



# TEST REPORT

Product Name: Tablet PC(Notebook)  
Trademark: N/A  
Model Number: MB02, For other series models, refer to Section 4.1.  
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Test Standards: EN 62479 :2010  
EN 50663 :2017  
EN IEC/IEEE 62209-1528 :2021  
EN 50566 :2017+A1 :2023  
Test Results: PASS  
Remark: This is SAR test report.

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## 1. VERSION

Report No.	Issue Date	Description	Approved
CTB25020704402RH03	Feb. 17, 2025	Original	Valid

## 2. PRODUCT INFORMATION AND TEST SETUP

### Product Information

Model(s):

MB02, MB01, MB02, MB03, MB05, I7, I7 Plus, I7 Pro, I7 Power, I7 Turbo, I7 Ultra, I7 A, I7 A Plus, I7 A Pro, I7 A Power, I7 A Turbo, I7 A Ultra, I7 AI, I7 AI Plus, I7 AI Pro, I7 AI Power, I7 AI Turbo, I7 AI Ultra, I7 S, I7 S Plus, I7 S Pro, I7 S Power, I7 S Turbo, I7 S Ultra, I8, I8 Plus, I8 Pro, I8 Power, I8 Turbo, I8 Ultra, I8 A, I8 A Plus, I8 A Pro, I8 A Power, I8 A Turbo, I8 A Ultra, I8 AI, I8 AI Plus, I8 AI Pro, I8 AI Power, I8 AI Turbo, I8 AI Ultra, I8 S, I8 S Plus, I8 S Pro, I8 S Power, I8 S Turbo, I8 S Ultra, I9, I9 Plus, I9 Pro, I9 Power, I9 Turbo, I9 Ultra, I9 A, I9 A Plus, I9 A Pro, I9 A Power, I9 A Turbo, I9 A Ultra, I9 AI, I9 AI Plus, I9 AI Pro, I9 AI Power, I9 AI Turbo, I9 AI Ultra, I9 S, I9 S Plus, I9 S Pro, I9 S Power, I9 S Turbo, I9 S Ultra, I10, I10 Plus, I10 Pro, I10 Power, I10 Turbo, I10 Ultra, I10 A, I10 A Plus, I10 A Pro, I10 A Power, I10 A Turbo, I10 A Ultra, I10 AI, I10 AI Plus, I10 AI Pro, I10 AI Power, I10 AI Turbo, I10 AI Ultra, I10 S, I10 S Plus, I10 S Pro, I10 S Power, I10 S Turbo, I10 S Ultra, I11, I11 Plus, I11 Pro, I11 Power, I11 Turbo, I11 Ultra, I11 A, I11 A Plus, I11 A Pro, I11 A Power, I11 A Turbo, I11 A Ultra, I11 AI, I11 AI Plus, I11 AI Pro, I11 AI Power, I11 AI Turbo, I11 AI Ultra, I11 S, I11 S Plus, I11 S Pro, I11 S Power, I11 S Turbo, I11 S Ultra, I12, I12 Plus, I12 Pro, I12 Power, I12 Turbo, I12 Ultra, I12 A, I12 A Plus, I12 A Pro, I12 A Power, I12 A Turbo, I12 A Ultra, I12 AI, I12 AI Plus, I12 AI Pro, I12 AI Power, I12 AI Turbo, I12 AI Ultra, I12 S, I12 S Plus, I12 S Pro, I12 S Power, I12 S Turbo, I12 S Ultra, I13, I13 Plus, I13 Pro, I13 Power, I13 Turbo, I13 Ultra, I13 A, I13 A Plus, I13 A Pro, I13 A Power, I13 A Turbo, I13 A Ultra, I13 AI, I13 AI Plus, I13 AI Pro, I13 AI Power, I13 AI Turbo, I13 AI Ultra, I13 S, I13 S Plus, I13 S Pro, I13 S Power, I13 S Turbo, I13 S Ultra, T8, T8 Plus, T8 Pro, T8 Power, T8 Turbo, T8 Ultra, T8 A, T8 A Plus, T8 A Pro, T8 A Power, T8 A Turbo, T8 A Ultra, T8 AI, T8 AI Plus, T8 AI Pro, T8 AI Power, T8 AI Turbo, T8 AI Ultra, T8 S, T8 S Plus, T8 S Pro, T8 S Power, T8 S Turbo, T8 S Ultra, T10, T10 Plus, T10 Pro, T10 Power, T10 Turbo, T10 Ultra, T10 A, T10 A Plus, T10 A Pro, T10 A Power, T10 A Turbo, T10 A Ultra, T10 AI, T10 AI Plus, T10 AI Pro, T10 AI Power, T10 AI Turbo, T10 AI Ultra, T10 S, T10 S Plus, T10 S Pro, T10 S Power, T10 S Turbo, T10 S Ultra, T11, T11 Plus, T11 Pro, T11 Power, T11 Turbo, T11 Ultra, T11 A, T11 A Plus, T11 A Pro, T11 A Power, T11 A Turbo, T11 A Ultra, T11 AI, T11 AI Plus, T11 AI Pro, T11 AI Power, T11 AI Turbo, T11 AI Ultra, T11 S, T11 S Plus, T11 S Pro, T11 S Power, T11 S Turbo, T11 S Ultra, T12, T12 Plus, T12 Pro, T12 Power, T12 Turbo, T12 Ultra, T12 A, T12 A Plus, T12 A Pro, T12 A Power, T12 A Turbo, T12 A Ultra, T12 AI, T12 AI Plus, T12 AI Pro, T12 AI Power, T12 AI Turbo, T12 AI Ultra, T12 S, T12 S Plus, T12 S Pro, T12 S Power, T12 S Turbo, T12 S Ultra, T13, T13 Plus, T13 Pro, T13 Power, T13 Turbo, T13 Ultra, T13 A, T13 A Plus, T13 A Pro, T13 A Power, T13 A Turbo, T13 A Ultra, T13 AI, T13 AI Plus, T13 AI Pro, T13 AI Power, T13 AI Turbo, T13 AI Ultra, T13 S, T13 S Plus, T13 S Pro, T13 S Power, T13 S Turbo, T13 S Ultra, I6, I14, I15, I16

Model Description:

All the model are the same circuit and RF module, only the name and appearance are different, used to distinguish between different sales customers.  
Test sample model: MB02

Bluetooth Version:

Bluetooth 5.0

Hardware Version:

V1.0

Software Version:

