

JianYan Testing Group Shenzhen Co., Ltd.

Report No.: JYTSZ-R14-2400171

FCC SAR REPORT

Report No.: JYTSZ-R14-2400171

Applicant: SWAGTEK

Address of Applicant: 10205 NW 19th Street, STE 101, Miami, FL33172, USA

Equipment Under Test (EUT)

Product Name: 2G Feature Phone

Model No.: B15, LAMP

Trade mark: LOGIC, UNONU, iSWAG

FCC ID: O552425124

Applicable standards: FCC 47 CFR Part 2.1093

Date of Test: 28 Dec., 2024

Test Result: Maximum Reported1-g SAR (W/kg)

> Head: 0.012 Body: 0.077

Project by: 21 Jan., 2025 Date:

Reviewed by: 21 Jan., 2025 Date:

Approved by:

21 Jan., 2025 Manager

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in above the application standard version. Test results reported herein relate only to the item(s) tested.

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2 Version

Version No.	Date	Description
00	21 Jan., 2025	Original



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4 SAR Results Summary

The maximum results of Specific Absorption Rate (SAR) found during test as below:

<Highest Reported standalone SAR Summary>

Exposure Position	Frequency Band	Reported 1-g SAR (W/kg)	Equipment Class	Highest Reported 1-g SAR (W/kg)
	GSM 850	0.012	PCE	
Head	PCS 1900	0.008	FGE	0.012
	Bluetooth	0.011	DSS	
D. J.	GSM 850	0.077	PCE	
Body (10 mm Gap)	PCS 1900	0.024	PGE	0.077
(10 mm Gap)	Bluetooth	0.004	DSS	

<Highest Reported simultaneous SAR Summary>

Exposure Position	Frequency Band	Reported 1-g SAR (W/kg)	Equipment Class	Highest Reported Simultaneous Transmission 1-g SAR (W/kg)
Back	GPRS 850 4Slots	0.077	PCE	0.079
Dack	Bluetooth	0.002	DSS	0.079

Note:

1. The highest simultaneous transmission is scalar summation of Reported standalone SAR per FCCKDB 690783 D01 v01r03, and scalar SAR summation of all possible simultaneous transmission scenarios are< 1.6W/kg.

This device is compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEC/IEEE 62209-1528.

JianYan Testing Group Shenzhen Co., Ltd. ReportTemplate No.: JYTSZ4b-284-C Project No.: JYTSZR2412107 No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.



5 General Information

5.1 Client Information

Applicant:	SWAGTEK	
Address of Applicant:	10205 NW 19th Street,STE 101, Miami, FL33172,USA	
Manufacturer:	SWAGTEK	
Address of Manufacturer:	10205 NW 19th Street,STE 101, Miami, FL33172,USA	
Factory:	SWAGTEK	
Address of Factory:	10205 NW 19th Street,STE 101, Miami, FL33172,USA	

5.2 General Description of EUT

Product Name:	2G Feature Ph	2G Feature Phone				
Model No.:	B15, LAMP					
Category of device	Portable devic	е				
Operation Frequency:	GSM:	GSM850: 824.2~84	8.8 MHz	PCS 1	900: 1850.2	2~1909.8 MHz
Operation requestoy.	Bluetooth: 240	2 MHz ~ 2480 MHz	<u>.</u>			
M. I. J. C t I I	GSM:	⊠Voice(GMSK)	⊠GPRS	(GMSK)	□EGPRS	(GMSK, 8PSK)
Modulation technology:	Bluetooth:	⊠BDR(GFSK)	⊠EDR(π	r/4-DQPS	SK, 8DPSK)	□LE(GFSK)
Antenna Type:	Internal Anten	Internal Antenna				
Antenna Gain:	GSM 850: 0.80 dBi; PCS 1900: 0.80 dBi Bluetooth: -4.10 dBi;					
GPRS Class:	GPRS Class: 12					
Dimensions (L*W*H):	126mm (L)× 6	126mm (L)× 63mm (W)× 12mm (H)				
Accessories information:	Adapter: Model: YD050AN-002-01 Input: AC100-240V, 50/60Hz, 0.3A Output: DC 5.0V, 500mA Battery: Rechargeable Li-ion Battery DC3.7V, 1400mAh Headset: Support headset		ıAh ,			
Remark:	(shipped without) B15, LAMP were identical inside, the electrical circuit design, layout, components used and internal wiring, with only difference being model name and trade mark.		esign, layout,			





5.3 Maximum RF Output Power

Mada	Average Power (dBm)		
Mode	GSM 850	PCS 1900	
GSM (Voice)	32.58	29.44	
GPRS (1TX Slot)	32.57	29.41	
GPRS (2TX Slots)	32.19	28.41	
GPRS (3TX Slots)	30.95	26.22	
GPRS (4TX Slots)	30.27	24.94	

Bluetooth Average Power (dBm)				
Mode/Band	1 Mbps(GFSK)	2 Mbps(π/4DQPSK)	3 Mbps (8DPSK)	
Bluetooth	4.10	3.32	3.85	



5.4 Environment of Test Site

Temperature:	18°C ~25°C
Humidity:	35%~75% RH
Atmospheric Pressure:	1010 mbar

5.5 Test Sample Plan

Sample Number	Used for Test Items
SZR012400661-9	SAR

Remark: Jian'Yan Testing Group Shenzhen Co., Ltd. is only responsible for the test project data of the above samples, and will keep the above samples for a month.

5.6 Laboratory Facility

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

FCC - Designation No.: CN1211

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

● ISED - CAB identifier.: CN0021

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

• CNAS - Registration No.: CNAS L15527

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

A2LA - Registration No.: 4346.01

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

5.7 Test Location

JianYan Testing Group Shenzhen Co., Ltd.

No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.

Tel: +86-755-23118282, Fax: +86-755-23116366

Email: info-JYTee@lets.com, Website: http://jyt.lets.com

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6 Introduction

6.1 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.

6.2 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:

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

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, δI is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

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.

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7 RF Exposure Limits

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

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

7.3 RF Exposure Limits

SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HO	MAN EXPOSURE LIMITS	
	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT Occupational (W/kg) or (mVV/g)
SPATIAL PEAK SAR Brain	1.6	80
SPATIAL AVERAGE SAR Whole Body	0,08	0.4
SPATIAL PEAK SAR Hands, Feet, Ankles, Wrists	4.0	20

Note:

- 1. The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube)and over the appropriate averaging time.
- 2. The Spatial Average value of the SAR averaged over the whole body.
- 3. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of acube) and over the appropriate averaging time.

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8 SAR Measurement System

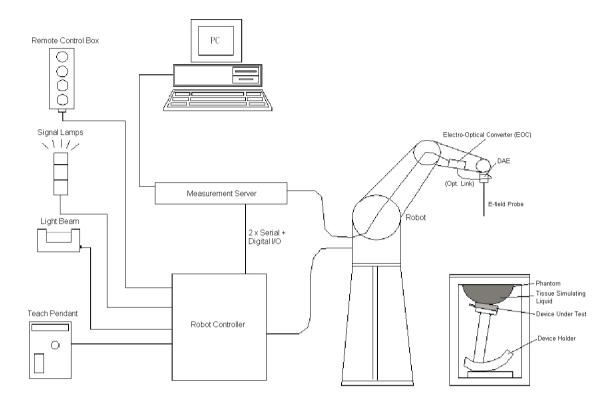


Fig.8.1 SPEAG DASY System Configurations

The DASY system 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
- > Remove control with teach pendant and additional circuitry for robot safety such as warming lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

Component details are described in the following sub-sections.



8.1 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)
Frequency Directivity	10MHz to 6 GHz; Linearity: ± 0.2 dB ± 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 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)
Dimensions	Overall length: 330 mm (Tip: 20mm) Tip diameter: 2.5 mm (Body: 12mm) Typical distance from probe tip to dipole centers: 1 mm



Fig.8.2 Photo of E-Field Probe

> E-Field Probe Calibration

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

8.2 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 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.



Fig. 8.3 Photo of DAE

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8.3 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX60XL) type from St?ubli SA (France). For the 6-axis controller system, the robot controller version (DASY5: CS8c) from St?ubliis used. The St?ublirobot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; nobelt drives)
- Jerk-free straight movements
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)



Fig. 8.4 Photo of Robot

8.4 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY 5: 400MHz, Intel Celeron), chip-disk (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.



Fig. 8.5 Photo of Server for DASY5

8.5 Light Beam Unit

The light beam switch allows automatic "tooling" of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip.

The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.



Fig. 8.6 Photo of Light Beam

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8.6 Phantom

<SAM Twin Phantom>

SAW I WIII FII AITOIII						
Shell Thickness	2 ± 0.2 mm;					
	Center ear point: 6 ± 0.2 mm					
Filling Volume	Approx. 25 liters					
Dimensions	Length: 1000mm; Width: 500mm;					
	Height: adjustable feet					
Measurement	Left Head, Right Head, Flat phantom					
Areas						
		l				



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>

The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30MHz to 6 GHz. ELI4 is fully compatible with the latest draft of the standard IEC 62209-2 and all known tissue simulating liquids.

ELI4 has been optimized regarding its performance and can be integrated into a SPEAG standard phantom table. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points The phantom can be used with the following tissue simulating liquids:

- Water-sugar based liquids can be left permanently in the phantom. Always cover the liquid if the system is not in use; otherwise the parameters will change due to water evaporation.
- DGBE based liquids should be used with care. As DGBE is a softener for most plastics, the liquid should be taken out of the phantom and the phantom should be dried when the system is not in use (desirable at least once a week).
- Do not use other organic solvents without previously testing the phantom resistiveness



Fig.8.8 Photo of ELI4 Phantom

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8.7 Device Holder

<Device Holder for SAM Twin Phantom>

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 \pm 0.5 mm would produce a SAR uncertainty of \pm 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-low POM material having the following dielectric parameters: relative permittivity $\varepsilon = 3$ and loss tangent $\delta = 0.02$. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.



