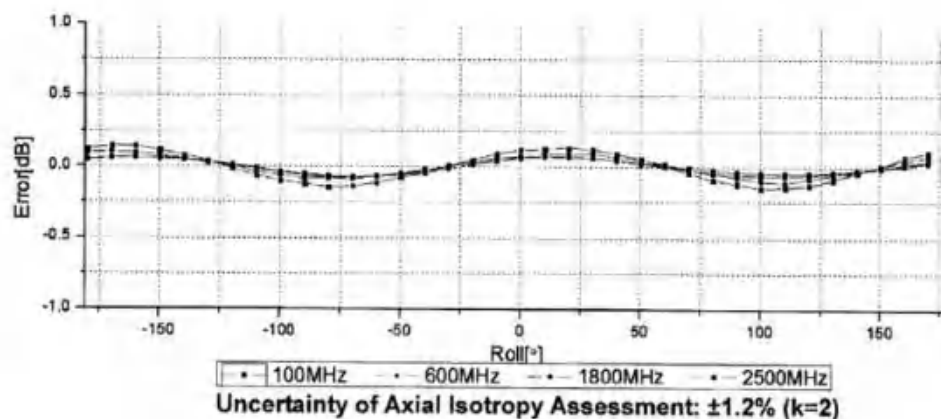
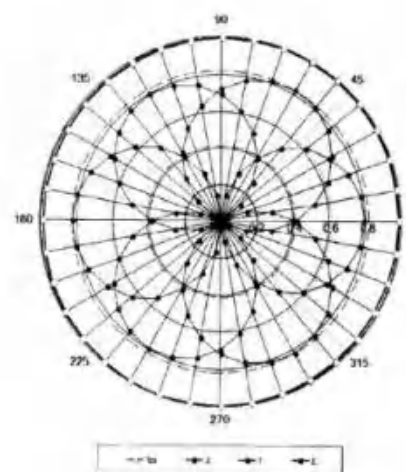
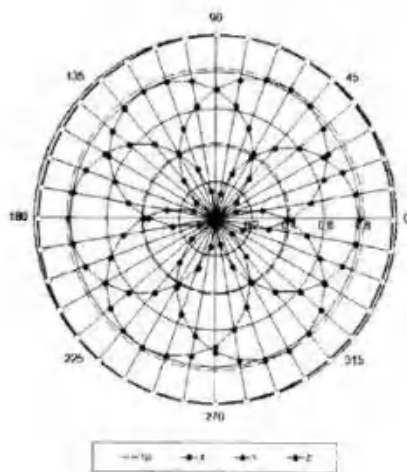


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Receiving Pattern (Φ), $\theta=0^\circ$

f=600 MHz, TEM

f=1800 MHz, R22

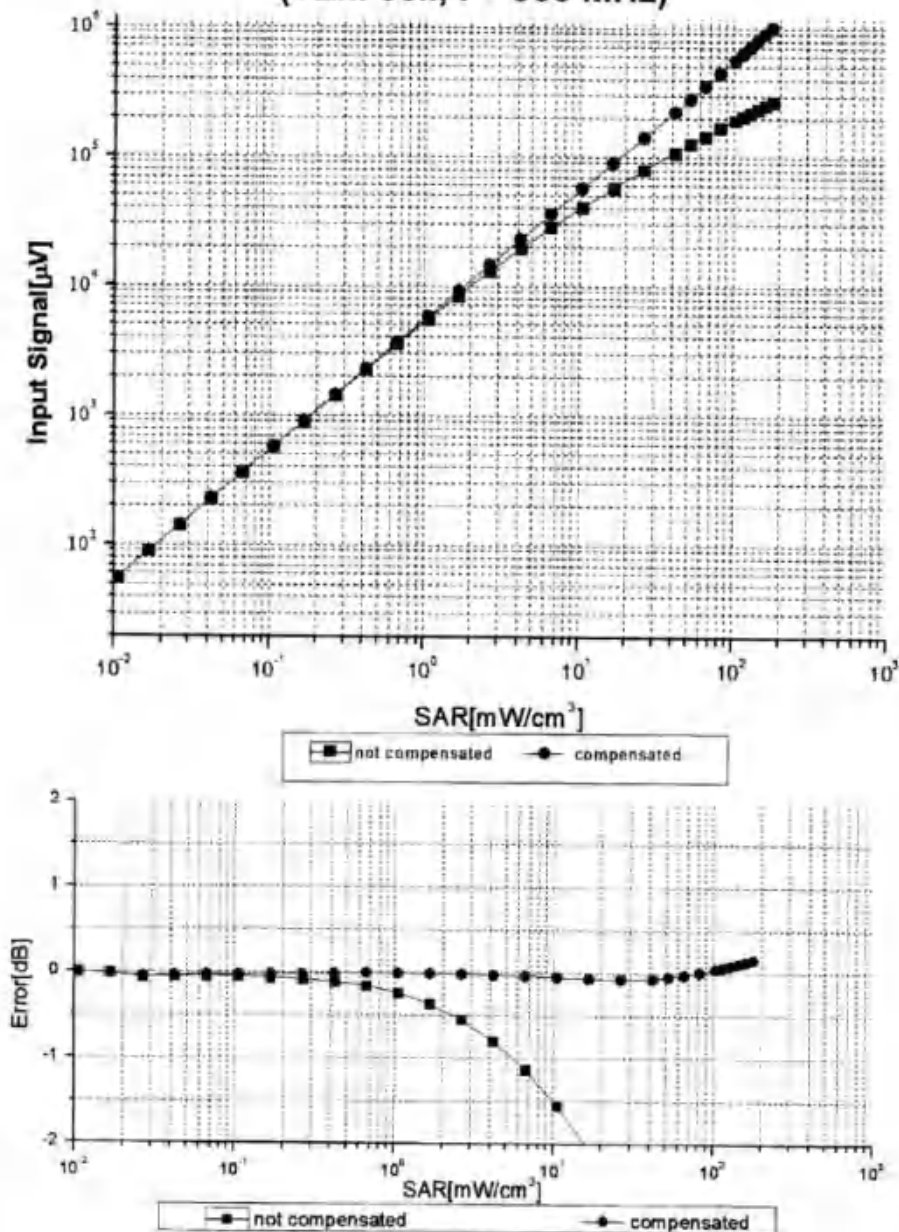




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Dynamic Range f(SAR_{head}) (TEM cell, f = 900 MHz)