V1.0

Operation Frequency: Bluetooth: 2402-2480MHz  
WiFi(5.8G): IEEE 802.11a/n/ac(20M): 5725MHz ~5850MHz/ 5 channel  
IEEE 802.11n/ac(40M): 5725MHz ~5850MHz/ 2 channel  
IEEE 802.11ac(80M): 5725MHz ~5850MHz/ 1 channel

Max. RF output power: Bluetooth: 7.64dBm  
WiFi(5.8G): 13.62dBm

Type of Modulation: Bluetooth: GFSK,  $\pi/4$  DQPSK, 8DPSK  
WiFi(5.8G): OFDM

Max reported SAR: 0.26 W/Kg 10g Body

Max Simultaneous SAR: 0.26 W/Kg 10g

Antenna Gain: Bluetooth: 1.0dBi  
WiFi(5.8G): 1.0dBi

Ratings: INPUT: AC 100-240V 0.5A,10.0W  
OUTPUT: DC 5.0V 2.0A

### 3. TEST FACILITY AND TEST INSTRUMENT USED

#### Test Facility

All measurement facilities used to collect the measurement data are located at Floor 1&2, Building A, No. 26 of Xinhel Road, Xinqiao Street, Baoan District, Shenzhen China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

#### 4. INTRODUCTION

##### Introduction

This measurement report shows compliance of the EUT with EN 50566:2017 and EN IEC/IEEE 62209-1528 :2021, 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-Human models, instrumentation, and procedures (Frequency range of 4 MHz to 10 GHz)

##### SAR Definition

- ✘ SAR : Specific Absorption Rate
- ✘ The SAR characterize the absorption of energy by a quantity of tissue
- ✘ This is related to a increase of the temperature of these tissues during a time period.

$$DAS = \frac{d}{dt} \left( \frac{dW}{dm} \right) = \frac{d}{dt} \left( \frac{dW}{\rho dV} \right)$$

$$DAS = \frac{\sigma E^2}{\rho}$$

$$DAS = c_h \left. \frac{dT}{dt} \right|_{t=0}$$

##### SAR definition

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

##### ✘ SAR : Specific Absorption Rate

- $\sigma$  : Liquid conductivity

$$\circ \epsilon_r = \epsilon' - j\epsilon'' \text{ (complex permittivity of liquid)}$$

$$\circ \sigma = \frac{\epsilon'' \omega}{\epsilon_0}$$

- $\rho$  : Liquid density

$$\circ \rho = 1000 \text{ g/L} = 1000 \text{ Kg/m}^3$$

where:

- $\sigma$  = conductivity of the tissue (S/m)
- $\rho$  = mass density of the tissue (kg/m<sup>3</sup>)
- $E$  = rms electric field strength (V/m)

##### SAR MEASUREMENT SETUP

The DASY5 system for performing compliance tests consists of the following items:

A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).

A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD- conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

A unit to operate the optical surface detector which is connected to the EOC.

The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.

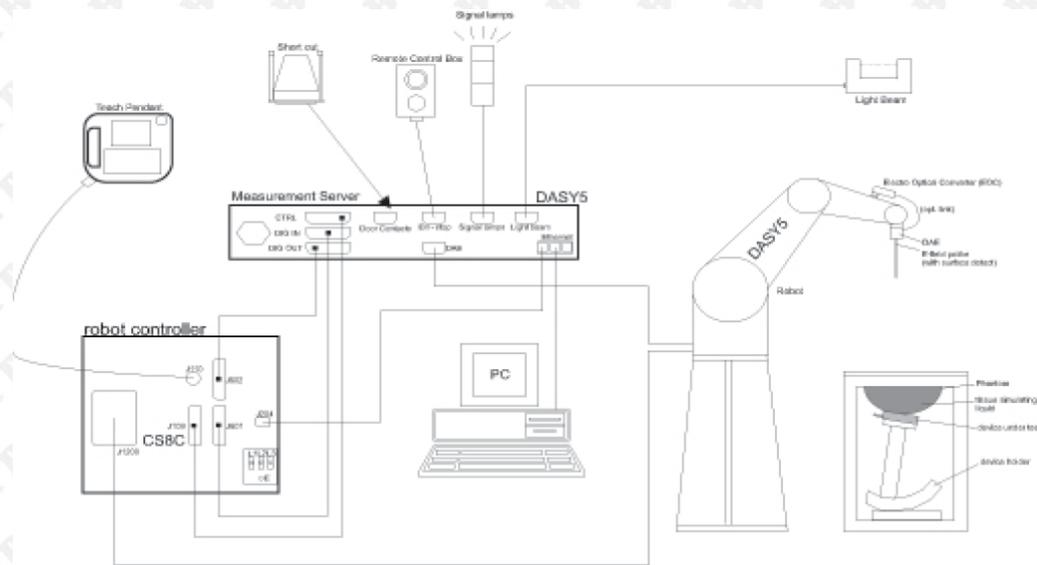
The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003. DASY5 software and SEMCAD data evaluation software.

Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc. The generic twin phantom enabling the testing of left-hand and right-hand usage.

The device holder for handheld Mobile Phones.

Tissue simulating liquid mixed according to the given recipes.

System validation dipoles allowing to validate the proper functioning of the system.



### DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

#### Probe Specification

Construction Symmetrical design with triangular core  
 Interleaved sensors  
 Built-in shielding against static charges  
 PEEK enclosure material (resistant to organic solvents, e.g., DGBE)

Calibration ISO/IEC 17025 calibration service available.

Frequency 4 MHz – 10 GHz  
 Linearity:  $\pm 0.2$  dB (30 MHz – 10 GHz)  
 Directivity  $\pm 0.1$  dB in TSL (rotation around probe axis)  
 $\pm 0.3$  dB in TSL (rotation normal to probe axis)  
 Dynamic Range 10  $\mu$ W/g – >100 W/kg  
 Linearity:  $\pm 0.2$  dB (noise: typically <1  $\mu$ W/g)

Dimensions Overall length: 337 mm (tip: 20 mm)  
 Tip diameter: 2.5 mm (body: 12 mm)  
 Typical distance from probe tip to dipole centers: 1 mm

Application General dosimetry up to 10 GHz  
 Dosimetry in strong gradient fields  
 Compliance tests of Mobile Phones

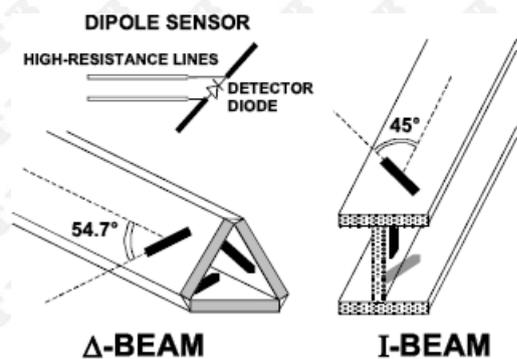
Compatibility DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI



#### Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



## Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SPEAG. The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6mm).

