FCC SAR Test Report

Applicant:	Meferi Technologies Co., Ltd.
EUT Description:	MOBILE COMPUTER
Model:	ME65
Model Covered:	ME65P, ME65T, ME65H, ME65L, ME65S, ME68
FCC ID:	2A9LJ-ME65
Standards:	FCC 47CFR §2.1093
Date of Receipt:	2024/06/05
Date of Test:	2024/08/01 to 2024/08/02
Date of Issue:	2024/08/12

TOWE. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

the results documented in this report apply only the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility assure that additional production units of the model are manufactured with identical electrical and mechanical components. All sample tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise. without written approval of TOWE, the test report shall not be reproduced except in full.

Huang Kun
Approved By:

Li Wei
Reviewed By:

Revision History

Rev.	Issue Date	Description	Revised by
01	2024/08/12	Original	Li Wei

Table of Contents

1 Summary of Test Results

Band	Highest SAR(W/kg)			Highest PD (W/m^2)
	Head 1g SAR	Body worn 1g SAR	Product specific 10g SAR	
WIFI 6E	0.04	0.04	0.15	7.32
Limit	1.6		4.0	10.0

2 Guidance Applied

FCC 47CFR §2.1093
ANSI/IEEE C95.1-1992
IEEE 1528-2013
IEC/IEEE 62209-1528:2020
IEC TR 63170:2018
IEC 62479:2010
KDB 447498 D01 General RF Exposure Guidance v06
KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02 RF Exposure Reporting v01r02
KDB 248227 D01 802.11 Wi-Fi SAR v02r02
KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03

3 Lab Information

3.1 Testing Location

These measurements tests were conducted at the Sushi TOWE Wireless Testing (Shenzhen) Co., Ltd. facility located at F401 and F101, Building E, Hongwei Industrial Zone, Liuxian 3rd Road, Bao'an District, Shenzhen, China. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014
Tel.: +86-755-27212361
Contact Email: info@towewireless.com

3.2 Test Facility / Accreditations

A2LA (Certificate Number: 7088.01)
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. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

FCC Designation No.: CN1353
Sushi TOWE Wireless Testing (Shenzhen) Co., Ltd. has been recognized as an accredited testing laboratory.
Designation Number: CN1353.

ISED CAB identifier: CN0152
Sushi TOWE Wireless Testing (Shenzhen) Co., Ltd. has been recognized by ISED as an accredited testing laboratory.
CAB identifier: CN0152
Company Number: 31000

3.3 Ambient Condition

Temperature: 18°C~25°C
Relative Humidity: 30%~75%

4 Client Information

4.1 Applicant

Applicant:	Meferi Technologies Co., Ltd.
Address:	4F, A6, Tianfu Software Park, No. 1129, Century City Road, High-tech Zone, 610041, Chengdu, Sichuan, 610041 China

4.2 Manufacturer

Applicant:	Meferi Technologies Co., Ltd.
Address:	4F, A6, Tianfu Software Park, No. 1129, Century City Road, High-tech Zone, 610041, Chengdu, Sichuan, 610041 China

5 Product Information

EUT Description	MOBILE COMPUTER	
Model	ME65	
Model Covered	ME65P,ME65T,ME65H,ME65L,ME65S,ME68	
Hardware Version	V1.0	
Software Version	ME65_EN_GE_V01_Q4_H01_20240328	
IMEI	861992060070485	
Device Capabilities:		
Band	Frequency Range (MHz)	Modulation Type
WIFI 6E	5925 ~ 6425 6425 ~ 6525 6525 ~ 6875 6875 ~ 7125	OFDM OFDMA
Antenna Type	☐ External, ☒ Integrated	
Battery Information	Model:	BATME61
	Normal Voltage:	+3.85V
	Rated capacity:	5000mAh
	Manufacturer:	DONGGUAN BOB ELECTRONICS CO.,LTD.

Remark:
1. The above EUT's information was declared by applicant, please refer to the specifications or user manual for more detailed description.
2. The 6GHz WLAN can transmit in MIMO antenna mode only.
3. Reference applicant Model Confirmation Letter:
   Their electrical circuit design, layout, components used, and internal wiring are identical, with only differences on model Number.
   According to the difference description above, only the ME65 model is tested, and other models share the same test data of ME65.