Uncertainty of Linearity Assessment: $\pm 0.9\%$ ($k=2$)

Certificate No: Z24-98671

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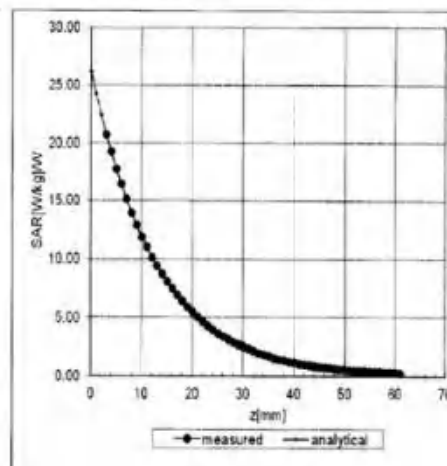
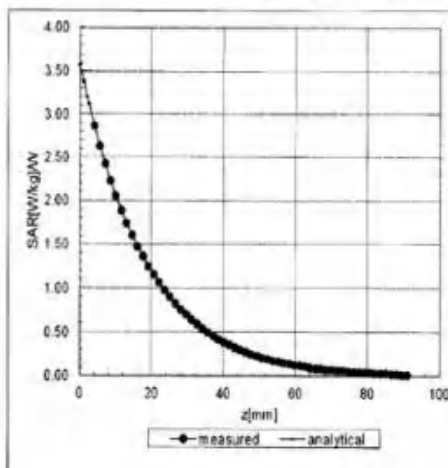


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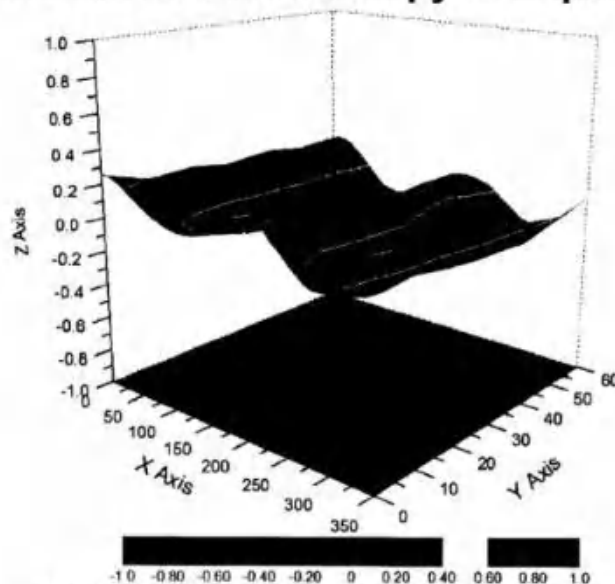
Conversion Factor Assessment

f=900 MHz, WGLS R9(H_convF)

f=1750 MHz, WGLS R22(H_convF)

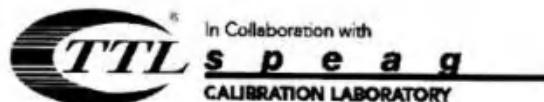


Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: $\pm 3.2\%$ (K=2)





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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7396**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	156.9
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm





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Client **Anbotek (Auden)**

Certificate No: **Z24-97076**

CALIBRATION CERTIFICATE

Object **D750V3 - SN: 1118**

Calibration Procedure(s) **FD-Z11-003-01**
Calibration Procedures for dipole validation kits

Calibration date: **June 04, 2024**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-23 (CTTL, No.J27X04256)	Jun-21
Power sensor NRP-Z91	101547	01-Jul-23 (CTTL, No.J27X04256)	Jun-21
Reference Probe EX3DV4	SN 7307	19-Feb-24(SPEAG,No.EX3-7307_Feb18)	Feb-22
DAE4	SN 771	02-Feb-24(CTTL-SPEAG,No.Z24-97011)	Feb-22
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-21 (CTTL, No.J18X00893)	Jan-22
Network Analyzer E5071C	MY46110673	26-Jan-21 (CTTL, No.J18X00894)	Jan-22

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: June 07, 2024

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Certificate No: Z24-97076

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Shenzhen Anbotek Compliance Laboratory Limited

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Tel:(86)0755-26066440 Email:service@anbotek.com



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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM _{x,y,z}
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procédure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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





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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.10.0.1442
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	42.1 $\pm$ 6 %	0.88 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	—	—

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.06 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	8.31 mW / g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.37 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	5.52 mW / g $\pm$ 18.7 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.7 $\pm$ 6 %	0.97 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	—	—

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.21 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	8.76 mW / g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.48 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	5.88 mW / g $\pm$ 18.7 % (k=2)

Certificate No: Z24-97076

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E-mail: cttl@chinattl.com http://www.chinattl.cn**Appendix (Additional assessments outside the scope of CNAS L0570)****Antenna Parameters with Head TSL**

Impedance, transformed to feed point	53.3Ω- 4.83jΩ
Return Loss	- 24.9dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.5Ω- 6.11jΩ
Return Loss	- 23.9dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.135 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

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DASY5 Validation Report for Head TSL

Date: 06.04.2024

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1118

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.882 \text{ S/m}$; $\epsilon_r = 42.14$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(10.05, 10.05, 10.05); Calibrated: 2/19/2024;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2024-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7372)