System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.



SAM Twin Phantom

## Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the DASY system.

The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.



Device holder supplied by SPEAG

## 5. SAR TEST PROCEDURE

### Scanning Procedure

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max.  $\pm 5\%$ .

The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above  $\pm 0.1\text{mm}$ ). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe (It does not depend on the surface reflectivity or the probe angle to the surface within  $\pm 30^\circ$ .)

### Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing of  $15\text{ mm} \times 15\text{ mm}$  is set. During the scan the distance of the probe to the phantom remains unchanged. After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

### Zoom Scan

Zoom Scans are used to estimate the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default Zoom Scan is done by  $7 \times 7 \times 5$  points within a cube whose base is centered around the maxima found in the preceding area scan.

### Spatial Peak Detection

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses. The DASY5 system allows evaluations that combine measured data and robot positions, such as: • maximum search • extrapolation • boundary correction • peak search for averaged SAR. During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard’s method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

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. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space. They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard’s method for extrapolation. For a grid using  $7 \times 7 \times 5$  measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10g cubes.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube  $7 \times 7 \times 5$  scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

## Data Storage and Evaluation

### Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension “.DA4”. The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [W/kg], [mW/cm<sup>2</sup>], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

### Data Evaluation

The SEMCAD software 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:	Normi, ai0, ai1, ai2
	Conversion factor:	ConvFi
	Diode compression point:	Dcpi
Device parameters:	Frequency:	f
Media parameters:	Crest factor:	cf
	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 DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

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

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

Vi: compensated signal of channel ( i = x, y, z ) Ui: input signal of channel ( i = x, y, z )

cf: crest factor of exciting field (DASY parameter) dcp\_i: diode compression point (DASY parameter)

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

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

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

Vi: compensated signal of channel ( i = x, y, z ) Normi: sensor sensitivity of channel ( i = x, y, z ), [mV/(V/m)<sup>2</sup>] for E-field Probes ConvF: sensitivity enhancement in solution

aij: sensor sensitivity factors for H-field probes f: carrier frequency [GHz]

Ei: 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.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

SAR: local specific absorption rate in W/kg  
 $E_{tot}$ : total field strength in V/m  
 $\sigma$ : conductivity in [mho/m] or [Siemens/m]  
 $\rho$ : equivalent tissue density in g/cm<sup>3</sup>

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

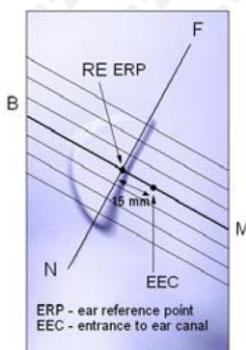
## 6. EXTRAPOLATION

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. Several measurements at different distances are necessary for the extrapolation. They are used in the Cube Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the fourth order least square polynomial method for extrapolation. For a grid using 5x5x7 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1 g and 10 g cubes.

### Definition of Reference Points

#### Ear Reference Point

Figure 6.2 shows the front, back and side views of the SAM Phantom. The point “M” is the reference point for the center of the mouth, “LE” is the left ear reference point (ERP), and “RE” is the right ERP. The ERPs are 15mm posterior to the entrance to the ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 6.1. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front) is perpendicular to the reference plane and passing through the RE (or LE) is called the Reference Pivoting Line (see Figure 6.1). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning [5].



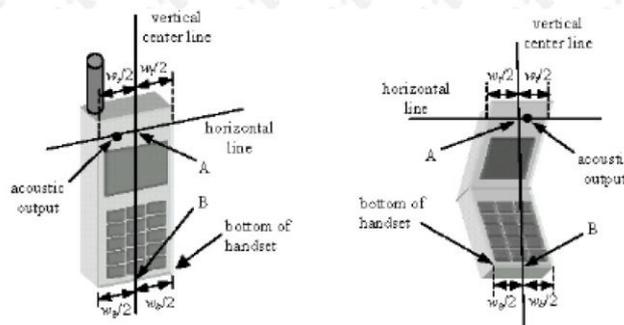
**Figure 6.1 Close-up side view of ERP's**



**Figure 6.2 Front, back and side view of SAM**

#### Device Reference Points

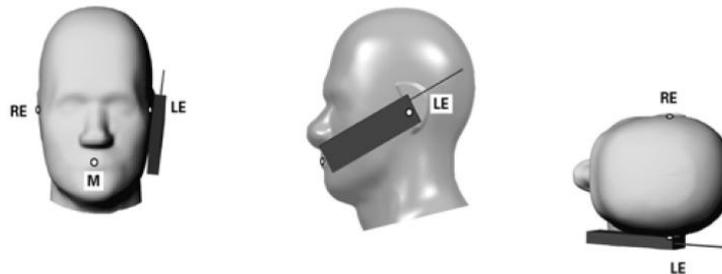
Two imaginary lines on the device need to be established: the vertical centerline and the horizontal line. The test device is placed in a normal operating position with the “test device reference point” located along the “vertical centerline” on the front of the device aligned to the “ear reference point” (See Fig. 6.3). The “test device reference point” is then located at the same level as the center of the ear reference point. The test device is positioned so that the “vertical centerline” is bisecting the front surface of the device at it's top and bottom edges, positioning the “ear reference point” on the outer surface of both the left and right head phantoms on the ear reference point [5].



**Figure 6.3 Handset Vertical Center & Horizontal Line Reference Points**

**Test Configuration – Positioning for Cheek / Touch**

Position the device close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure below), such that the plane defined by the vertical center line and the horizontal line of the device is approximately parallel to the sagittal plane of the phantom



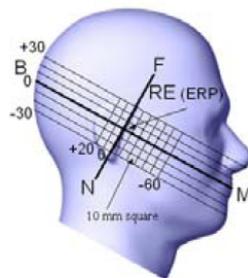
**Figure 7.1 Front, Side and Top View of Cheek/Touch Position**

Translate the device towards the phantom along the line passing through RE and LE until the device touches the ear.

While maintaining the device in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to MB-NF including the line MB (called the reference plane).

Rotate the device around the vertical centerline until the device (horizontal line) is symmetrical with respect to the line NF.

While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE and maintaining the device contact with the ear, rotate the device about the line NF until any point on the device is in contact with a phantom point below the ear (cheek). See Figure below.