Fig. 8.9 Photo of Device Holder

Telephone: +86 (0) 755 23118282 Fax: +86 (0) 755 23116366, E-mail: info-JYTee@lets.com

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8.8 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 verifications 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], [mW/g]). Some of these units are not available in certain situations or give meaningless results, e.g., a SAR-output in a non-lose 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) 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	Norm _i , a _{i0} , a _{i1} , a _{i2}
	- Conversion	ConvF _i
	- Diode compression point	dcp _i
Device Parameters:	- Frequency	f
	- Crest	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.

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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) dcpⁱ= diode compression point (DASY parameter)

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

E- Field Probes:
$$E_i = \sqrt{\frac{v_i}{Norm_i \cdot ConvF}}$$

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= senor sensitivity of channel i, (i = x, y, z), $\mu V/(V/m)^2$

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 Hi = magnetic field strength of channel i in A/m

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

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

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

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

With

SAR = local specific absorption rate in mW/g

E_{tot}= total field strength in V/m

 σ = conductivity in (mho/m) or (Siemens/m)

ρ= equipment 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.



8.9 Test Equipment List

M f t	Familian and Danasiation	Madal	Management	Cal. Information		
Manufacturer	Equipment Description	Model	Number	Last Cal.	Due Date	
SPEAG	835MHz System Validation Kit	D835V2	WXJ023-1	06.08.2022	06.07.2025	
SPEAG	1900MHz System Validation Kit	D1900V2	WXJ023-2	06.07.2022	06.06.2025	
SPEAG	Data Acquisition Electronics	DAE4	WXJ021-1	03.26.2024	03.25.2025	
SPEAG	Dosimetric E-Field Probe	EX3DV4	WXJ022	03.20.2024	03.19.2025	
SPEAG	DASY 52 Measurement Software	DASY 52	Version 52.10.4.1527	N.C.R	N.C.R	
SPEAG	DASY 52 File Conversion Software	SEMCAD X	Version 14.6.14 (7501)	N.C.R	N.C.R	
SPEAG	Robot Controller	CS8Cspeag- TX60	WXG021-1	N.C.R	N.C.R	
SPEAG	Phantom	Twin SAM Phantom	WXG021-4	N.C.R	N.C.R	
SPEAG	Phantom	ELI V5.0	WXG021-5	N.C.R	N.C.R	
SPEAG	Phone Positioner	N/A	WXG021-6	N.C.R	N.C.R	
St?ubli	Robot	TX60Lspeag	WXG021-3	N.C.R	N.C.R	
R&S	Universal Radio Communication Tester	CMU200	WXJ008-2	12.27.2023	12.26.2025	
KEYSIGHT	Network Analyzer	E5071C	WXJ091	12.16.2024	12.15.2025	
KEYSIGHT	EPM Series Power Meter	N1914A	WXJ075	06.11.2024	06.10.2025	
KEYSIGHT	E-Series Power Sensor	E9300H	WXJ075-1	06.11.2024	06.10.2025	
KEYSIGHT	E-Series Power Sensor	E9300H	WXJ075-2	06.11.2024	06.10.2025	
KEYSIGHT	Signal Generator	N5173B	WXJ006-3	09.09.2024	09.08.2025	
Huber Suhner	RF Cable	SUCOFLEX	WXG008-13	See N	Note 3	
Huber Suhner	RF Cable	SUCOFLEX	WXG008-14	See Note 3		
Huber Suhner	RF Cable	SUCOFLEX	WXG008-15	See Note 3		
Weinschel	Attenuator	23-3-34	WXG008-16	See Note 3		
Anritsu	Directional Coupler	MP654A	WXG008-17	See Note 3		
SPEAG	Dielectric Assessment Kit	3.5 Probe	WXG008-7	See Note 4		
SPEAG	DAK Measurement Software	DAK	Version: DAK 3.5	N.C	C.R	
TXC	Broadband Amplifier	BBA018000	WXG008-11	See N	Note 5	

Note:

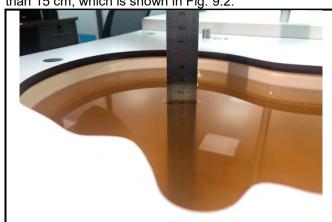
- 1. The calibration certificate of DASY can be referred to appendix C of this report.
- 2. Referring to KDB 865664 D01v01r04, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
- 3. The Insertion 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 Speag.
- 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 1 W input power according to the ratio of 1 W 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. Attenuator insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.
- 7. N.C.R means No Calibration Requirement.

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9 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. 9.1, for body SAR testing, the liquid height from the center of the flat phantom to liquid top surface is larger than 15 cm, which is shown in Fig. 9.2.



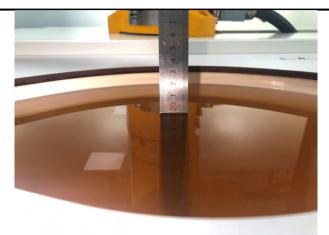


Fig. 9.3 Photo of Liquid Height for Head SAR (600MHz~6000MHz)(depth>15cm)

Fig. 9.4 Photo of Liquid Height for Body SAR (600MHz~6000MHz) (depth>15cm)

The relative permittivity and conductivity of the tissue material should be within ±5% of the values given in the table below recommended by the FCC OET 65 supplement C and RSS 102 Issue 5.

Target Frequency (MHz)	εr	σ(S/m)
150	52.3	0.76
300	45.3	0.87
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
915	41.5	0.98
1450	40.5	1.20
1610	40.3	1.29
1800-2000	40.0	1.40
2450	39.2	1.80
3000	38.5	2.40
5800	35.3	5.27

($\varepsilon r = relative permittivity, \sigma = conductivity and \rho = 1000 kg/m³)$



The dielectric parameters of liquids were verified prior to the SAR evaluation using a Speag Dielectric Probe Kit and an Agilent Network Analyzer.

The following table shows the measuring results for simulating liquid.

Frequency (MHz)	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (εr)	Conductivity Target(σ)	Permittivity Target(εr)	Delta (σ)%	Delta (εr)%	Limit (%)	Date (mm/dd/yy)
835	22.9	0.90	40.52	0.90	41.50	-0.56	-2.37	£5	12/28/2024
1900	22.9	1.37	39.48	1.40	40.00	-2.50	-1.31	£	12/28/2024
2450	22.9	1.76	38.68	1.80	39.20	-2.50	-1.34	£	12/28/2024



10 SAR System Verification

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:

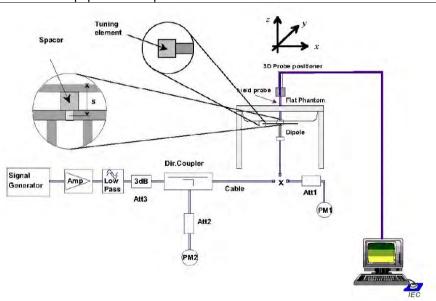


Fig.10.1 System Verification Setup Diagram



Fig.10.2 Photo of Dipole setup



> System Verification Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10%. The table as below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix C of this report.

Date (mm/dd/yy)	Frequency (MHz)	Power fed onto dipole (mW)	Measured 1g SAR (W/kg)	Normalized to 1W 1g SAR (W/kg)	1W Target 1g SAR (W/kg)	Deviation (%)
12/28/2024	835	80	0.781	9.76	9.6	1.67
12/28/2024	1900	40	1.630	40.75	39.9	2.13
12/28/2024	2450	40	2.180	54.50	53.4	2.06



11 EUT Testing Position

This EUT was tested in six different positions. They are right cheek/right tilted/left cheek/left tilted for head, Front/Back of the EUT with phantom 10 mm gap, as illustrated below, please refer to Appendix B for the test setup photos.

11.1 Handset Reference Points

- The vertical centreline passes through two points on the front side of the handset the midpoint of the width w_t of the handset at the level of the acoustic output, and the midpoint of the width w_b of the bottom of the handset.
- > The horizontal line is perpendicular to the vertical centreline and passes the center of the acoustic output. The horizontal line is also tangential to the handset at point A.
- The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centreline is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.



Fig.11.1 Illustration for Front, Back and Side of SAM Phantom

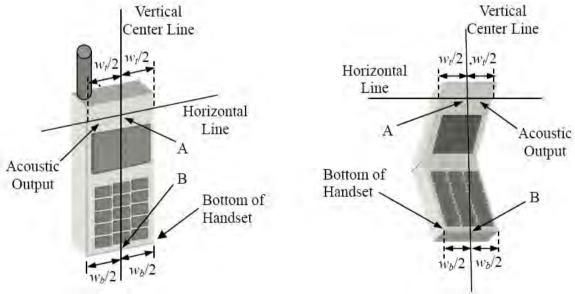


Fig. 11.2Illustration for Handset Vertical and Horizontal Reference Lines



11.2 Positioning for Cheek / Touch

- To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear and LE: Left Ear) and align the center of the ear piece with the line RE-LE.
- To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost (see below figure)

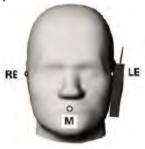






Fig. 11.3 Illustration for Cheek Position

11.3 Positioning for Ear / 150 Tilt

- To position the device in the "cheek" position described above.
- While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost (see figure below).





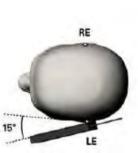


Fig.11.4 Illustration for Tilted Position

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11.4 SAR Evaluations near the Mouth/Jaw Regions of the SAM Phantom

Antennas located near the bottom of a phone may require SAR measurements around the mouth and jaw regions of the SAM head phantom. This typically applies to clam-shell style phones that are generally longer in the unfolded normal use positions or to certain older style long rectangular phones.

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document FCC KDB Publication 648474 D04v01r03. The SAR required in these regions of SAM should be measured using a flat phantom. The phone should be positioned with a separation distance of4 mm between the ear reference point (ERP) and the outer surface of the flat phantom shell. While maintaining this distance at the ERP location, the low (bottom) edge of the phone should be lowered from the phantom to establish the same separation distance between the peak SAR locations identified by the truncated partial SAR distribution measured with the SAM phantom. The distance from the peak SAR location to the phone is determined by the straight line passing perpendicularly through the phantom surface. When it is not feasible to maintain 4 mm separation at the ERP while also establishing the required separation at the peak SAR location, the top edge of the phone will be allowed to touch the phantom with a separation < 4 mm at the ERP. The phone should not be tilted to the left or right while placed in this inclined position to the flat phantom.