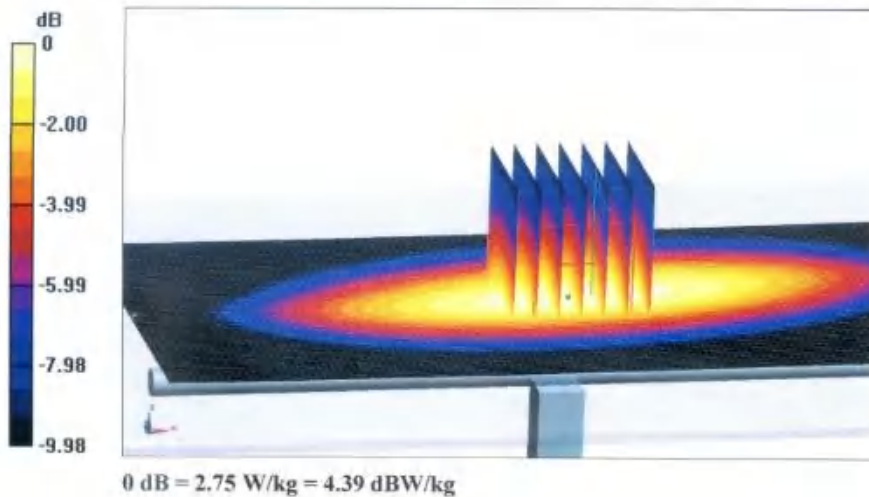
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 56.45 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 3.14 W/kg

SAR(1 g) = 2.06 W/kg; SAR(10 g) = 1.37 W/kg

Maximum value of SAR (measured) = 2.75 W/kg



Certificate No: Z24-97076

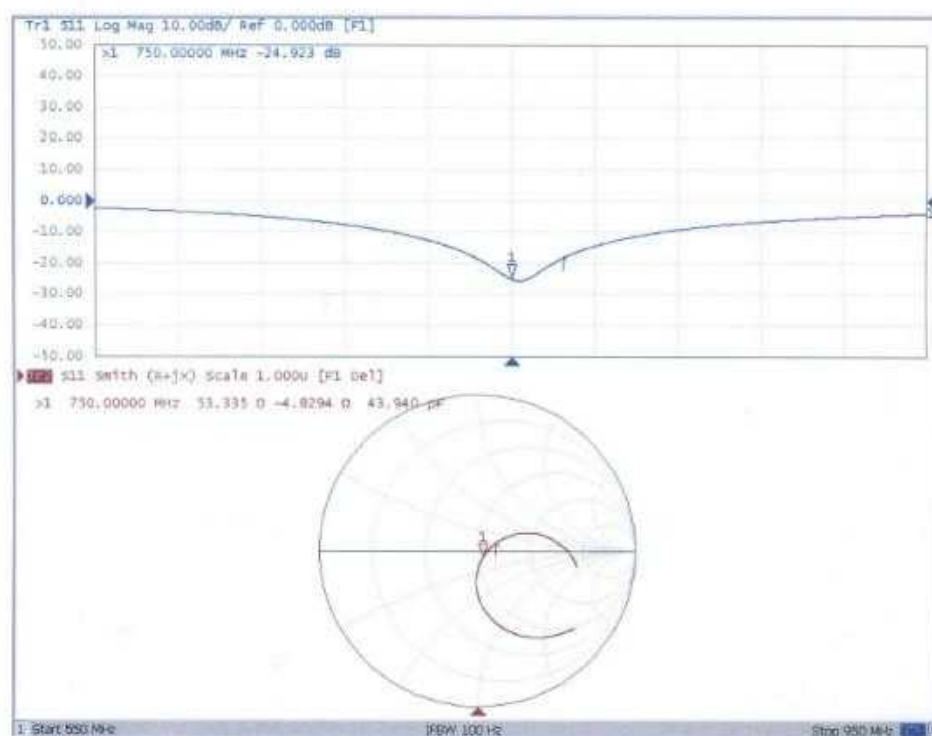
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Impedance Measurement Plot for Head TSL



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E-mail: cttl@chinattl.com http://www.chinattl.cn**DASY5 Validation Report for Body TSL**

Date: 06.04.2024

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1118

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.972 \text{ S/m}$; $\epsilon_r = 55.73$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(9.8, 9.8, 9.8); Calibrated: 2/19/2024;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2024-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7372)

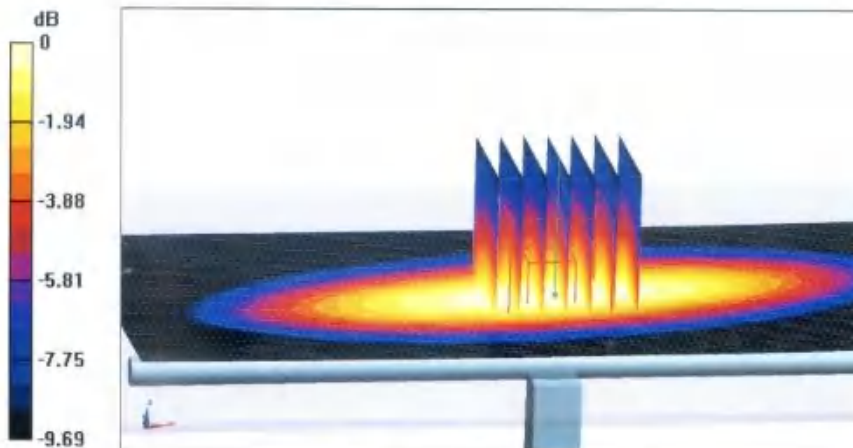
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.05 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.37 W/kg