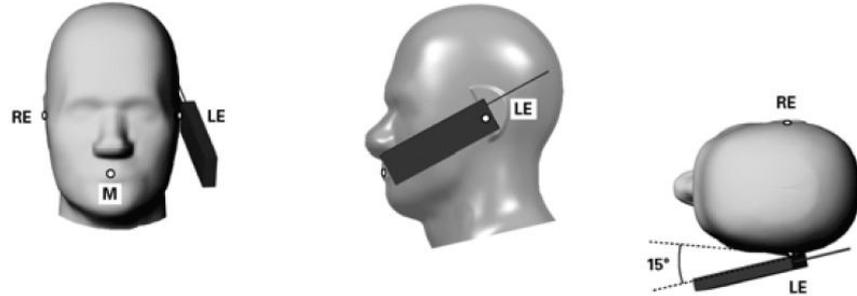


**Figure 7.2 Side view w/ relevant markings**

**Test Configuration – Positioning for Ear / 15° Tilt**

With the test device aligned in the Cheek/Touch Position”:

1. While maintaining the orientation of the device, retracted the device parallel to the reference plane far enough to enable a rotation of the device by 15 degrees.
2. Rotate the device around the horizontal line by 15 degrees.
3. While maintaining the orientation of the device, move the device parallel to the reference plane until any part of the device touches the head. (In this position, point A is located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact is at any location other than the pinna, the angle of the device shall be reduced. The tilted position is obtained when any part of the device is in contact with the ear as well as a second part of the device is in contact with the head (see Figure below).

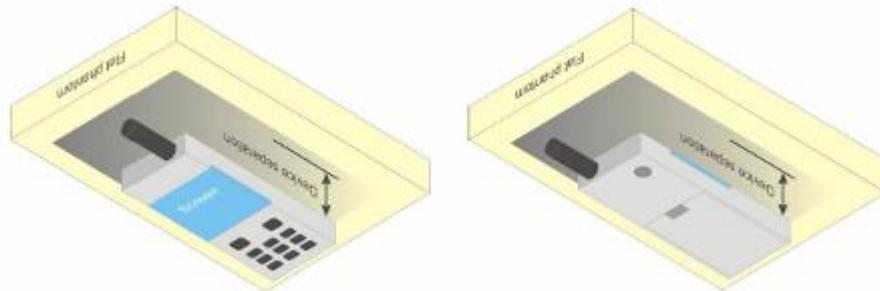


**Figure 7.3 Front, Side and Top View of Ear/15° Tilt Position**

**Test Position – Body Configurations**

Body Worn Position

- (a) To position the device parallel to the phantom surface with either keypad up or down.
- (b) To adjust the device parallel to the flat phantom.
- (c) To adjust the distance between the device surface and the flat phantom to 0 cm or holster surface and the flat phantom to 0 cm.



**7. EXPOSURE LIMIT**

In order for users to be aware of the body-worn operating requirements for meeting RF exposure compliance, operating instructions and cautions statements are included in the user’s manual.

**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.

**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.

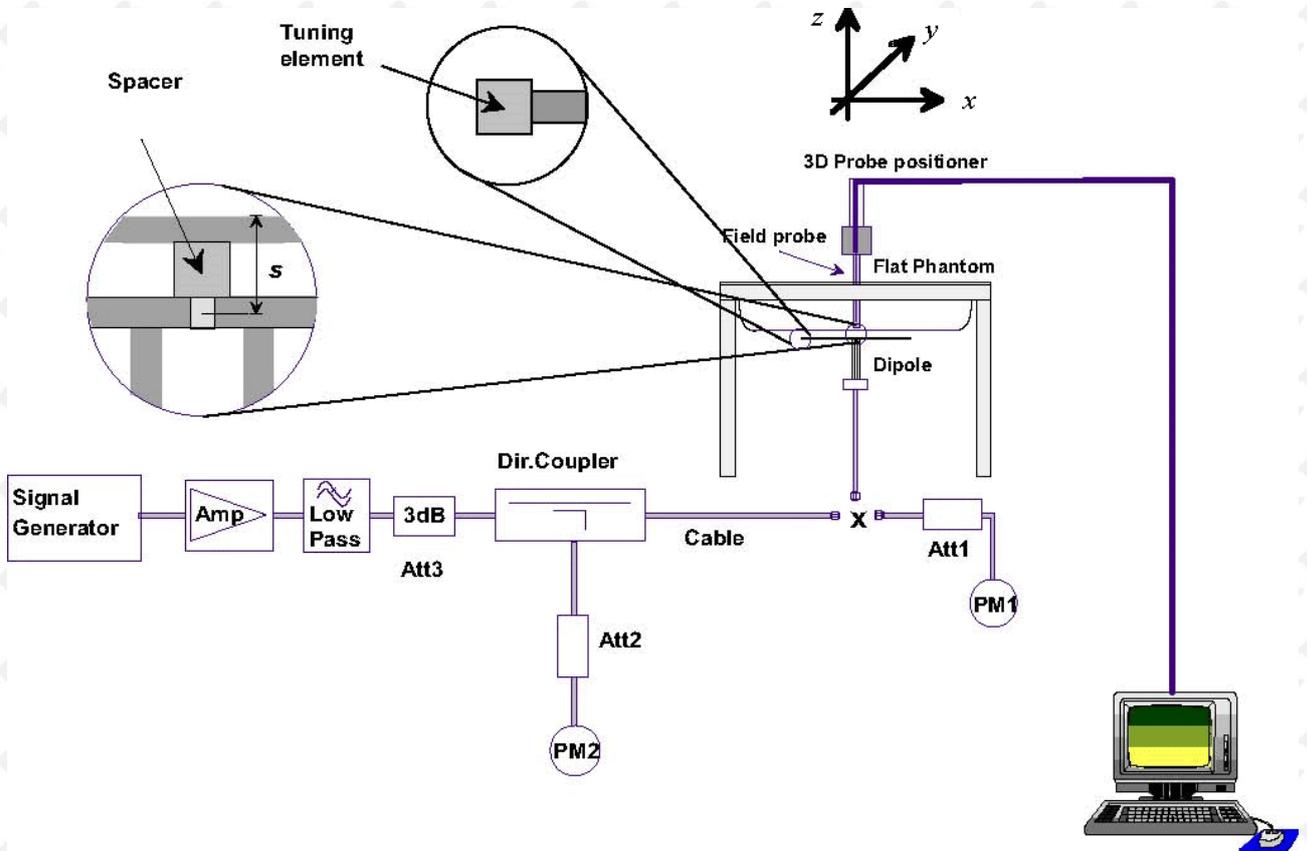
Whole-Body	Head and Trunk	Limbs
0.08W/Kg	2.0W/Kg	4.0W/Kg

Note:

- 1) **Whole-Body SAR** is averaged over the entire body, **Head and Trunk SAR** is averaged over any 10 gram of tissue defined as a tissue volume in the shape of a cube.  
**SAR for limbs** is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.
- 2) **Head and Trunk** limit applied to this EUT.