11.5 Body Worn Accessory Configurations

- > To position the device parallel to the phantom surface with either keypad up or down.
- To adjust the device parallel to the flat phantom.
- > To adjust the distance between the device surface and the flat phantom to 1.5 cm or holster surface and the flat phantom to 0 cm.

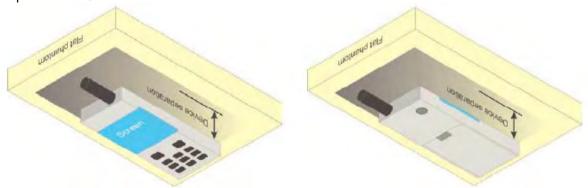


Fig.11.5 Illustration for Body Worn Position



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12 Measurement Procedures

The measurement procedures are as bellows:

<Conducted power measurement>

For WWAN power measurement, use base station simulator to configure EUT WWAN transition in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.

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- Read the WWAN RF power level from the base station simulator.
- For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band.
- Connect EUT RF port through RF cable to the power meter or spectrum analyzer, and measure WLAN/BT output power.

<Conducted power measurement>

- Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
- Place the EUT in positions as Appendix B demonstrates.
- > Set scan area, grid size and other setting on the DASY software.
- Measure SAR results for the highest power channel on each testing position.
- Find out the largest SAR result on these testing positions of each band.
- Measure SAR results for other channels in worst SAR testing position if the Reported SAR or highest power channel is larger than 0.8 W/kg.

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

- Power reference measurement
- Area scan
- Zoom scan
- Power drift measurement

12.1 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 10 g 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 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

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

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12.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurement 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.

12.3 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r04 guoted below.

			≤3 GHz	>3 GHz
Maximum distance fro (geometric center of pr			5 ± 1 mm	1± & lu(2) ± 0 5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30°±1°	20°±1°
			± 1 GHz: ≤ 15 mm 2 − 3 GHz ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
Maximum area scan sp	anal resol	шіон: Ах _{Ант} , Ау _{Анн}	When the x or y dimension of measurement plane orientation the measurement resolution of x or y dimension of the fest of measurement point on the ter-	on, is smaller than the above must be ⊆ the corresponding fevice with at least one
Maximum zoom scan spatial resolution: Δκ _{έτοσε} , Δγ _{έτοσε}			≤2 GHz: ≤8 mm 2-3 GHz: ≤5 mm	3 = 4 GHz: ≤5 mm 4 = 6 GHz: ≤ 4 mm
	vniform grid: Δz _{Decri} (u)		≤5mm	3 – 4 GHz. ≤ 4 mm 4 – 5 GHz. ≤ 3 mm 5 – 6 GHz. ≤ 2 mm
Maximum zoom scau spanial resolution normal to phantom surface	graded	$\Delta z_{local}(1)$: between 1" two points closes; to phantom surface	≤4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
	grid \[\Delta z_{\lambda \text{sem}}(n-1) \] between subsequent points		$\leq 1.5 \Delta x_{i,max}(n-1)$	
Minimum zoom scan volume	zoom scan x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: _ 22 mm

Note: 5 is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE. P1528-2011 for details.

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When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.



12.4 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 post-processor scan combine and subsequently superpose these measurement data to calculating the multiband SAR.

12.5 SAR Averaged Methods

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

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

12.6 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 drifts more than 5%, the SAR will be retested.



Conducted RF Output Power

13.1 GSM Conducted Power

Band: GSM 850	Burst Average Power (dBm)			Frame	-Average Powe	er(dBm)
Channel	128	190	251	128	190	251
Frequency (MHz)	824.2	836.6	848.8	824.2	836.6	848.8
GSM (GMSK, Voice)	32.58	32.18	31.23	23.55	23.15	22.20
GPRS (GMSK, 1 TX slot)	32.57	32.08	31.26	23.54	23.05	22.23
GPRS (GMSK, 2 TX slots)	32.19	31.79	31.02	26.17	25.77	25.00
GPRS (GMSK, 3 TX slots)	30.95	30.78	30.31	26.69	26.52	26.05
GPRS (GMSK, 4 TX slots)	30.27	30.18	29.82	27.26	27.17	26.81

Remark:

The frame-averaged power is linearly reported the maximum burst averaged power over 8 time slots. The calculated method are shown as below:

The duty cycle "x" of different time slots as below:

1 TX slot is 1/8, 2 TX slots is 2/8, 3 TX slots is 3/8 and 4 TX slots is 4/8

Based on the calculation formula:

Frame-averaged power = Burst averaged power + 10 1og (x)

Frame-averaged power (1 TX slot) = Burst averaged power (1 TX slot) – 9.03

Frame-averaged power (2 TX slots) = Burst averaged power (2 TX slots) – 6.02 Frame-averaged power (3 TX slots) = Burst averaged power (3 TX slots) – 4.26

Frame-averaged power (4 TX slots) = Burst averaged power (4 TX slots) – 3.01

CS1 coding scheme was used in GPRS conducted power measurements and SAR testing. MCS5 coding scheme was used in EGPRS conducted power measurements and SAR testing (if necessary).

Note:

- For Head SAR testing, GSM Voice mode should be evaluated, therefore the EUT was set in GSM 850 Voice mode.
- For Body worn SAR testing, GPRS and EGPRS mode should be evaluated, therefore the EUT was set in GPRS 4 TX slots mode due to the highest frame-averaged power.
- For GPRS multi time slots SAR measurement, when the measured maximum output power levels are within 0.25 dB of 3. each other, test the configuration with the most number of time slots.
- Per KDB447498 D04v01, the maximum output power channel is used for SAR testing and for further SAR test 4. reduction.
- 5. The EUT do not support DTM.

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Band: PCS 1900	Burst Average Power (dBm)			Bm) Frame-Average Power(dBm)		
Channel	512	661	810	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8	1850.2	1880.0	1909.8
GSM (GMSK, Voice)	29.27	29.44	28.67	20.24	20.41	19.64
GPRS (GMSK, 1 TX slot)	29.26	29.41	28.59	20.23	20.38	19.56
GPRS (GMSK, 2 TX slots)	28.19	28.41	27.75	22.17	22.39	21.73
GPRS (GMSK, 3 TX slots)	25.96	26.22	25.71	21.70	21.96	21.45
GPRS (GMSK, 4 TX slots)	24.70	24.94	24.45	21.69	21.93	21.44

Remark:

The frame-averaged power is linearly reported the maximum burst averaged power over 8 time slots. The calculated method are shown as below:

The duty cycle "x" of different time slots as below:

1 TX slot is 1/8, 2 TX slots is 2/8, 3 TX slots is 3/8 and 4 TX slots is 4/8

Based on the calculation formula:

Frame-averaged power = Burst averaged power + 10 1og (x)

Frame-averaged power (1 TX slot) = Burst averaged power (1 TX slot) - 9.03

Frame-averaged power (2 TX slots) = Burst averaged power (2 TX slots) - 6.02

Frame-averaged power (3 TX slots) = Burst averaged power (3 TX slots) – 4.26 Frame-averaged power (4 TX slots) = Burst averaged power (4 TX slots) – 3.01

CS1 coding scheme was used in GPRS conducted power measurements and SAR testing, MCS5 coding scheme was used in EGPRS conducted power measurements and SAR testing (if necessary). Frame-averaged power (4 TX slots) = Burst averaged power (4 TX slots) - 3.01

Note:

- 1 For Head SAR testing, GSM Voice mode should be evaluated, therefore the EUT was set in PCS 1900 Voice mode.
- For Body worn SAR testing, GPRS and EGPRS mode should be evaluated, therefore the EUT was set in GPRS 2 TX slots mode due to the highest frame-averaged power.
- 3. Per KDB447498 D04v01, the maximum output power channel is used for SAR testing and for further SAR test
- 4. The EUT do not support DTM.



13.2 Bluetooth Conducted Power

Average Power (dBm)(Bluetooth)							
Channel Frequency (MHz) GFSK π/4-DQPSK 8DPSK							
CH 00	2402	4.10	3.32	3.85			
CH 39	2441	4.01	3.25	3.69			
CH 78	2480	3.73	2.94	3.37			

Note:

- 1. SAR test of Bluetooth is performed and the mode with highest average power is selected for SAR testing.
- 2. Per KDB 447498 D04v01 section 2.1.2: 1-mW Test Exemption, SAR test for BLE is not required.
- 3. The output power of all data rate were pre-scan, just the worst case of all mode were shown in report.
- 4. Per KDB 248227 D01V02r02 section 2.2, when the EUT in continuously transmitting mode, the actual duty cycle is 100%, so the duty cycle factor is 1.



14 SAR Test Results Summary

14.1 Standalone Head SAR Data

GSM Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)
1	GSM850/Voice	Right Cheek	128	824.2	32.58	0.20	33.0	0.011	1.102	0.012
	GSM850/Voice	Right Tilted	128	824.2	32.58	-0.10	33.0	0.003	1.102	0.003
	GSM850/Voice	Left Cheek	128	824.2	32.58	-0.02	33.0	0.005	1.102	0.006
	GSM850/Voice	Left Tilted	128	824.2	32.58	-0.16	33.0	0.002	1.102	0.002
2	PCS1900/Voice	Right Cheek	661	1880	29.44	0.01	29.5	0.008	1.014	0.008
	PCS1900/Voice	Right Tilted	661	1880	29.44	-0.17	29.5	0.002	1.014	0.002
	PCS1900/Voice	Left Cheek	661	1880	29.44	0.04	29.5	0.007	1.014	0.007
	PCS1900/Voice	Left Tilted	661	1880	29.44	-0.12	29.5	0.001	1.014	0.001
Uı	ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						1.6 W/kg Averaged	ı (mW/g) d over 1g		

Bluetooth Head SAR

	> Blactocii i i cad o/ i c										
Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR _{1g} (W/kg)	Scaling Factor	D.C	Reported SAR _{1g} (W/kg)
	BT/GFSK	Right Cheek	0	2402	4.10	0.00	4.5	0.008	1.096	1.000	0.008
	BT/GFSK	Right Tilted	0	2402	4.10	-0.16	4.5	0.003	1.096	1.000	0.003
3	BT/GFSK	Left Cheek	0	2402	4.10	0.00	4.5	0.010	1.096	1.000	0.011
	BT/GFSK	Left Tilted	0	2402	4.10	-0.08	4.5	0.004	1.096	1.000	0.004
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1g						

Note:

- Per KDB 447498 D04v01, for each exposure position, if the highest output power channel Reported SAR ≤ 0.8W/kg, other channels SAR testing is not necessary.
- 2. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥ 0.8W/kg.
- 3. According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
- 4. *: Due the antenna location and antenna performance results the SAR value lower than the lowest system limit, then we show "<0.001* W/Kg" in the report.