SAR(1 g) = 2.21 W/kg; SAR(10 g) = 1.48 W/kg

Maximum value of SAR (measured) = 2.95 W/kg

**0 dB = 2.95 W/kg = 4.70 dBW/kg**

Certificate No: Z24-97076

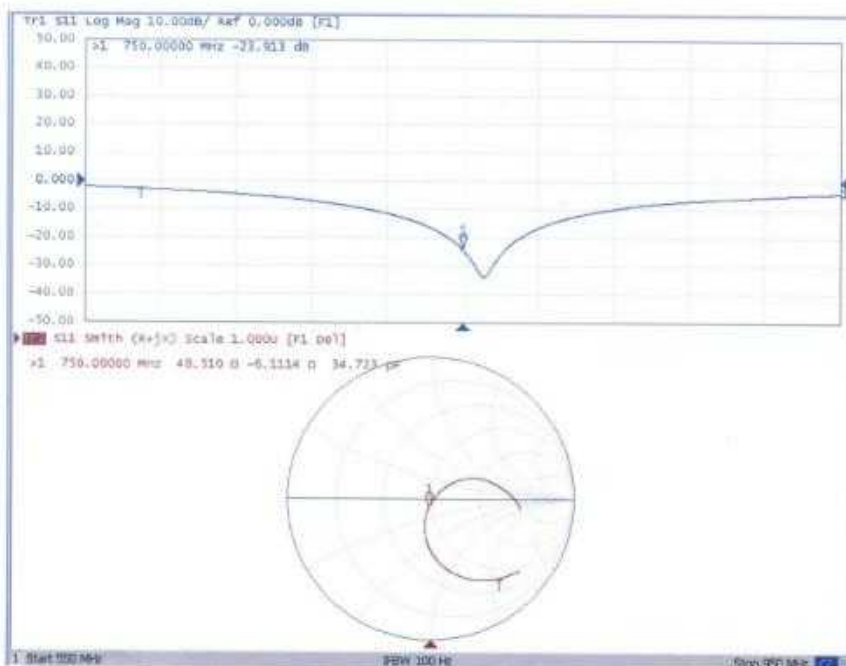
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Impedance Measurement Plot for Body TSL





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Client: **Anbotech (Auden)** Certificate No: **Z24-97089**

CALIBRATION CERTIFICATE

Object: **D835V2 - SN: 4d154**

Calibration Procedure(s): **FD-Z11-2-003-01**
Calibration Procedures for dipole validation kits

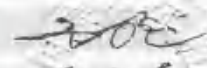
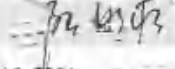
Calibration date: **Jun 11, 2024**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	1-Jul-23 (CTTL, No J23X04256)	Jun-24
Power sensor NRP-Z91	101547	1-Jul-23 (CTTL, No J23X04256)	Jun-24
Reference Probe EX3DV4	SN 7307	19-Feb-24(SPEAG No. EX3-7307_Feb24)	Feb-25
D4E4	SN 771	02-Feb-24(CTTL-SPEAG No.Z24-97011)	Feb-25
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-24 (CTTL, No.J24X00893)	Jan-25
Network Analyzer E5071C	MY46110673	26-Jan-24 (CTTL, No.J24X00894)	Jan-25

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: Jun 12, 2024

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Certificate No: Z24-97089

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM _{x,y,z}
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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





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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.0 $\pm$ 6 %	0.89 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	—	—

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.30 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.24 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.50 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.02 mW / g $\pm$ 20.4 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.4 $\pm$ 6 %	0.99 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	—	—

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.43 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.57 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.81 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.36 mW / g $\pm$ 20.4 % (k=2)

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E-mail: cttl@chinattl.com Http://www.chinattl.cn**Appendix****Antenna Parameters with Head TSL**

Impedance, transformed to feed point	49.2Ω- 3.11jΩ
Return Loss	- 29.8dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6Ω- 2.33jΩ
Return Loss	- 27.4dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.508 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

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DASY5 Validation Report for Head TSL

Date: 06.11.2024

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d154

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.891 \text{ S/m}$; $\epsilon_r = 40.97$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(10.01, 10.01, 10.01); Calibrated: 2/19/2021;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2021-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

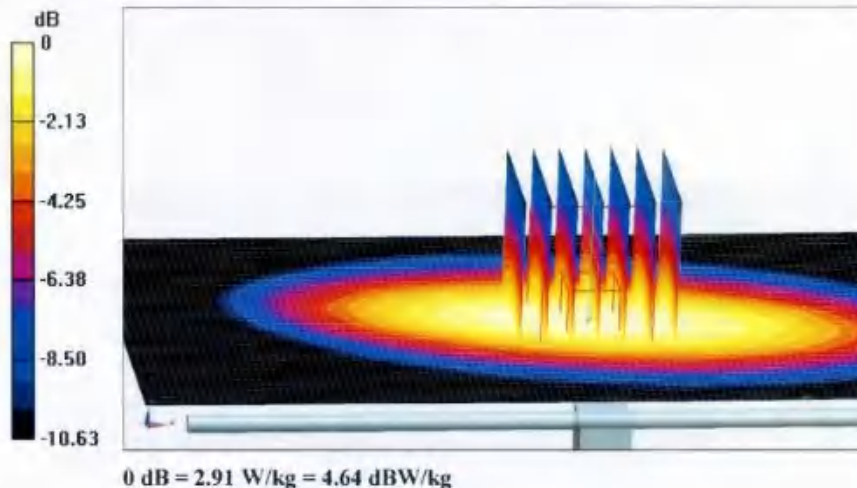
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 58.14V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.41 W/kg