## 8. SYSTEM AND LIQUID VALIDATION

### System Validation



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.

In the simplified setup for system evaluation, the DUT 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:

1. Signal Generator
2. Amplifier
3. Directional Coupler
4. Power Meter
5. Calibrated Dipole

The output power on dipole port must be calibrated to 30 dBm (1000 mW) before dipole is connected.

**Numerical reference SAR values (W/kg) for reference dipole and flat phantom**

Frequency (MHz)	1 g SAR	10 g SAR	Local SAR at surface (above feed-point)	Local SAR at surface ( $y = 2$ cm offset from feed-point) <sup>a</sup>
300	3.0	2.0	4.4	2.1
450	4.9	3.3	7.2	3.2
835	9.5	6.2	4.1	4.9
900	10.8	6.9	16.4	5.4
1450	29.0	16.0	50.2	6.5
1800	38.1	19.8	69.5	6.8
1900	39.7	20.5	72.1	6.6
2000	41.1	21.1	74.6	6.5
2450	52.4	24.0	104.2	7.7
3000	63.8	25.7	140.2	9.5

**Target and measurement SAR after Normalized:**

Measurement Date	Frequency (MHz)	Liquid Type (head/body)	Target SAR10g (W/kg)	Measured SAR10g (W/kg)	Normalized SAR10g (W/kg)	Deviation ( $\pm 10\%$ )
2025-2-15	5800	head	22.7	2.25	22.5	-0.09

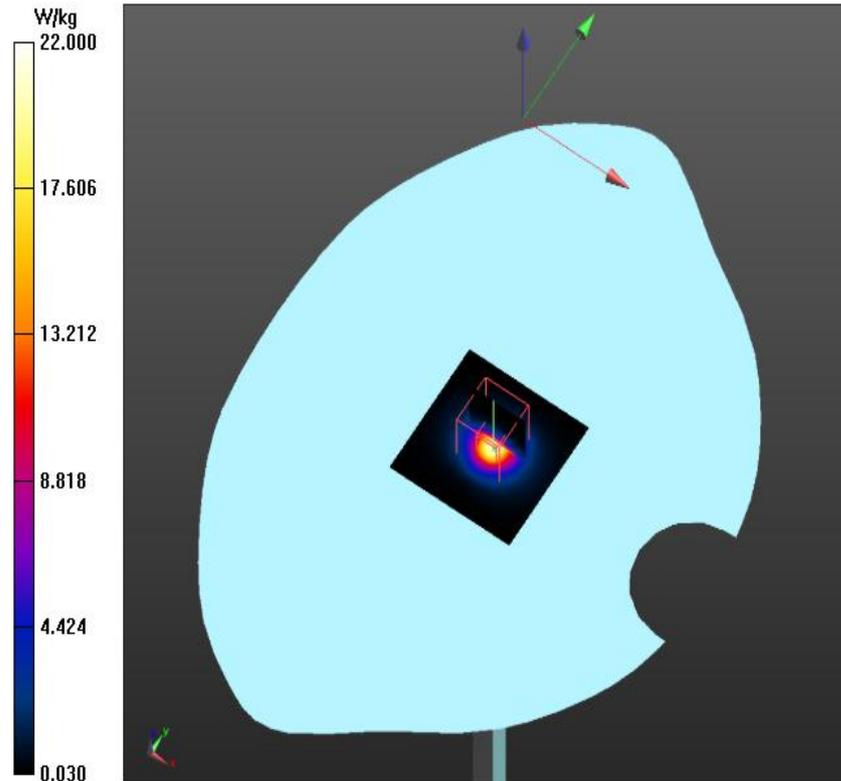
Note: Below 5GHz, system check input power is 250mW, above 5GHz the input power is 100mW .

### System Check-5800

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1190  
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);  
Frequency: 5800 MHz; Communication System PAR: 0 dB; PMF: 1  
Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.169$  S/m;  $\epsilon r = 34.837$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)  
DASY Configuration:  
Probe: EX3DV4 - SN7769; ConvF(4.85, 4.85, 4.85) @ 5800 MHz; Calibrated: 2024/9/5  
Modulation Compensation:  
Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 25.0$   
Electronics: DAE4 Sn881; Calibrated: 2024/7/4  
Phantom: SAM 1; Type: QD000P40CD; Serial: TP: 1119  
DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

System Performance Check with D5GHzV2 Dipole/d=5mm, Pin=100mW, f=5800 MHz/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm  
Maximum value of SAR (interpolated) = 22.0 W/kg

System Performance Check with D5GHzV2 Dipole/d=5mm, Pin=100mW, f=5800 MHz/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm  
Reference Value = 71.28 V/m; Power Drift = -0.09 dB  
Peak SAR (extrapolated) = 35.4 W/kg  
SAR(1 g) = 7.97 W/kg; SAR(10 g) = 2.25 W/kg  
Smallest distance from peaks to all points 3 dB below = 7.2 mm  
Ratio of SAR at M2 to SAR at M1 = 61%  
Maximum value of SAR (measured) = 19.5 W/kg



**9. LIQUID VALIDATION**

The dielectric parameters were checked prior to assessment using the HP85070C dielectric probe kit. The dielectric parameters measured are reported in each correspondent section.

**IEEE SCC-34/SC-2 P1528 recommended Tissue Dielectric Parameters**

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in P1528, According to EN 62209-2:2010, the liquid parameters for body are the same as head requirements

Target Frequency	Head	
	$\epsilon_r$	$\sigma$ (S/m)
300	45.3	0.87
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
915	41.5	0.93
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
5200	36.0	4.66
5400	35.8	4.86
5600	35.5	5.07
5800	35.3	5.27

**Liquid Confirmation Result:**

Temperature: <u>21</u> °C , Relative humidity: <u>57</u> % ,				
Liquid type/ Band(MHz)	Measured Date	Description	Dielectric Parameters	
			$\epsilon_r$	$\sigma$ (s/m)
5800	2025-2-15	Target Value $\pm 5\%$ window	35.3 33.535-37.065	5.27 5.007-5.534
		Measurement Value	34.837	5.169

**10. TYPE A MEASUREMENT UNCERTAINTY**

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

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

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

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

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

(b)  $\kappa$  is the coverage factor

**Standard Uncertainty for Assumed Distribution**

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type -sum- by taking the positive square root of the estimated variances.