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14.2 Standalone Body SAR

➢ GSM Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)
	GPRS850/4 slots	Front	128	824.2	30.27	0.19	30.5	0.046	1.054	0.048
4	GPRS850/4 slots	Back	128	824.2	30.27	-0.09	30.5	0.073	1.054	0.077
	GPRS1900/2 slots	Front	661	1880	28.41	-0.02	28.5	0.011	1.021	0.011
5	GPRS1900/2 slots	Back	661	1880	28.41	-0.13	28.5	0.023	1.021	0.024
ANSI / IEEE C95.1 – SAFETY LIMIT							1.6 W/kc	ı (mW/a)		

ANSI / IEEE C95.1 – SAFETY LIMIT
Spatial Peak
Uncontrolled Exposure/General Population

1.6 W/kg (mW/g) Averaged over 1g

Bluetooth Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR _{1g} (W/kg)	Scaling Factor	D.C	Reported SAR _{1g} (W/kg)
6	BT/GFSK	Front	0	2402	4.10	0.00	4.5	0.003	1.096	1.000	0.004
	BT/GFSK	Back	0	2402	4.10	0.09	4.5	0.002	1.096	1.000	0.002
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1g						

Note:

- 1. Body-worn SAR testing was performed at 10mm separation, and this distance is determined by the handset manufacturer that there will be body-worn accessories that users may acquire at the time of equipment certification, to enable users to purchase aftermarket body-worn accessories with the required minimum separation.
- 2. Per KDB 648474 D04v01r03, when the Reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 1.2 W/kg, SAR testing with a headset connected to the handset is not required.
- 3. Per KDB 447498 D04v01, for each exposure position, if the highest output channel Reported SAR ≤0.8W/kg, other channels SAR testing is not necessary.
- 4. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥0.8W/kg.
- 5. According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
- 6. *: Due the antenna location and antenna performance results the SAR value lower than the lowest system limit, then we show "<0.001* W/Kg" in the report.
- 7. Highlight part of test data means repeated test.

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14.3 Multi-Band Simultaneous Transmission Considerations

> Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D04v01, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the EUT are shown in below Figure and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.



Fig.15.1 Simultaneous Transmission Paths

Multi-Band simultaneous Transmission Consideration

Simultaneous	Position	Applicable Combination
Transmission	Head	WWAN + Bluetooth
Consideration	Body	WWAN + Bluetooth

Note:

- 1. The Report SAR summation is calculated based on the same configuration and test position.
- 2. Per KDB 447498 D04v01, simultaneous transmission SAR is compliant if,
 - i. Scalar SAR summation < 1.6 W/kg.
 - ii. SPLSR = $(SAR_1 + SAR_2)^{1.5} / (min. separation distance, mm)$, and the peak separation distance is determined from the square root of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$, where (x_1, y_1, z_1) and (x_2, y_2, z_2) are the coordinates of the extrapolated peak SAR locations in the zoom scan If SPLSR ≤ 0.04 , simultaneously transmission SAR measurement is not necessary
 - iii. Simultaneously transmission SAR measurement, and the Reported multi-band SAR < 1.6 W/kg

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14.4 SAR Simultaneous Transmission Analysis

> Simultaneous Transmission

) : it :	Stand SAR(? SAR _{1g} (W/kg)	
P	osition	1	2	1+2
		WWAN	BT	1+2
	Right Cheek	0.012	0.008	0.020
Head	Right Tilted	0.003	0.003	0.006
пеаи	Left Cheek	0.007	0.011	0.018
	Left Tilted	0.002	0.004	0.006
Body-	Front	0.048	0.004	0.052
worn	Back	0.077	0.002	0.079

Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D04v01.



14.5 Measurement Uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEC/IEEE 62209-1528 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.



14.6 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested. Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.



15 Reference

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- [4]. OpenSAR V5 Software User Manual
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Appendix A: Plots of SAR System Check



Test Laboratory: JYTSZ Date: 12/28/2024

DUT: Dipole 835 MHz; Type: D835V2; Serial: SN:4D154

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

Medium parameters used (interpolated): f = 835 MHz; $\sigma = 0.895$ S/m; $\varepsilon_r = 40.517$; $\rho = 1000$

 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 SN3924; ConvF(9.85, 9.85, 9.85) @ 835 MHz; Calibrated: 03.20.2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 03.26.2024
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

System Performance Check at Frequency835 MHz Head Tissue/d=15mm, Pin=80 mW, dist=1.4mm (EX-Probe)/Area Scan (41x141x1): Interpolated grid:

dx=1.500 mm, dv=1.500 mm

Maximum value of SAR (interpolated) = 1.05 W/kg

System Performance Check at Frequency835 MHz Head Tissue/d=15mm, Pin=80 mW, dist=1.4mm (EX-Probe)/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 35.76 V/m; Power Drift = -0.11 dB

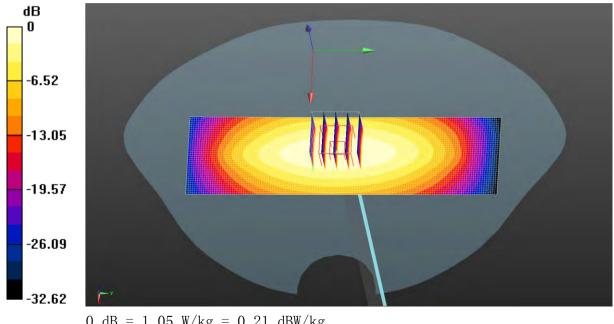
Peak SAR (extrapolated) = 1.22 W/kg

SAR(1 g) = 0.781 W/kg; SAR(10 g) = 0.495 W/kg

Smallest distance from peaks to all points 3 dB below = 17.2 mm

Ratio of SAR at M2 to SAR at M1 = 61.3%

Maximum value of SAR (measured) = 1.05 W/kg



0 dB = 1.05 W/kg = 0.21 dBW/kg

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Test Laboratory: JYTSZ Date: 12/28/2024

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

Communication System: UID 0, CW (0); Frequency: 1900 MHz; Duty Cycle: 1:1 Medium parameters used: f = 1900 MHz; $\sigma = 1.365$ S/m; $\varepsilon_r = 39.475$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 SN3924; ConvF(8.12, 8.12, 8.12) @ 1900 MHz; Calibrated: 03.20.2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 03.26.2024
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

System Performance Check at Frequency1900 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Area Scan (41x71x1): Interpolated grid:

dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.73 W/kg

System Performance Check at Frequency1900 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 43.35 V/m; Power Drift = 0.02 dB

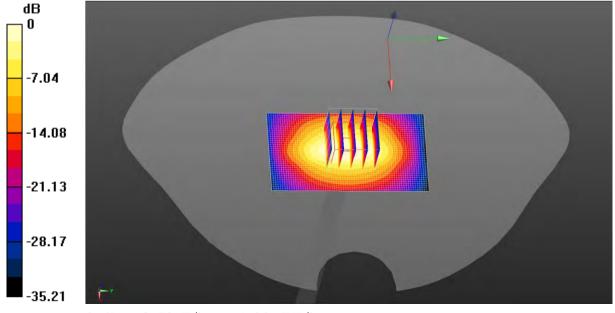
Peak SAR (extrapolated) = 3.17 W/kg

SAR(1 g) = 1.63 W/kg; SAR(10 g) = 0.833 W/kg

Smallest distance from peaks to all points 3 dB below = 9.6 mm

Ratio of SAR at M2 to SAR at M1 = 51.6%

Maximum value of SAR (measured) = 2.59 W/kg



0 dB = 2.73 W/kg = 4.36 dBW/kg

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Test Laboratory: JYTSZ Date: 12/28/2024

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

Communication System: UID 0, CW (0); Frequency: 2450 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2450 MHz; $\sigma = 1.755$ S/m; $\epsilon_r = 38.675$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 SN3924; ConvF(7.59, 7.59, 7.59) @ 2450 MHz; Calibrated: 03.20.2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 03.26.2024
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

System Performance Check at Frequency2450 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Area Scan (51x81x1): Interpolated grid:

dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 3.62 W/kg

System Performance Check at Frequency2450 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement

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

Reference Value = 45.58 V/m; Power Drift = -0.13 dB

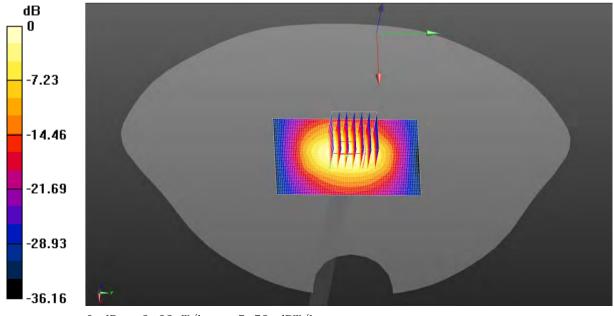
Peak SAR (extrapolated) = 4.42 W/kg

SAR(1 g) = 2.18 W/kg; SAR(10 g) = 0.982 W/kg

Smallest distance from peaks to all points 3 dB below = 9 mm

Ratio of SAR at M2 to SAR at M1 = 48.5%

Maximum value of SAR (measured) = 3.41 W/kg



0 dB = 3.62 W/kg = 5.59 dBW/kg

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Appendix B: Plots of SAR Test Data