5.1 Antenna Locations

Refer to Appendix D Test Setup Photos.

Note:

1) The test device is a smart phone. The overall diagonal dimension of this device is >160 mm. Per KDB 648474 D04, because the diagonal distance of this device is ≥160mm, so it is a phablet.

2) According to the distance between WIFI antenna and the sides of the EUT we can draw the conclusion that:

EUT sides for testing							
Mode	Exposure Condition	Front	Back	Left	Right	Top	Bottom
WIFI 6E MIMO	Product specific 10g SAR	Yes	Yes	No	Yes	Yes	No

Note: When the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested.

6 RF Exposure Limits

RF Exposure Limit for below 6GHz

Human Exposure	Uncontrolled Environment General Population (W/kg) or (mW/g)	Controlled Environment Occupational (W/kg) or (mW/g)
Spatial Peak SAR[1] (Brain/Trunk)	1.6	8.0
Spatial Average SAR[2] (Whole Body)	0.08	0.4
Spatial Peak SAR[3] (Hands/Feet/Ankle/Wrist)	4.0	20.0

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 a cube) and over the appropriate averaging time.

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

RF Exposure Limit for above 6GHz

Per §1.1310 (d)(3), the MPE limits are applied for frequencies above 6 GHz. Power Density is expressed in units of W/m^2 or mW/cm^2.

Peak Spatially Averaged Power Density was evaluated over a circular area of 4cm^2 per interim FCC Guidance for near-field power density evaluations per October 2018 TCB Workshop notes.

Human Exposure to Radiofrequency (RF) Radiation Limits		
Frequency Range (MHz)	**Power Density (mW/cm^2)**	**Average Time (Minutes)**
(A)Limits for Occupational/Controlled Environments		
1,500-100,000	5.0	6
(B)Limits for General Population/Uncontrolled Environments		
1,500-100,000	1.0	30

Note: 1.0 mW/cm^2 is 10.0 W/m^2.

7 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.

7.1 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:

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

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

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

Where:

σ is the conductivity of the tissue material (S/m)