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

The COMOSAR Uncertainty Budget is show in below table:

<b>DASY5 Uncertainty</b>								
Measurement uncertainty for 300MHz to 3GHz averaged over 1 gram/ 10 gram								
Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(vi) vef f
<b>Measurement System</b>								
Probe Calibration	±6.88 %	N	1	1	1	±6.88 %	±6.88 %	∞
Axial Isotropy	±4.7 %	R	√3	0.7	0.7	±1.9 %	±1.9 %	∞
Hemispherical Isotropy	±9.6 %	R	√3	0.7	0.7	±3.9 %	±3.9 %	∞
Boundary Effects	±1.0 %	R	√3	1	1	±0.6 %	±0.6 %	∞
Linearity	±4.7 %	R	√3	1	1	±2.7 %	±2.7 %	∞
System Detection Limits	±1.0 %	R	√3	1	1	±0.6 %	±0.6 %	∞
Modulation Responsem	±2.4 %	R	√3	1	1	±1.4 %	±1.4 %	∞
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %	∞
Response Time	±0.8 %	R	√3	1	1	±0.5 %	±0.5 %	∞
Integration Time	±2.6 %	R	√3	1	1	±1.5 %	±1.5 %	∞
RF Ambient Noise	±3.0 %	R	√3	1	1	±1.7 %	±1.7 %	∞
RF Ambient Reflections	±3.0 %	R	√3	1	1	±1.7 %	±1.7 %	∞
Probe Positioner	±0.4 %	R	√3	1	1	±0.2 %	±0.2 %	∞
Probe Positioning	±2.9 %	R	√3	1	1	±1.7 %	±1.7 %	∞
Max. SAR Eval.	±2.0 %	R	√3	1	1	±1.2 %	±1.2 %	∞
<b>Test Sample Related</b>								
Device Positioning	±2.9 %	N	1	1	1	±2.9 %	±2.9 %	145
Device Holder	±3.6 %	N	1	1	1	±3.6 %	±3.6 %	5
Power Drift	±5.0 %	R	√3	1	1	±2.9 %	±2.9 %	∞
Power Scalingp	±0 %	R	√3	1	1	±0.0 %	±0.0 %	∞
<b>Phantom and Setup</b>								
Phantom Uncertainty	±6.1 %	R	√3	1	1	±3.5 %	±3.5 %	∞
SAR correction	±1.9 %	R	√3	1	0.84	±1.1 %	±0.9 %	∞
Liquid Conductivity (mea.)DAK	±2.5 %	R	√3	0.78	0.71	±1.1 %	±1.0 %	∞
Liquid Permittivity (mea.) DAK	±2.5 %	R	√3	0.26	0.26	±0.3 %	±0.4 %	∞
Temp. unc. - Conductivity BB	±3.4 %	R	√3	0.78	0.71	±1.5 %	±1.4 %	∞
Temp. unc. - Permittivity BB	±0.4 %	R	√3	0.23	0.26	±0.1 %	±0.1 %	∞
Combined Std. Uncertainty						±11.65 %	±11.61 %	361
Expanded STD Uncertainty						±23.3 %	±23.22 %	

**11. TEST INSTRUMENT**

Name of Equipment	Manufacturer	Type/Model	Serial Number	Calibration Date	Calibration Due
Data acquisition electronics	SPEAG	DAE4	881	2024/7/4	2025/7/3
Dosimetric E-field Probes	SPEAG	EX3DV4	7769	2024/9/5	2025/9/4
SAR test software	SPEAG	DASY 52	52.10.3.1513	/	/
Dipole	SPEAG	D5GHzV2	1190	2022/9/16	2025/9/15
Communication test set	R&S	CMW500	108058	2024/6/29	2025/6/28
Network analyzer	R&S	ZVB 8	100348	2024/6/29	2025/6/28
Dielectric Assessment Kit	SPEAG	PLAN AR R140	0060913	/	/
power meter	Agilent	E4419B	N10149	2024/6/29	2025/6/28
MXA signal analyzer	Agilent	N5181A	MY49060920	2024/6/29	2025/6/28
RF Power Meter	Agilent	E9301A	MY41495675	2024/6/29	2025/6/28
Amplifier 2-6GHz	SHW	SHWPA-02000800P30 35-S	202211040001	2024/6/29	2025/6/28
Thermometer and Hygrometer	SMART SENSOR	AR867	/	2024/7/2	2025/7/1
Phantom(S)	SPEAG	SAM 1	TP-1119	/	/

## 12. OUTPUT POWER VERIFICATION

### Test Condition:

1. Conducted Measurement  
EUT was set for low, mid, high channel with modulated mode and highest RF output power.  
The base station simulator was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty  
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is  $\pm 1.5\text{dB}$ .
3. Environmental Conditions  

Temperature	23°C
Relative Humidity	53%
Atmospheric Pressure	1019mbar
4. Tested By : Martin Feng

**Test Result:**

## WIFI Mode (5.8G)

Mode	Channel number	Frequency (MHz)	Average Output Power(dBm)	Average Tune up limited(dBm)
802.11a	147	5745	15.11	15.0±1
	157	5785	15.5	15.0±1
	165	5825	15.57	15.0±1
802.11n (HT20)	147	5745	15.1	15.0±1
	157	5785	15.6	15.0±1
	165	5825	15.62	15.0±1
802.11n (HT40)	151	5755	14.9	14.0±1
	159	5795	15.28	15.0±1
802.11ac (VHT20)	147	5745	15.07	15.0±1
	157	5785	15.58	15.0±1
	165	5825	15.56	15.0±1
802.11ac (VHT40)	151	5755	14.83	14.0±1
	159	5795	15.37	15.0±1
802.11ac (VHT80)	155	5775	15.18	15.0±1

## Bluetooth Measurement Result

Mode	Channel	Output Power(dBm)	Tune up limited(dBm)
GFSK	Low	7.64	7.0±1
	Mid	7.63	7.0±1
	High	7.62	7.0±1
π/4DQPSK	Low	6.56	6.0±1
	Mid	6.76	6.0±1
	High	6.74	6.0±1
8DPSK	Low	6.67	6.0±1
	Mid	6.58	6.0±1
	High	6.71	6.0±1

**Note:** BT Power is less than 20mW, so the SAR for BT is not required.



**Simultaneous Transmission SAR Analysis.**

No.	Applicable Simultaneous Transmission Combination
1.	WLAN+BT

Note:

- For Bluetooth stand-alone SAR is according to the formula below:

$$P_{\text{available}} = P_{\text{th,m}} \times (\text{SAR}_{\text{lim}} - \text{SAR}_1) / \text{SAR}_{\text{lim}}$$

where  $P_{\text{th,m}}$  is the threshold exclusion power level taken from Annex B of IEC 62479<sup>7</sup> for the frequency of the secondary transmitter at the separation distance used in the testing.