Test Laboratory: JYTSZ Date: 12/28/2024

DUT: 2G Feature Phone; Type: LAMP; Serial: SZR012400661-9

Communication System: UID 0, GSM (0); Frequency: 824.2 MHz; Duty Cycle: 1:8.30042 Medium parameters used (interpolated): f = 824.2 MHz; $\sigma = 0.891$ S/m; $\epsilon_r = 40.556$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 SN3924; ConvF(9.85, 9.85, 9.85) @ 824.2 MHz; Calibrated: 3/20/2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 3/26/2024
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

GSM 850 Right Cheek/Low Channel/Area Scan (61x71x1): Interpolated grid:

dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.0280 W/kg

GSM 850 Right Cheek/Low Channel/Zoom Scan (5x5x7)/Cube 0: Measurement

grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.591 V/m; Power Drift = 0.20 dB

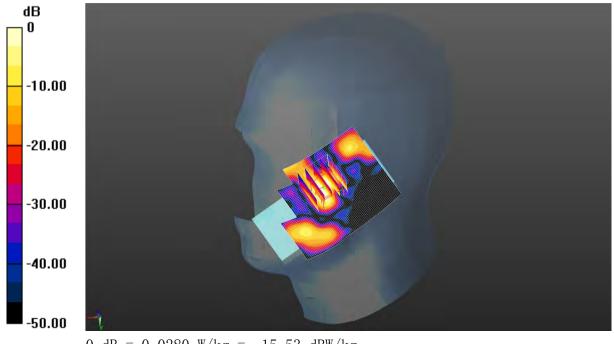
Peak SAR (extrapolated) = 0.0170 W/kg

SAR(1 g) = 0.011 W/kg; SAR(10 g) = 0.00843 W/kg

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid (> 16 mm)

Ratio of SAR at M2 to SAR at M1 = 70%

Maximum value of SAR (measured) = 0.0145 W/kg



0 dB = 0.0280 W/kg = -15.53 dBW/kg

Project No.: JYTSZR2412107

JianYan Testing Group Shenzhen Co., Ltd. ReportTemplate No.: JYTSZ4b-284-C Project No. No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street,

Bao'an District, Shenzhen, Guangdong, People's Republic of China.



Test Laboratory: JYTSZ Date: 12/28/2024

DUT: 2G Feature Phone; Type: LAMP; Serial: SZR012400661-9

Communication System: UID 0, GSM (0); Frequency: 1880 MHz; Duty Cycle: 1:8.30042 Medium parameters used: f = 1880 MHz; $\sigma = 1.366$ S/m; $\epsilon_r = 39.475$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 SN3924; ConvF(8.12, 8.12, 8.12) @ 1880 MHz; Calibrated: 3/20/2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 3/26/2024
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

GSM 1900 Right Cheek/Middle Channel/Area Scan (61x71x1): Interpolated grid:

dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.0247 W/kg

GSM 1900 Right Cheek/Middle Channel/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 0.8440 V/m; Power Drift = 0.01 dB

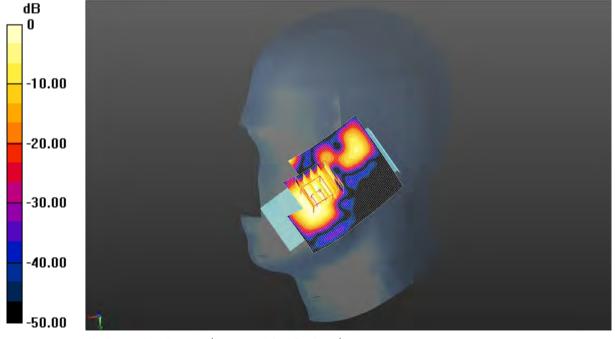
Peak SAR (extrapolated) = 0.0170 W/kg

SAR(1 g) = 0.00753 W/kg; SAR(10 g) = 0.00423 W/kg

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid (> 16 mm)

Ratio of SAR at M2 to SAR at M1 = 53.9%

Maximum value of SAR (measured) = 0.0106 W/kg



0 dB = 0.0247 W/kg = -16.08 dBW/kg



Test Laboratory: JYTSZ Date: 12/28/2024

DUT: 2G Feature Phone; Type: LAMP; Serial: SZR012400661-9

Communication System: UID 0, Bluetooth (0); Frequency: 2402 MHz; Duty Cycle: 1:1 Medium parameters used (interpolated): f = 2402 MHz; $\sigma = 1.713$ S/m; $\varepsilon_r = 38.761$; $\rho = 1000$ kg/m^3

Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 SN3924; ConvF(7.59, 7.59, 7.59) @ 2402 MHz; Calibrated: 3/20/2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 3/26/2024
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Bluetooth Left Cheek/Low Channel/Area Scan (71x71x1): Interpolated grid:

dx=1.200 mm, dv=1.200 mm

Maximum value of SAR (interpolated) = 0.0293 W/kg

Bluetooth Left Cheek/Low Channel/Zoom Scan (7x7x7)/Cube 0: Measurement

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

Reference Value = 0 V/m; Power Drift = 0.00 dB

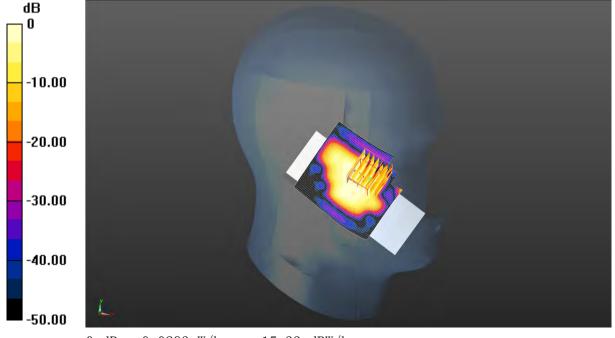
Peak SAR (extrapolated) = 0.0230 W/kg

SAR(1 g) = 0.010 W/kg; SAR(10 g) = 0.0039 W/kg

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid (> 15 mm)

Ratio of SAR at M2 to SAR at M1 = 53.7%

Maximum value of SAR (measured) = 0.0162 W/kg



0 dB = 0.0293 W/kg = -15.33 dBW/kg

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Bao'an District, Shenzhen, Guangdong, People's Republic of China.



Test Laboratory: JYTSZ Date: 12/28/2024

DUT: 2G Feature Phone; Type: LAMP; Serial: SZR012400661-9

Communication System: UID 0, GPRS(4 Slots) (0); Frequency: 824.2 MHz; Duty Cycle: 1:1.99986

Medium parameters used (interpolated): f = 824.2 MHz; $\sigma = 0.891$ S/m; $\epsilon_r = 40.556$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 SN3924; ConvF(9.85, 9.85, 9.85) @ 824.2 MHz; Calibrated: 3/20/2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 3/26/2024
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

GPRS 850 4Slots Body Back/Low Channel/Area Scan (61x71x1): Interpolated grid:

dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.0957 W/kg

GPRS 850 4Slots Body Back/Low Channel/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.31 V/m; Power Drift = -0.09 dB

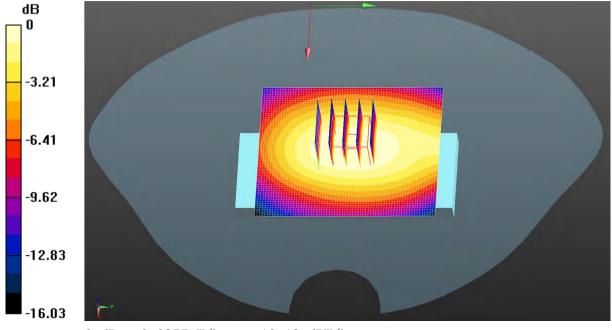
Peak SAR (extrapolated) = 0.104 W/kg

SAR(1 g) = 0.073 W/kg; SAR(10 g) = 0.053 W/kg

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid (> 16 mm)

Ratio of SAR at M2 to SAR at M1 = 71.3%

Maximum value of SAR (measured) = 0.0915 W/kg



0 dB = 0.0957 W/kg = -10.19 dBW/kg

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Test Laboratory: JYTSZ Date: 12/28/2024

DUT: 2G Feature Phone; Type: LAMP; Serial: SZR012400661-9

Communication System: UID 0, GPRS(2 Slots) (0); Frequency: 1880 MHz; Duty Cycle:

1:4.10015

Medium parameters used: f = 1880 MHz; $\sigma = 1.366 \text{ S/m}$; $\epsilon_r = 39.475$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3924; ConvF(8.12, 8.12, 8.12) @ 1880 MHz; Calibrated: 3/20/2024

• Sensor-Surface: 1.4mm (Mechanical Surface Detection)

• Electronics: DAE4 Sn1452; Calibrated: 3/26/2024

• Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765

• Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

GPRS 1900 2Slots Body Back/Middle Channel/Area Scan (61x61x1): Interpolated

grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.0376 W/kg

GPRS 1900 2Slots Body Back/Middle Channel/Zoom Scan (5x5x7)/Cube 0:

Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.023 V/m; Power Drift = -0.13 dB

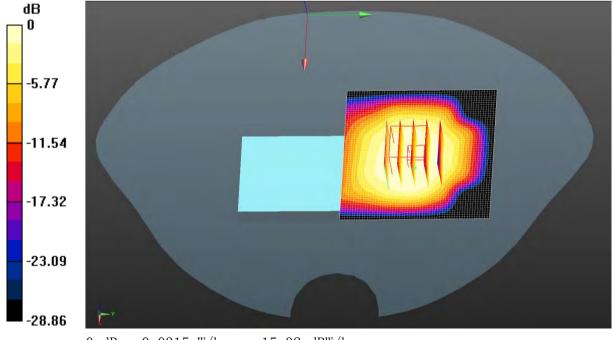
Peak SAR (extrapolated) = 0.0390 W/kg

SAR(1 g) = 0.022 W/kg; SAR(10 g) = 0.014 W/kg

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid (> 16 mm)

Ratio of SAR at M2 to SAR at M1 = 57.5%

Maximum value of SAR (measured) = 0.0315 W/kg



0 dB = 0.0315 W/kg = -15.02 dBW/kg

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Bao'an District, Shenzhen, Guangdong, People's Republic of China.