SAR(1 g) = 2.3 W/kg; SAR(10 g) = 1.5 W/kg

Maximum value of SAR (measured) = 2.91 W/kg

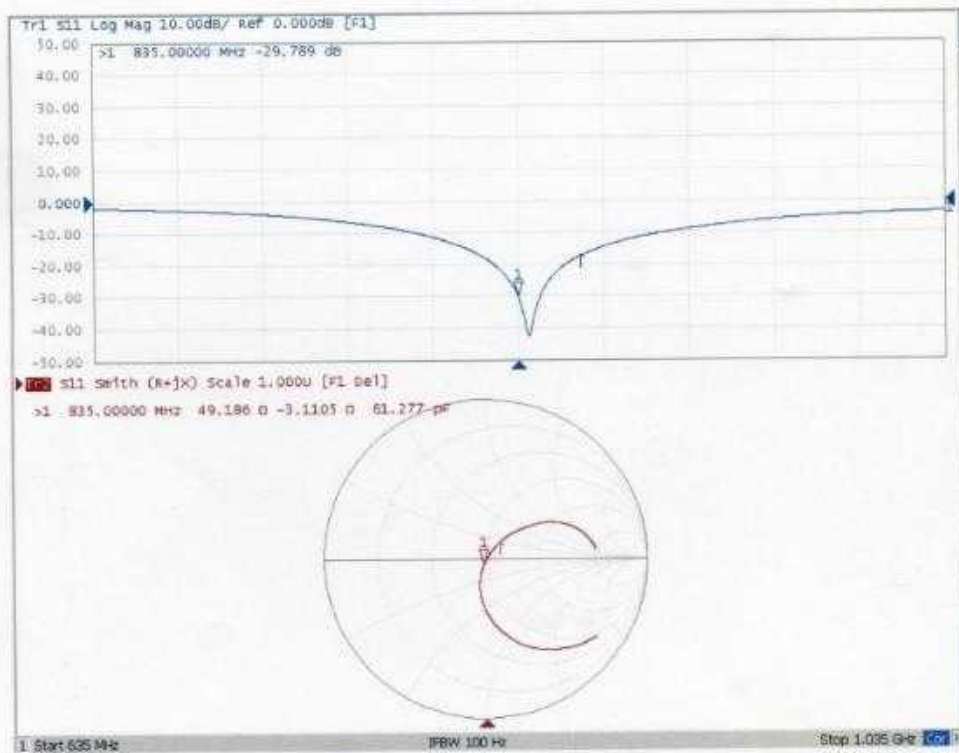


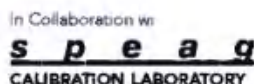


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Impedance Measurement Plot for Head TSL





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E-mail: ctrl@chinattl.com Http://www.chinattl.cn

DASY5 Validation Report for Body TSL

Date: 06.11.2024

Test Laboratory: CCTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d154

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.991 \text{ S/m}$; $\epsilon_r = 55.41$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(9.83,9.83, 9.83); Calibrated: 2/19/2021;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2021-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

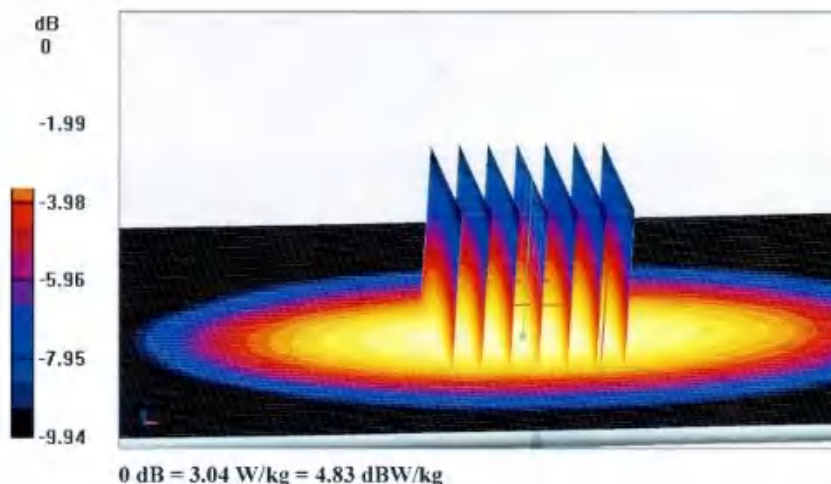
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.01 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.53 W/kg

SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.61 W/kg

Maximum value of SAR (measured) = 3.04 W/kg

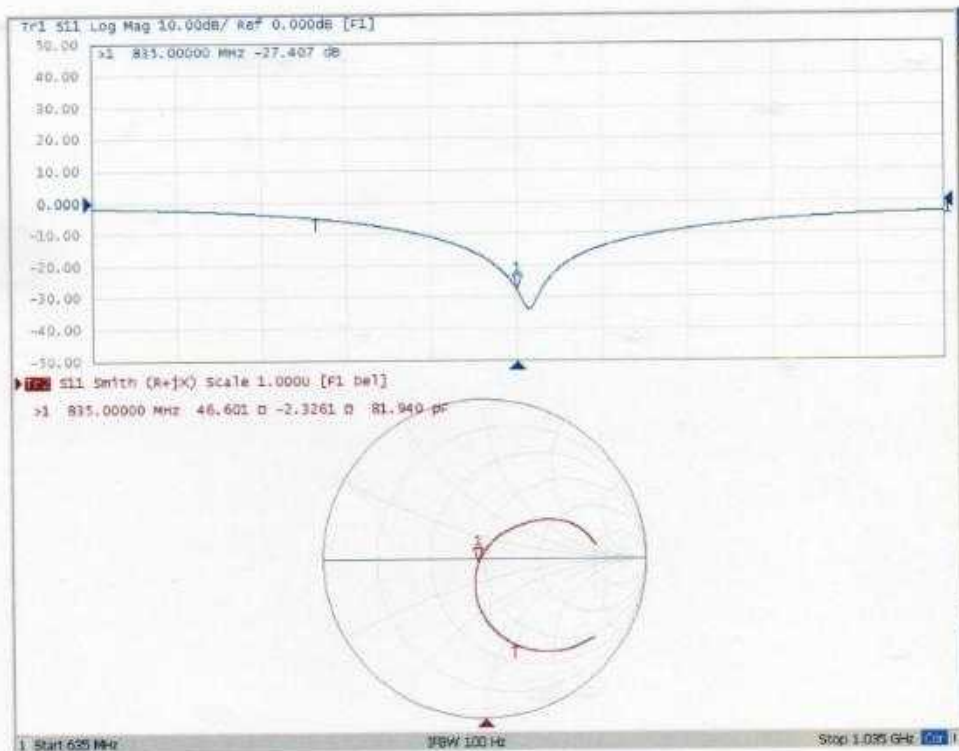




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Impedance Measurement Plot for Body TSL



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



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **Anbotech (Auden)**

Certificate No: **D2600V2-1058_Jun11**

CALIBRATION CERTIFICATE

Object **D2600V2 - SN: 1058**

Calibration procedure(s) **QA CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **June 12, 2024**

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

All calibrations have been conducted in the closed laboratory facility, environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-23 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-23 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-23 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-24 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-24 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-23 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-23 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-23 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-23 (in house check Oct-14)	In house check: Oct-15

Calibrated by:	Name Leif Klysner	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 12, 2024

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Certificate No: D2600V2-1058_Jun11

Page 1 of 8

Shenzhen Anbotech Compliance Laboratory Limited

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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



Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	37.6 $\pm$ 6 %	2.05 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	57.2 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.57 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	25.9 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	50.4 $\pm$ 6 %	2.22 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	14.5 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	56.8 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	25.5 W/kg $\pm$ 16.5 % (k=2)



Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.5 Ω - 6.3 j Ω
Return Loss	- 24.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.7 Ω - 5.2 j Ω
Return Loss	- 24.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.151 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 14, 2012



DASY5 Validation Report for Head TSL

Date: 12.06.2024

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1058

Communication System: UID 0 - CW; Frequency: 2600 MHz

Medium parameters used: $f = 2600$ MHz; $\sigma = 2.05$ S/m; $\epsilon_r = 37.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.49, 4.49, 4.49); Calibrated: 30.12.2023;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2023
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

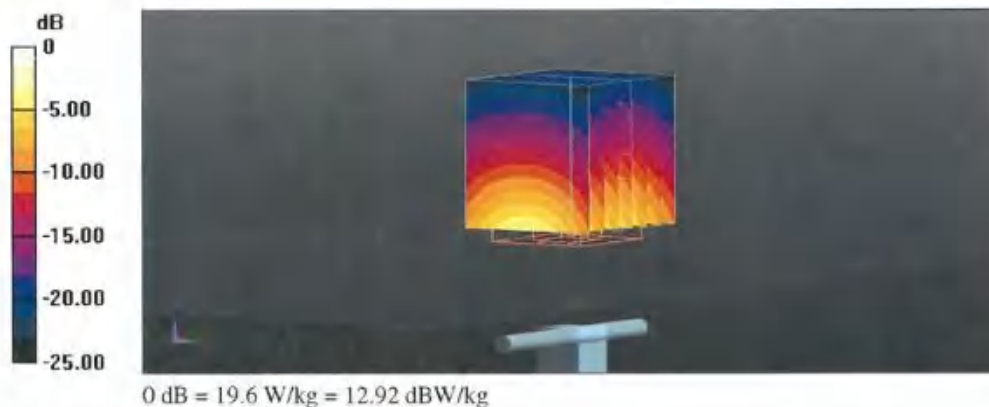
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 102.6 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 30.9 W/kg

SAR(1 g) = 14.7 W/kg; SAR(10 g) = 6.57 W/kg

Maximum value of SAR (measured) = 19.6 W/kg



DASY5 Validation Report for Head TSL

Date: 12.06.2024

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1058

Communication System: UID 0 - CW; Frequency: 2600 MHz

Medium parameters used: $f = 2600$ MHz; $\sigma = 2.05$ S/m; $\epsilon_r = 37.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.49, 4.49, 4.49); Calibrated: 30.12.2023;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2023
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

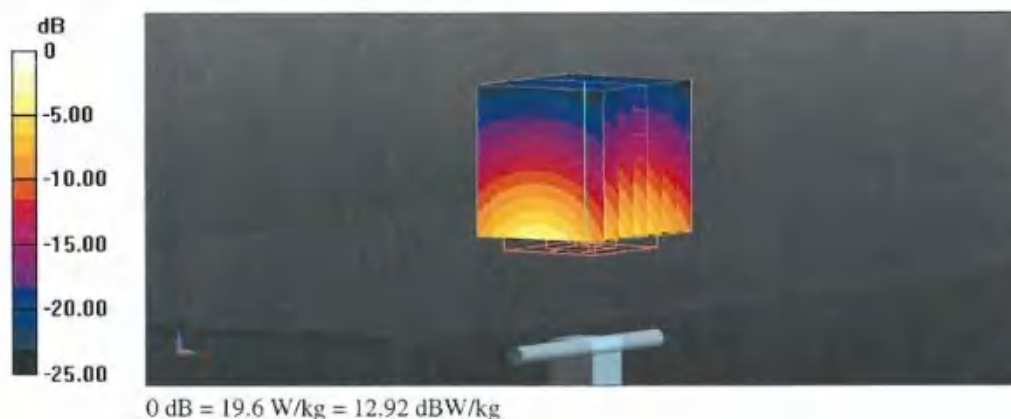
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 102.6 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 30.9 W/kg

SAR(1 g) = 14.7 W/kg; SAR(10 g) = 6.57 W/kg

Maximum value of SAR (measured) = 19.6 W/kg



DASY5 Validation Report for Body TSL

Date: 12.06.2024

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1058

Communication System: UID 0 - CW; Frequency: 2600 MHz

Medium parameters used: $f = 2600 \text{ MHz}$; $\sigma = 2.22 \text{ S/m}$; $\epsilon_r = 50.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.13, 4.13, 4.13); Calibrated: 30.12.2023;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2023;
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

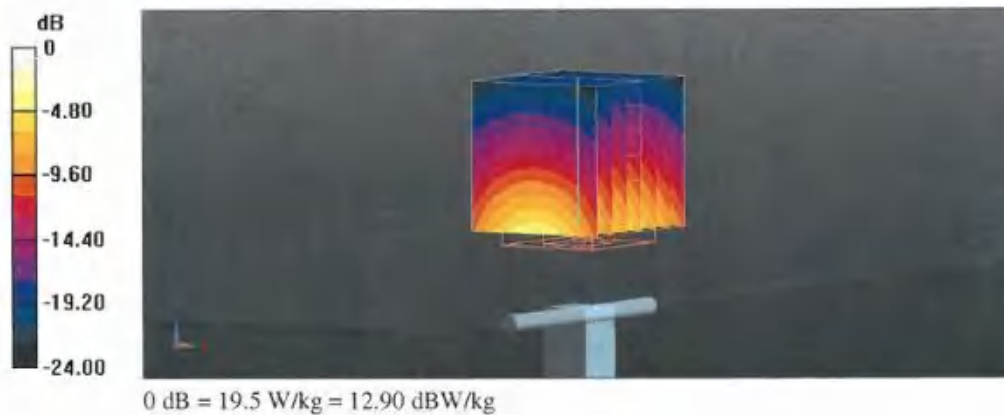
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.96 V/m; Power Drift = 0.00 dB