$\text{SAR}_{\text{lim}}$  is 2.0W/kg,  $\text{SAR}_1$  is the SAR for primary transmitter.

If the output power of the WIFI/BT is less than  $P_{\text{available}}$ , SAR measurement for WIFI/BT is not necessary.

- BT's maximum tune up power is 6.31mW,  $P_{\text{available}}$  for 5G WiFi is 17.4mW. SAR measurement for BT is not necessary.

**3. Maximum Summation:**

position	WIFI(5G)		BT	Summed SAR
	Mode	Max. Scaled SAR	Max. Scaled SAR	
Body 0mm	Back side	0.09	0	0.09
Body 0mm	Front side	0.21	0	0.21
Body 0mm	Left edge	0.01	0	0.01
Body 0mm	Right edge	0.01	0	0.01
Body 0mm	Top edge	0.26	0	0.26
Body 0mm	Bottom edge	0.001	0	0.001

Note:

- 1.10g-SAR scalar summation < 2.0W/kg, so no simultaneous SAR is required.

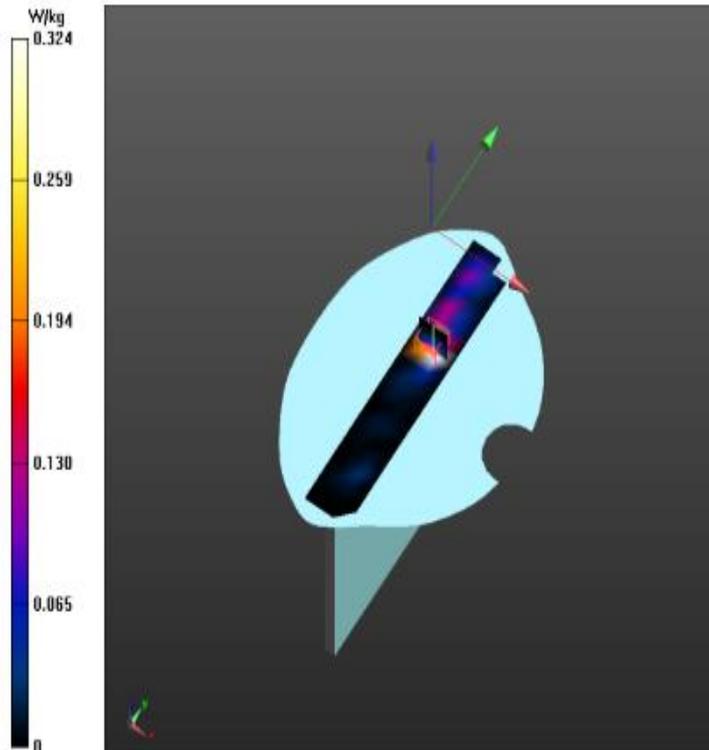
#### 14. SAR MEASUREMENT PLOTS

##### Plot 1

DUT: DUT Sample; Type: Sample; Serial: Not Specified  
 Communication System: UID 0, 5.8G WIFI (0); Communication System Band: 5.8G WIFI 11n20; Frequency: 5825 MHz; Communication System PAR: 0 dB; PMF: 1.12202e-005  
 Medium parameters used (interpolated):  $f = 5825$  MHz;  $\sigma = 5.265$  S/m;  $\epsilon_r = 34.997$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section  
 Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)  
 DASY Configuration:  
 Probe: EX3DV4 - SN7769; ConvF(4.85, 4.85, 4.85) @ 5825 MHz; Calibrated: 2024/9/5  
 Modulation Compensation:  
 Sensor-Surface: 4mm (Mechanical Surface Detection),  $z = 2.0, 32.0$   
 Electronics: DAE4 Sn881; Calibrated: 2024/7/4  
 Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1119  
 DASY52 52.10.3(1513); SEMCAD X 14.6.13(7474)

KA25020704402 CE Flat/Top/Area Scan (4x19x1): Measurement grid:  $dx=15$ mm,  $dy=15$ mm  
 Maximum value of SAR (measured) = 0.324 W/kg

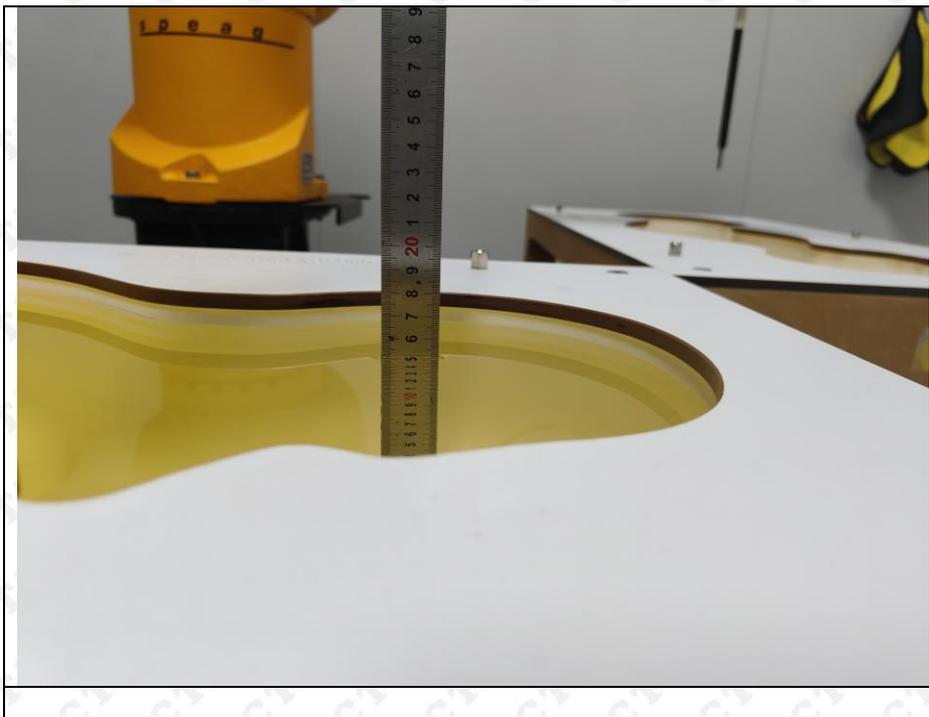
KA25020704402 CE Flat/Top/Zoom Scan (7x7x7)/Cube 0: Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm  
 Reference Value = 2.207 V/m; Power Drift = 0.08 dB  
 Peak SAR (extrapolated) = 2.33 W/kg  
 SAR(1 g) = 0.739 W/kg; SAR(10 g) = 0.241 W/kg  
 Smallest distance from peaks to all points 3 dB below = 6.3 mm  
 Ratio of SAR at M2 to SAR at M1 = 38.7%  
 Maximum value of SAR (measured) = 0.883 W/kg