Test Laboratory: JYTSZ Date: 12/28/2024

DUT: 2G Feature Phone; Type: LAMP; Serial: SZR012400661-9

Communication System: UID 0, Bluetooth (0); Frequency: 2402 MHz; Duty Cycle: 1:1 Medium parameters used (interpolated): f = 2402 MHz; $\sigma = 1.713$ S/m; $\epsilon_r = 38.761$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 SN3924; ConvF(7.59, 7.59, 7.59) @ 2402 MHz; Calibrated: 3/20/2024
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 3/26/2024
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Bluetooth Body Front/Low Channel/Area Scan (71x61x1): Interpolated grid:

dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.0134 W/kg

Bluetooth Body Front/Low Channel/Zoom Scan (7x7x7)/Cube 0: Measurement

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

Reference Value = 0 V/m; Power Drift = 0.00 dB

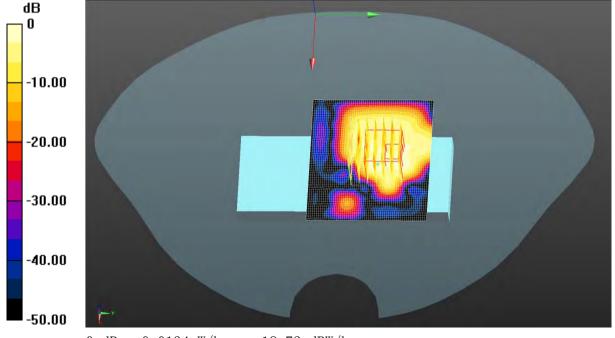
Peak SAR (extrapolated) = 0.00921 W/kg

SAR(1 g) = 0.00323 W/kg; SAR(10 g) = 0.00132 W/kg

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid (> 15 mm)

Ratio of SAR at M2 to SAR at M1 = 38%

Maximum value of SAR (measured) = 0.00591 W/kg



0 dB = 0.0134 W/kg = -18.72 dBW/kg

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Bao'an District, Shenzhen, Guangdong, People's Republic of China.





Appendix C: System Calibration Certificate





Calibration information for E-field probes



中国认可 国际互认 校准 CAICT ORAS LOS70

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2117

E-mail: emf@caict.ac.cn http://www.caict.ac.cn

Client JYT Certificate No: 24J02Z000049

CALIBRATION CERTIFICATE

Object EX3DV4 - SN: 3924

Calibration Procedure(s) FF-Z11-004-02

Calibration Procedures for Dosimetric E-field Probes

Calibration date: March 20, 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# C	al Date(Calibrated by, Certificate No.) Scheduled	d Calibration
Power Meter NRP2	101919	12-Jun-23(CTTL, No.J23X05435)	Jun-24
Power sensor NRP-Z91	101547	12-Jun-23(CTTL, No.J23X05435)	Jun-24
Power sensor NRP-Z91	101548	12-Jun-23(CTTL, No.J23X05435)	Jun-24
Reference 10dBAttenuator	18N50W-10dB	19-Jan-23(CTTL, No.J23X00212)	Jan-25
Reference 20dBAttenuator	18N50W-20dB	19-Jan-23(CTTL, No.J23X00211)	Jan-25
Reference Probe EX3DV4	SN 3846	31-May-23(SPEAG, No.EX-3846_May23)	May-24
DAE4	SN 1555	24-Aug-23(SPEAG, No.DAE4-1555_Aug23)	Aug-24
Secondary Standards	ID#	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGenerator MG3700A	6201052605	12-Jun-23(CTTL, No.J23X05434)	Jun-24
Network Analyzer E5071C	MY46110673	25-Dec-23(CTTL, No.J23X13425)	Dec-24
Reference 10dBAttenuator	BT0520	11-May-23(CTTL, No.J23X04061)	May-25
Reference 20dBAttenuator	BT0267	11-May-23(CTTL, No.J23X04062)	May-25
OCP DAK-12	SN 1174	25-Oct-23(SPEAG, No.OCP-DAK12-1174_Oc	t23) Oct-24

Name Function Signature
Calibrated by: Yu Zongying SAR Test Engineer

Reviewed by: Lin Jun SAR Test Engineer

Approved by: Qi Dianyuan SAR Project Leader

Issued: March 24, 2024

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: 24J02Z000049 Page 1 of 9







Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

Glossary:

TSL tissue simulating liquid
NORMx,y,z sensitivity in free space
ConvF sensitivity in TSL / NORMx,y,z
DCP diode compression point

CF crest factor (1/duty_cycle) of the RF signal modulation dependent linearization parameters

Polarization Φ Φ rotation around probe axis

Polarization θ θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i

 θ =0 is normal to probe axis

Connector Angle information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) 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

b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016

c) 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

d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

NORMx,y,z: Assessed for E-field polarization θ=0 (f≤900MHz in TEM-cell; f>1800MHz: waveguide).
 NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E²-field uncertainty inside TSL (see below ConvF).

NORM(f)x,y,z = NORMx,y,z* frequency_response (see Frequency Response Chart). This
linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the
frequency response is included in the stated uncertainty of ConvF.

 DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.

PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.

Ax,y,z; Bx,y,z; Cx,y,z;VRx,y,z:A,B,C are numerical linearization parameters assessed based on the
data of power sweep for specific modulation signal. The parameters do not depend on frequency nor
media. VR is the maximum calibration range expressed in RMS voltage across the diode.

ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f≤800MHz) and inside waveguide using analytical field distributions based on power measurements for f >800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from±50MHz to±100MHz.

 Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.

 Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

 Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

Certificate No:24J02Z000049

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:3924

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
$Norm(\mu V/(V/m)^2)^A$	0.51	0.41	0.67	±10.0%
DCP(mV) ^B	102.1	100.9	99.9	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dBõV	С	D dB	VR mV	Unc ^E (k=2)
0	0 CW	Х	0.0	0.0	1.0	0.00	181.5	±2.0%
		Y	0.0	0.0	1.0		158.7	
		Z	0.0	0.0	1.0		212.0	

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 4).

B Numerical linearization parameter: uncertainty not required.

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







DASY/EASY - Parameters of Probe: EX3DV4 - SN:3924

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. (<i>k</i> =2)
750	41.9	0.89	10.23	10.23	10.23	0.15	1.21	±12.7%
835	41.5	0.90	9.85	9.85	9.85	0.12	1.51	±12.7%
900	41.5	0.97	9.75	9.75	9.75	0.15	1.33	±12.7%
1750	40.1	1.37	8.52	8.52	8.52	0.24	1.07	±12.7%
1900	40.0	1.40	8.12	8.12	8.12	0.23	1.10	±12.7%
2100	39.8	1.49	8.02	8.02	8.02	0.26	1.03	±12.7%
2300	39.5	1.67	7.87	7.87	7.87	0.52	0.71	±12.7%
2450	39.2	1.80	7.59	7.59	7.59	0.55	0.72	±12.7%
2600	39.0	1.96	7.41	7.41	7.41	0.65	0.67	±12.7%
3300	38.2	2.71	7.16	7.16	7.16	0.54	0.81	±13.9%
3500	37.9	2.91	6.96	6.96	6.96	0.43	1.01	±13.9%
3700	37.7	3.12	6.70	6.70	6.70	0.45	1.06	±13.9%
3900	37.5	3.32	6.45	6.45	6.45	0.40	1.47	±13.9%
4100	37.2	3.53	6.50	6.50	6.50	0.40	1.15	±13.9%
4400	36.9	3.84	6.30	6.30	6.30	0.35	1.35	±13.9%
4600	36.7	4.04	6.25	6.25	6.25	0.45	1.20	±13.9%
4800	36.4	4.25	6.20	6.20	6.20	0.40	1.35	±13.9%
4950	36.3	4.40	6.01	6.01	6.01	0.45	1.25	±13.9%
5250	35.9	4.71	5.40	5.40	5.40	0.45	1.40	±13.9%
5600	35.5	5.07	4.78	4.78	4.78	0.45	1.40	±13.9%
5750	35.4	5.22	4.93	4.93	4.93	0.55	1.20	±13.9%

 $^{^{\}rm C}$ Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ± 50 MHz. 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 \pm 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 \pm 110 MHz.

Certificate No:24J02Z000049

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FAt frequency up to 6 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to $\pm 10\%$ if liquid compensation formula is applied to measured SAR values. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

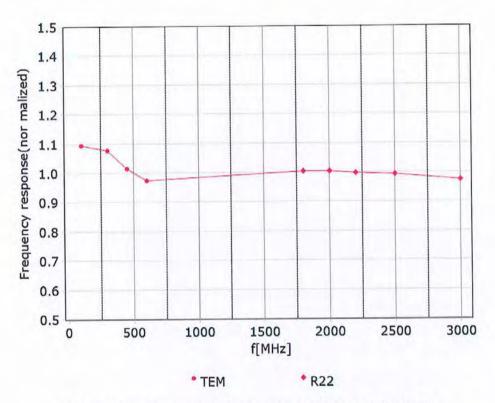
^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than \pm 1% for frequencies below 3 GHz and below \pm 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter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







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



Uncertainty of Frequency Response of E-field: ±7.4% (k=2)

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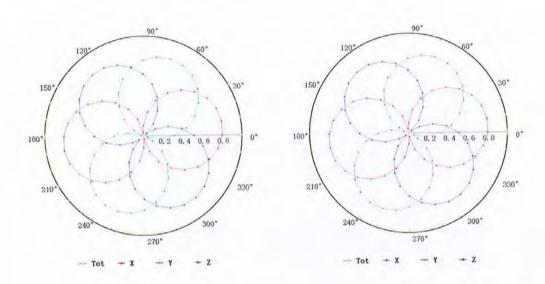