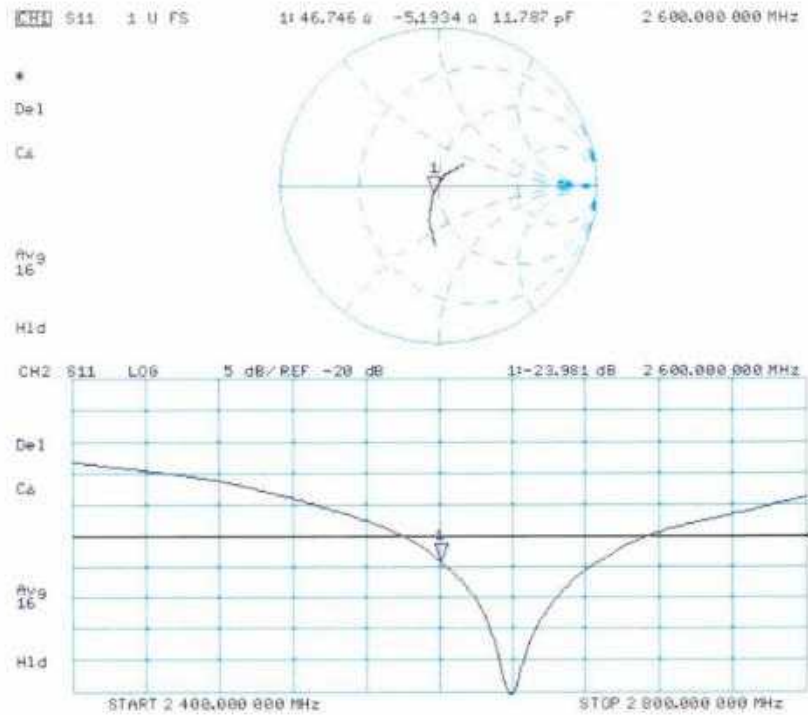
Peak SAR (extrapolated) = 30.1 W/kg

SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.45 W/kg

Maximum value of SAR (measured) = 19.5 W/kg



Impedance Measurement Plot for Body TSL





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CNAS L0570

Client: **Anbotech (Auden)** Certificate No: **Z24-97103**

CALIBRATION CERTIFICATE

Object: **D1750V2 - SN: 1021**

Calibration Procedure(s): **FD-Z11-2-003-01**
Calibration Procedures for dipole validation kits

Calibration date: **Jun 11, 2024**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	1-Jul-23(CTTL, No.J23X04256)	Jun-24
Power sensor NRP-Z91	101547	1-Jul-23(CTTL, No.J23X04256)	Jun-24
Reference Probe EX3DV4	SN 7307	19-Feb-24(SPEAG, No.EX3-7307_Feb24)	Feb-25
DAE4	SN 771	02-Feb-24(CTTL-SPEAG, No.Z24-97011)	Feb-25
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-24(CTTL, No.J24X00893)	Jan-25
Network Analyzer E5071C	MY46110673	26-Jan-24 (CTTL, No.J24X00894)	Jan-25

Calibrated by: **Zhao Jing** SAR Test Engineer

Reviewed by: **Qi Danyuan** SAR Project Leader

Approved by: **Lu Bingsong** Deputy Director of the laboratory

Signature

[Signatures]

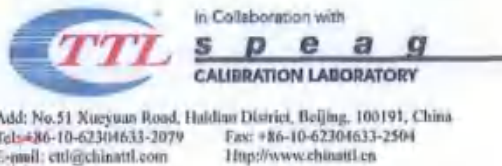
Issued: Jun 12, 2024

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Certificate No: Z24-97103

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**Glossary:**

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM _{x,y,z}
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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





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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.5 $\pm$ 6 %	1.36 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.17 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	36.9 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.94 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	19.8 mW / g $\pm$ 20.4 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.1 $\pm$ 6 %	1.51 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.25 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	36.7 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	4.94 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	19.7 mW / g $\pm$ 20.4 % (k=2)

Certificate No: Z24-97103

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.6Ω- 1.40jΩ
Return Loss	- 33.9dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.0Ω+ 0.61jΩ
Return Loss	- 27.5dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.318 ns
----------------------------------	----------

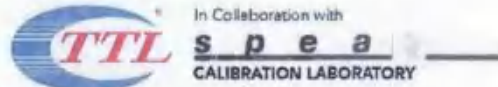
After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 06.11.2024

Test Laboratory: CCTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1021

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.362$ S/m; $\epsilon_r = 40.49$; $\rho = 1000$ kg/m³

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(8.37, 8.37, 8.37); Calibrated: 2/19/2021;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2021
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

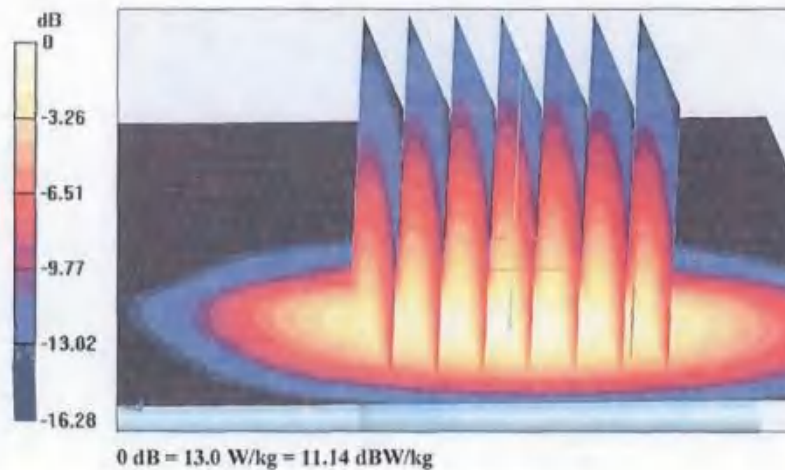
dx=5mm, dy=5mm, dz=5mm

Reference Value = 47.11 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 16.4 W/kg