**15. CALIBRATION REPORTS-PROBE**

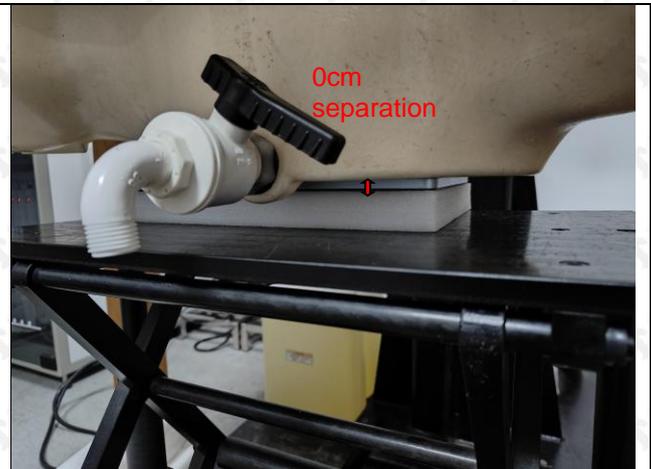
The Probe, Dipole and DAE calibration please refer to the Attachment.

**16. SAR SYSTEM PHOTOS**

## 17. SETUP PHOTOS



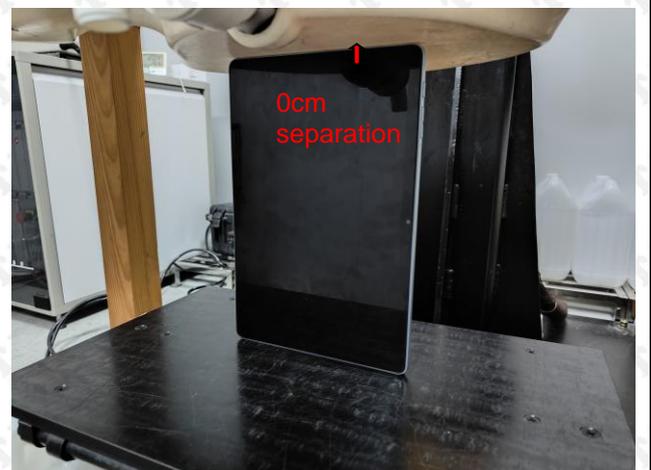
Hotspot( Front side)



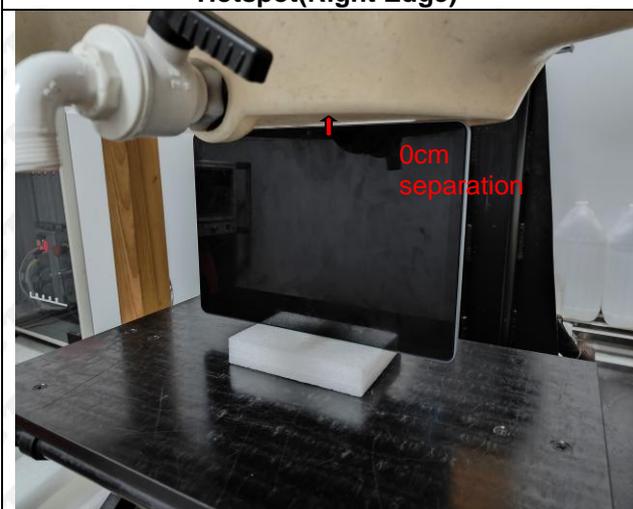
Hotspot ( Back side)



Hotspot(Right Edge)



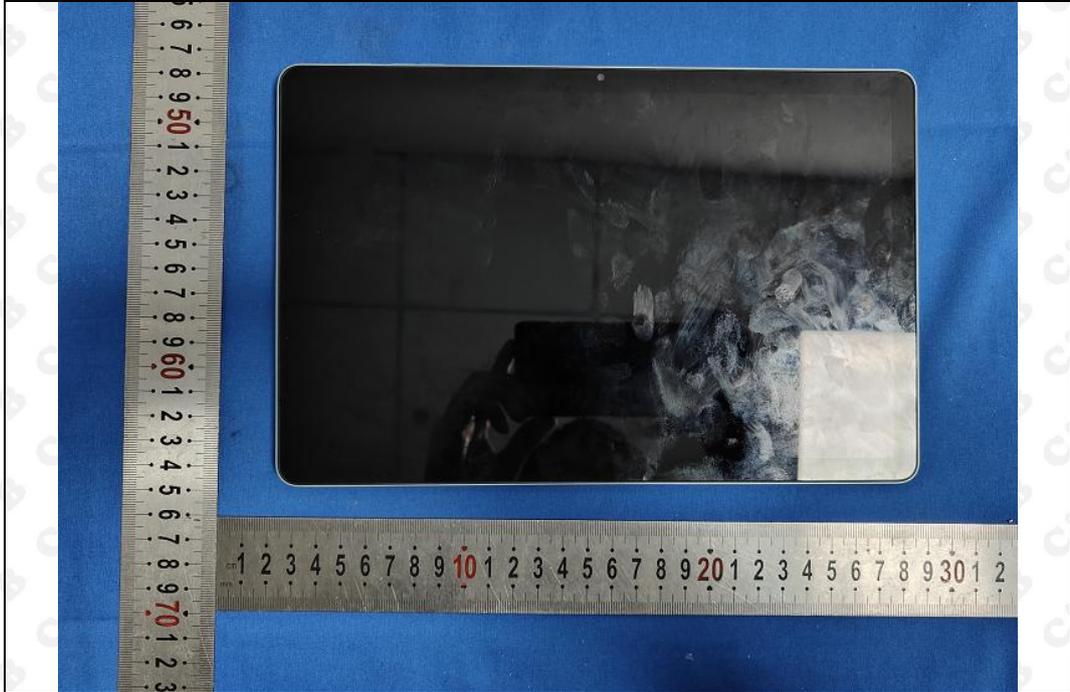
Hotspot(Left Edge)



Hotspot(Top Edge)



Hotspot(Bottom Edge)

**18. EUT PHOTOS****Front side****Back side**

====End of Report====