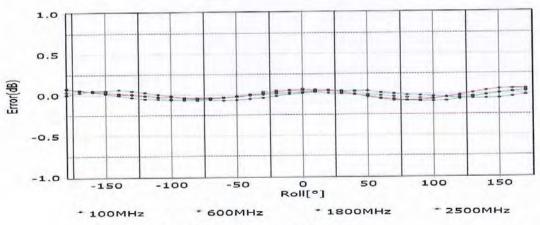


Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM

f=1800 MHz, R22





Uncertainty of Axial Isotropy Assessment: ±1.2% (k=2)

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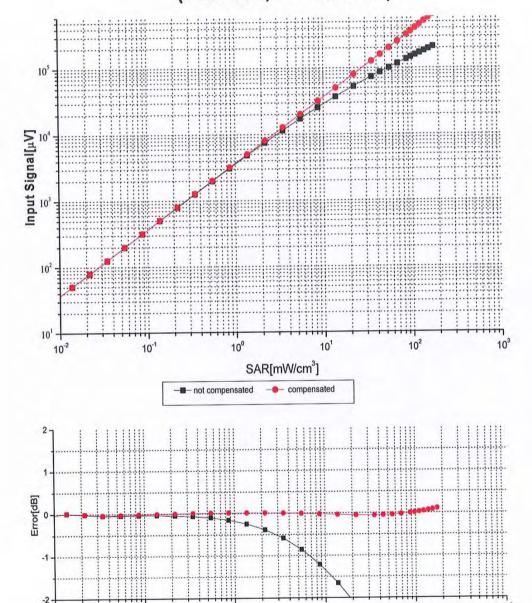
Page 6 of 9







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



— not compensated — compensated

Uncertainty of Linearity Assessment: ±0.9% (*k*=2)

SAR[mW/cm3]

Certificate No:24J02Z000049

10

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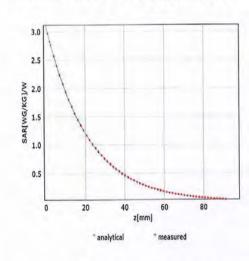


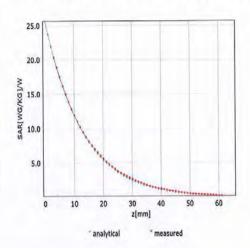


Conversion Factor Assessment

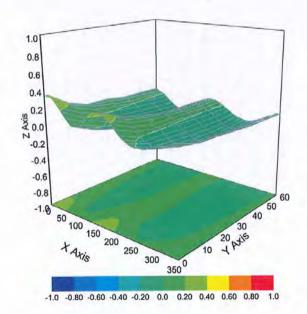
f=750 MHz,WGLS R9(H_convF)

f=1750 MHz,WGLS R22(H_convF)





Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: ±3.2% (k=2)

Certificate No:24J02Z000049

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:3924

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	161.2
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

Certificate No:24J02Z000049

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Client

JYT

Certificate No:

Z22-60210

CALIBRATION CERTIFICATE

Object

D835V2 - SN: 4d154

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

June 8, 2022

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	106277	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7464	26-Jan-22(SPEAG,No.EX3-7464_Jan22)	Jan-23
DAE4	SN 1556	12-Jan-22(CTTL-SPEAG,No.Z22-60007)	Jan-23
Secondary Standards	ID#	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL, No.J22X00409)	Jan-23
Network Analyzer E5071C	MY46110673	14-Jan-22 (CTTL, No.J22X00406)	Jan-23
	1.2-90		

C. 2. 3. va	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	92
Reviewed by:	Lin Hao	SAR Test Engineer	林光
Approved by:	Qi Dianyuan	SAR Project Leader	dia

Issued: June 13, 2022

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: Z22-60210

Page 1 of 6









Glossary:

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

Calibration is Performed According to the Following Standards:

- a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) 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%.

Certificate No: Z22-60210

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
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 ± 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 ± 0.2) °C	41.9 ± 6 %	0.88 mho/m ± 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	2.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.60 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.53 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.20 W/kg ± 18.7 % (k=2)

Certificate No: Z22-60210

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.9Ω- 3.78jΩ	
Return Loss	- 28.0dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.310 ns	
----------------------------------	----------	--

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

Additional EUT Data

Manufactured by	SPEAG
-----------------	-------

Certificate No: Z22-60210

Page 4 of 6

Date: 2022-06-08







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DASY5 Validation Report for Head TSL

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 MHz; $\sigma = 0.882$ S/m; $\varepsilon_r = 41.9$; $\rho = 1000$ kg/m³

Phantom section: Right Section

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

DASY5 Configuration:

- Probe: EX3DV4 SN7464; ConvF(9.96, 9.96, 9.96) @ 835 MHz; Calibrated: 2022-01-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2022-01-12
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

dy=5mm, dz=5mm

Reference Value = 59,20 V/m; Power Drift = -0.01 dB

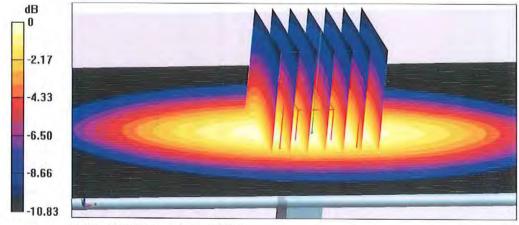
Peak SAR (extrapolated) = 3.58 W/kg

SAR(1 g) = 2.36 W/kg; SAR(10 g) = 1.53 W/kg

Smallest distance from peaks to all points 3 dB below = 18 mm

Ratio of SAR at M2 to SAR at M1 = 65.7%

Maximum value of SAR (measured) = 3.17 W/kg



0 dB = 3.17 W/kg = 5.01 dBW/kg

Certificate No: Z22-60210

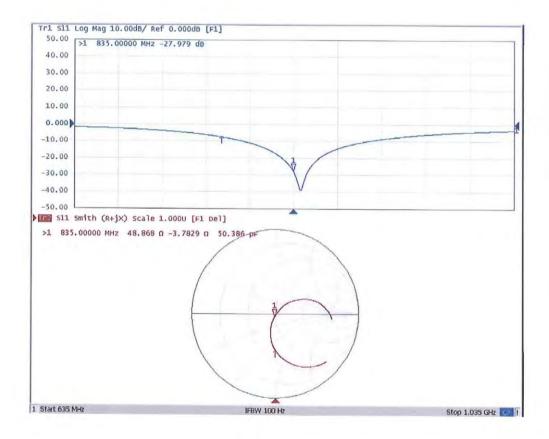
Page 5 of 6







Impedance Measurement Plot for Head TSL



Certificate No: Z22-60210



Dipole Impedance and Return Loss Check Report

Object: D835V2 - SN: 4d157

Check Date: June 03, 2024

Check reference: IEC/IEEE 62209-1528:2020, FCC KDB 865664 D01

Checked By: Eric Wang

Eric Wang (Eric Wang, SAR project engineer)

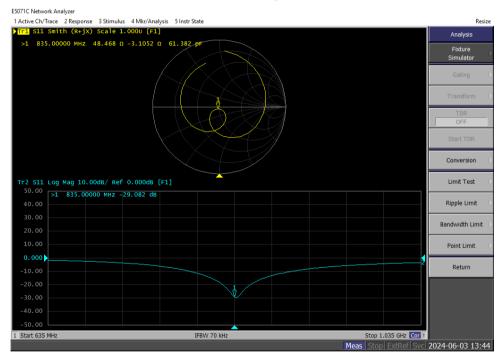
Reviewed By: Tanet Wei (Janet Wei, manager)

Environment of Test Site

Temperature:	21 ~ 23°C
Humidity:	50~60% RH
Atmospheric Pressure:	1011 mbar

Test Data

Measurement Plot for Head TSL In 2024



Comparison with Original report

	<u> </u>			
Items	Checked By JYT In 2023	Checked By JYT In 2024	Deviation	Limit
Impendence for Head TSL	49.63Ω -3.87jΩ	48.47Ω -3.11jΩ	-1.16Ω -0.76jΩ	±5Ω
Return Loss for Head TSL	-28.17	-29.09	3.27%	±20%(No less than 20 dB)

Result

Compliance









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http://www.caict.ac.cn

Client

JYT

Certificate No:

Z22-60211

CALIBRATION CERTIFICATE

Object

D1900V2 - SN: 5d175

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

June 7, 2022

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	106277	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7464	26-Jan-22(SPEAG,No.EX3-7464_Jan22)	Jan-23
DAE4	SN 1556	12-Jan-22(CTTL-SPEAG,No.Z22-60007)	Jan-23
Secondary Standards	ID#	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-22 (CTTL, No.J22X00409)	Jan-23
Network Analyzer E5071C	MY46110673	14-Jan-22 (CTTL, No.J22X00406)	Jan-23

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	A E
Reviewed by:	Lin Hao	SAR Test Engineer	献光

Issued: June 13, 2022

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Qi Dianyuan

Certificate No: Z22-60211

Approved by:

Page 1 of 6

SAR Project Leader







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E-mail: cttl@chinattl.com http://www.caict.ac.cn

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020

b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) 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%.