SAR(1 g) = 9.17 W/kg; SAR(10 g) = 4.94 W/kg

Maximum value of SAR (measured) = 13.0 W/kg



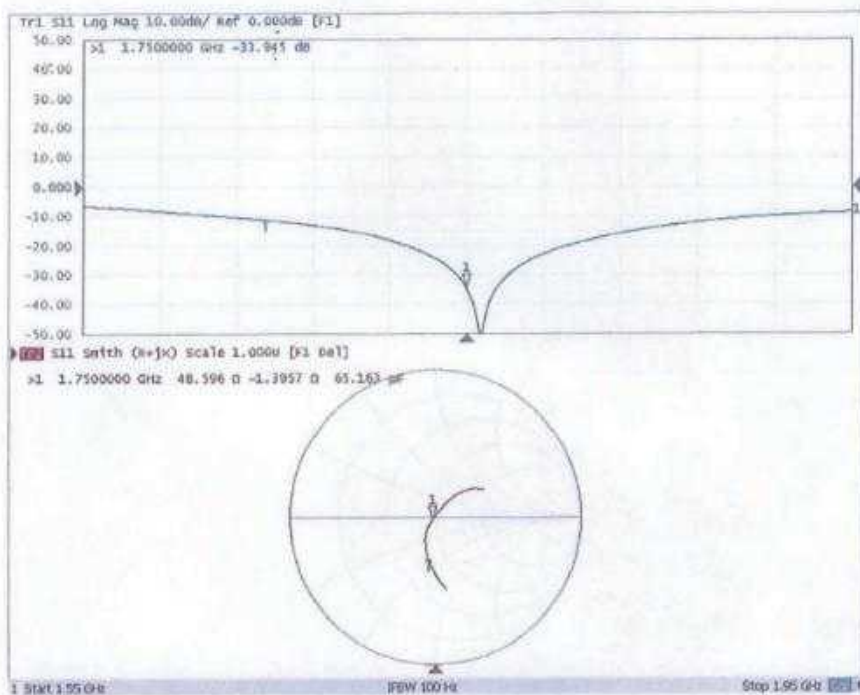


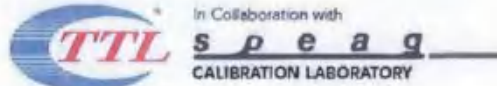
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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 06.11.2024

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1021

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.505$ S/m; $\epsilon_r = 53.06$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 -SN7307; ConvF(8.18, 8.18, 8.18); Calibrated: 2/19/2021;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2021
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

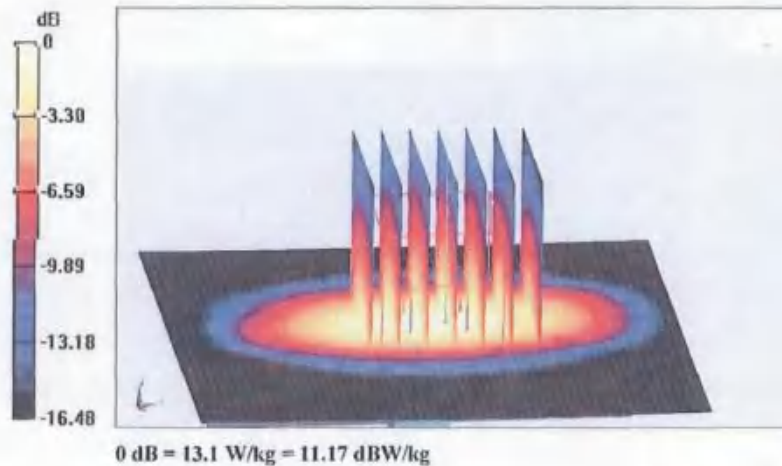
dx=5mm, dy=5mm, dz=5mm

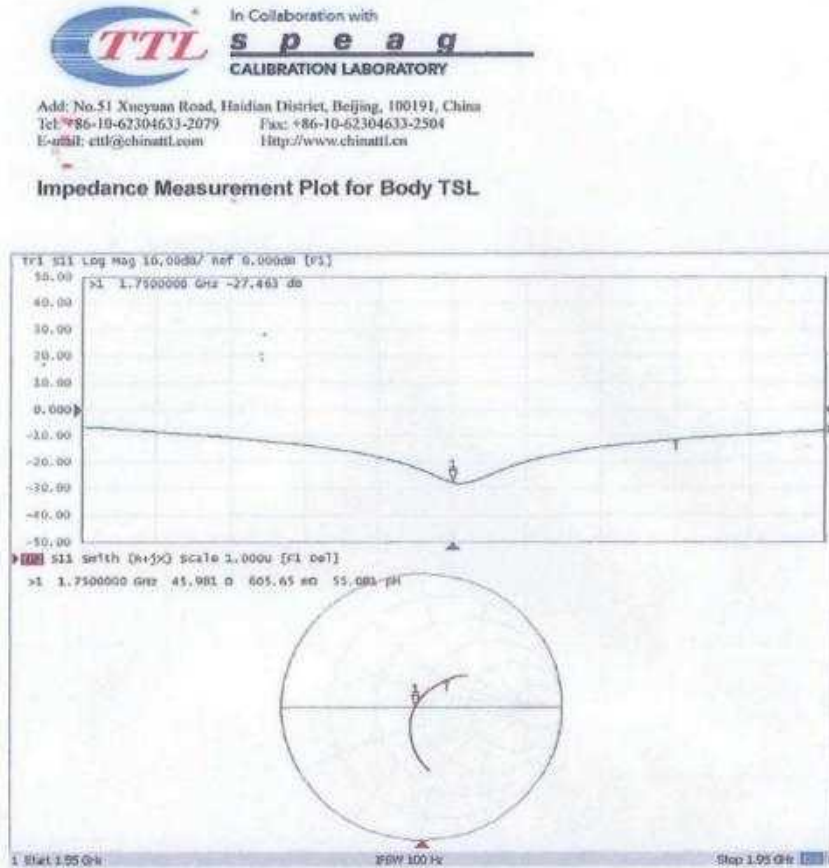
Reference Value = 94.11 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 16.4 W/kg

SAR(1 g) = 9.25 W/kg; SAR(10 g) = 4.94 W/kg

Maximum value of SAR (measured) = 13.1 W/kg





Certificate No: Z24-97103

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*****END OF REPORT*****