Certificate No: Z22-60211

Page 2 of 6







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Measurement Conditions

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

DASY Version	DASY52	52.10.4
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	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.9 ± 6 %	1.39 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	4444	****

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.93 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.9 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.8 W/kg ± 18.7 % (k=2)

Certificate No: Z22-60211









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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.7Ω+ 5.90jΩ	
Return Loss	- 24.4dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.110 ns
The state of the s	1.1,0110

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

Additional EUT Data

Manufactured by	ODEAO
Manufactured by	SPEAG

Certificate No: Z22-60211

Page 4 of 6

Date: 2022-06-07







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DASY5 Validation Report for Head TSL

Test Laboratory: CTTL, Beijing, China DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d175

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1 Medium parameters used: f = 1900 MHz; $\sigma = 1.385$ S/m; $\varepsilon_r = 39.85$; $\rho = 1000$ kg/m³

Phantom section: Right Section

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

DASY5 Configuration:

- Probe: EX3DV4 SN7464; ConvF(8.18, 8.18, 8.18) @ 1900 MHz; Calibrated: 2022-01-26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2022-01-12
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

Reference Value = 101.8 V/m; Power Drift = 0.00 dB

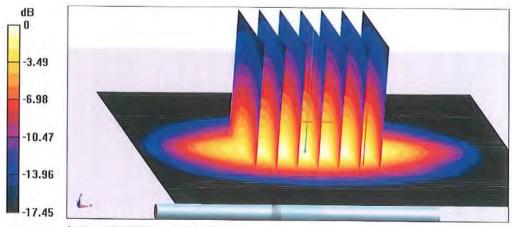
Peak SAR (extrapolated) = 18.5 W/kg

SAR(1 g) = 9.93 W/kg; SAR(10 g) = 5.18 W/kg

Smallest distance from peaks to all points 3 dB below = 10 mm

Ratio of SAR at M2 to SAR at M1 = 54.3%

Maximum value of SAR (measured) = 15.5 W/kg



0 dB = 15.5 W/kg = 11.90 dBW/kg

Certificate No: Z22-60211

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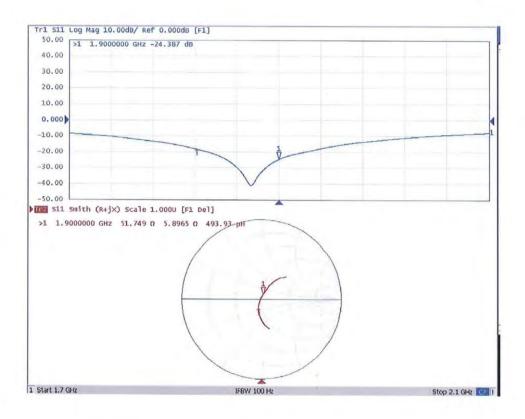


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http://www.caict.ac.cn

Impedance Measurement Plot for Head TSL



Certificate No: Z22-60211

Page 6 of 6



Dipole Impedance and Return Loss Check Report

Object: D1900V2 - SN: 5d175

Check Date: June 03, 2024

Check reference: IEC/IEEE 62209-1528:2020, FCC KDB 865664 D01

Checked By: Eric Wang

Eric Wang (Eric Wang, SAR project engineer)

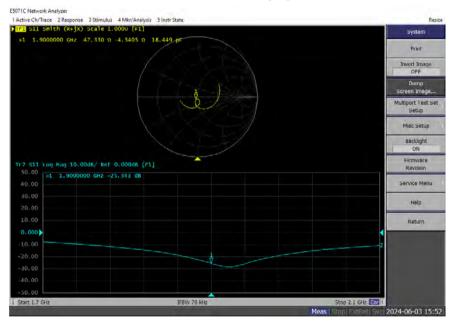
Reviewed By: Tanet Wei (Janet Wei, manager)

Environment of Test Site

Temperature:	21 ~ 23°C
Humidity:	50~60% RH
Atmospheric Pressure:	1011 mbar

Test Data

Measurement Plot for Head TSL In 2023



Comparison with Original report

Items	Checked By JYT In 2023	Checked By JYT In 2024	Deviation	Limit
Impendence for Head TSL	49.30Ω-5.47jΩ	47.33Ω-4.54jΩ	-1.97Ω+0.93jΩ	±5Ω
Return Loss for Head TSL	-26.32	-25.34	-3.72%	±20%(No less than 20 dB)

Result

Compliance









Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191 Tel: +86-10-62304633-2117

E-mail: cttl@chinattl.com

http://www.caict.ac.en

Client

JYT

Certificate No:

Z22-60212

CALIBRATION CERTIFICATE

Object

D2450V2 - SN: 910

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

June 6, 2022

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)

duled Calibration	ate No.)	Cal Date (Calibrated by, Certification)#	rds	rimary Standar
Sep-22	3)	24-Sep-21 (CTTL, No.J21X0832	06277	NRP2	Power Meter
Sep-22	3)	24-Sep-21 (CTTL, No.J21X0832	04291	NRP8S	Power sensor
Jan-23	_Jan22)	26-Jan-22(SPEAG, No. EX3-7464	N 7464	be EX3DV4	Reference Pro
Jan-23	-60007)	12-Jan-22(CTTL-SPEAG,No.Z22	N 1556		DAE4
duled Calibration	te No.)	Cal Date (Calibrated by, Certifica) #	ndards	Secondary Sta
Jan-23	9)	13-Jan-22 (CTTL, No. J22X0040	1Y49071430	tor E4438C	Signal General
Jan-23	i)	14-Jan-22 (CTTL, No.J22X00406	1Y46110673	zer E5071C	Network Analy
	i)	14-Jan-22 (CTTL, No.J22X00406	1Y46110673	zer E5071C	Network Analy

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	22
Reviewed by:	Lin Hao	SAR Test Engineer	तारिक
Approved by:	Qi Dianyuan	SAR Project Leader	20

Issued: June 13, 2022

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020

b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) 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 Version	DASY52	52.10.4
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	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.0 ± 6 %	1.81 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	4	

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	53.4 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.19 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.8 W/kg ± 18.7 % (k=2)

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.2Ω+ 2.79jΩ	
Return Loss	- 27.7dB	

General Antenna Parameters and Design

Floatrical Dalay (our dispution)		
Electrical Delay (one direction)	1.066 ns	

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

Additional EUT Data

Manufactured by	SPEAG	
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Date: 2022-06-06







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DASY5 Validation Report for Head TSL

Test Laboratory: CTTL, Beijing, China DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 910

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2450 MHz; σ = 1.806 S/m; ϵ_r = 40.03; ρ = 1000 kg/m³

Phantom section: Right Section

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

DASY5 Configuration:

- Probe: EX3DV4 SN7464; ConvF(7.77, 7.77, 7.77) @ 2450 MHz; Calibrated: 2022-01-26
- · Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2022-01-12
- Phantom; MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

Reference Value = 97.85 V/m; Power Drift = -0.03 dB

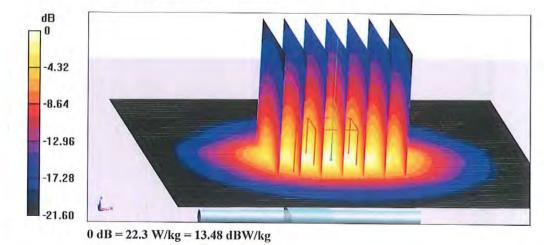
Peak SAR (extrapolated) = 27.3 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.19 W/kg

Smallest distance from peaks to all points 3 dB below = 8.5 mm

Ratio of SAR at M2 to SAR at M1 = 49.3%

Maximum value of SAR (measured) = 22.3 W/kg



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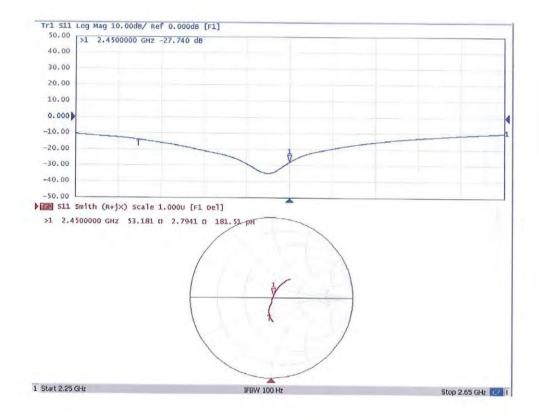




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Impedance Measurement Plot for Head TSL



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Dipole Impedance and Return Loss Check Report

Object: D2450V2 - SN: 910

Check Date: June 03, 2024

Check reference: IEC/IEEE 62209-1528:2020, FCC KDB 865664 D01

Checked By: Eric Wan

Eric Wang (Eric Wang, SAR project engineer)

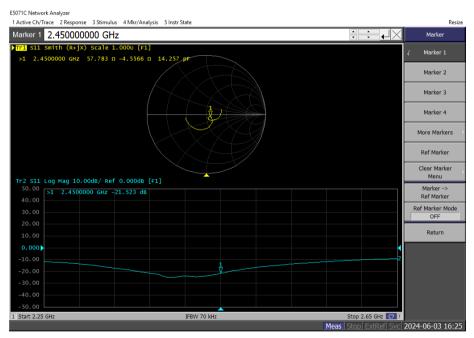
Reviewed By: Tanet Wei (Janet Wei, manager)

Environment of Test Site

Temperature:	18 ~ 25°C
Humidity:	50~60% RH
Atmospheric Pressure:	1011 mbar

Test Data

Measurement Plot for Head TSL In 2023



Comparison with Original report

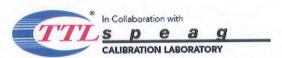
Items	Checked By JYT In 2023	Checked By JYT In 2024	Deviation	Limit
Impendence for Head TSL	53.28Ω-0.28jΩ	57.78Ω-4.56jΩ	4.5Ω+4.28jΩ	±5Ω
Return Loss for Head TSL	-22.94dB	-21.52dB	2.77%	±20%(No less than 20 dB)

Result

Compliance



Calibration information for DAE



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Client :

JYT



Certificate No: 24J02Z000112

CALIBRATION CERTIFICATE

Object DAE4 - SN: 1452

Calibration Procedure(s) FF-Z11-002-01

Calibration Procedure for the Data Acquisition Electronics

(DAEx)

Calibration date: March 26, 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

Process Calibrator 753 1971018 12-Jun-23 (CTTL, No.J23X05436) Jun-24

Name Function Signature

Calibrated by: Yu Zongying SAR Test Engineer

Reviewed by: Lin Jun SAR Test Engineer

Approved by: Qi Dianyuan SAR Project Leader

Issued: March 27, 2024

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: 24J02Z000112

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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 report provide only calibration results for DAE, it does not contain other performance test results.

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DC Voltage Measurement

A/D - Converter Resolution nominal High Range: 1LSB = 6.1μV , 61nV , full range = -100...+300 mV full range = -1.....+3mV 1LSB = Low Range: DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	х	Υ	Z
High Range	404.422 ± 0.15% (k=2)	404.754 ± 0.15% (k=2)	405.328 ± 0.15% (k=2)
Low Range	3.99317 ± 0.7% (k=2)	3.99738 ± 0.7% (k=2)	4.01684 ± 0.7% (k=2)

Connector Angle

	27/45 10
Connector Angle to be used in DASY system	51° ± 1 °

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-----End of Report-----