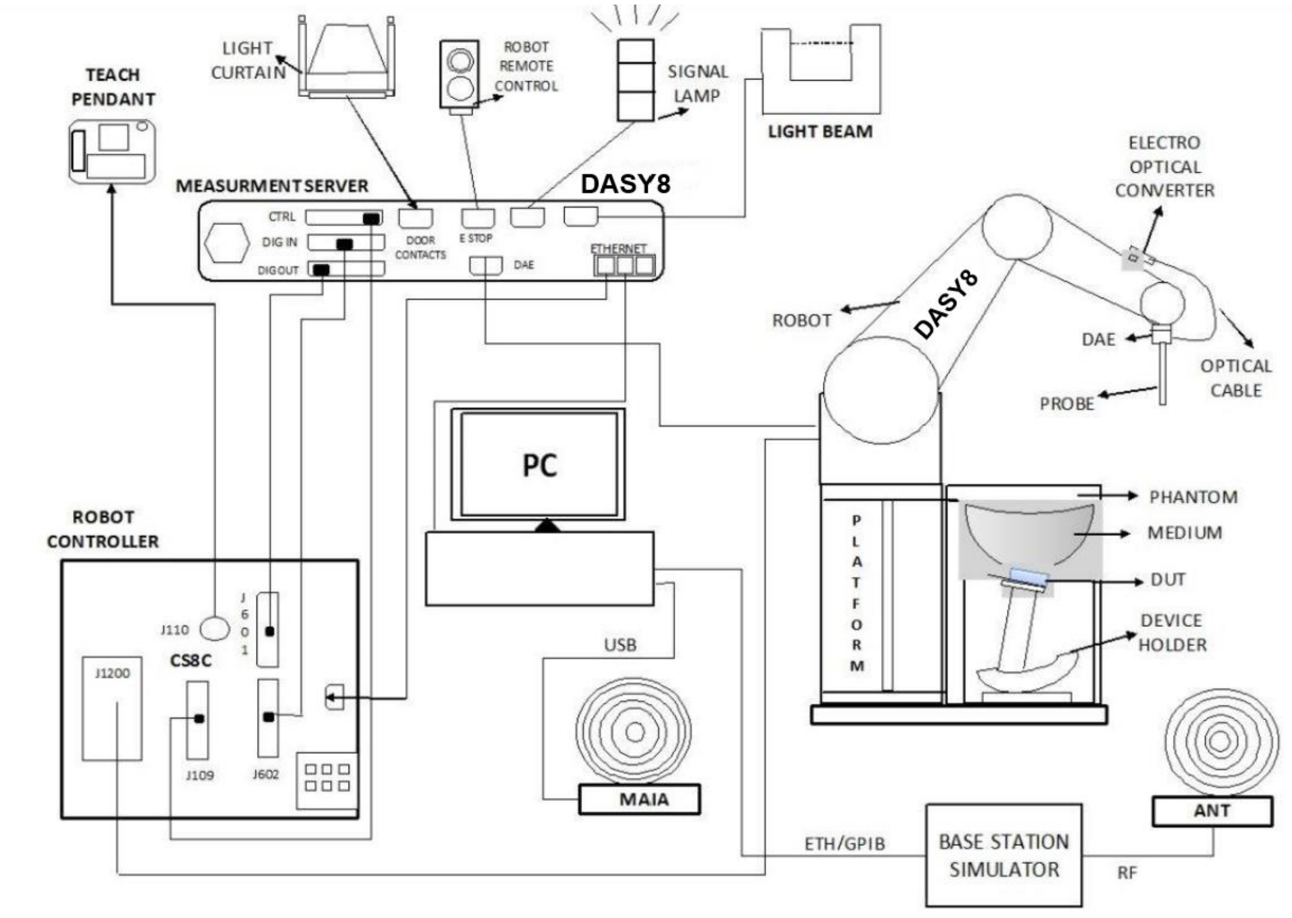
ρ is the mass density of the tissue material (kg/m^3)

E is the RMS electrical field strength (V/m)

8 SAR Measurements System

8.1 The SAR Measurement Set-up

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (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.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Windows 11 and the DASY8 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

8.2 Measurement procedure

8.2.1 Power reference measurement

The Power Reference Measurement and Power Drift Measurement jobs are useful jobs 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.

8.2.2 Area scan

Measurement procedures for evaluating SAR from wireless handsets typically start with a coarse measurement grid to determine the approximate location of the local peak SAR values. This is known as the area-scan procedure. In addition, identify the positions of any local maxima with SAR values within 2 dB of the maximum value, and that will not be within the zoom scan of other peaks. Additional zoom scans shall be measured for such peaks only when the primary peak is within 2 dB of the SAR compliance limit.

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

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

8.2.3 Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz.

<table>
<tr><th colspan="3"></th><th>$\leq$ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>$\leq$ 2 GHz: $\leq$ 8 mm
2 – 3 GHz: $\leq$ 5 mm*</td><td>3 – 4 GHz: $\leq$ 5 mm*
4 – 6 GHz: $\leq$ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>$\leq$ 5 mm</td><td>3 – 4 GHz: $\leq$ 4 mm
4 – 5 GHz: $\leq$ 3 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>$\leq$ 4 mm</td><td>3 – 4 GHz: $\leq$ 3 mm
4 – 5 GHz: $\leq$ 2.5 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>$\geq$ 30 mm</td><td>3 – 4 GHz: $\geq$ 28 mm
4 – 5 GHz: $\geq$ 25 mm
5 – 6 GHz: $\geq$ 22 mm</td></tr>
</table>

8.2.4 Power Drift Measurement

The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. Several drift measurements are possible for one reference measurement. This allows a user to monitor the power drift of the device under test that must remain within a maximum variation of ±5%. Detail power drift measurement refer to appendix B.

9 Test Equipment list

Manufacturer	Equipment Name	Model	Serial Number	Calibration Date	Due Date of calibration
SPEAG	Twin Phantom	SAM	2168	NCR	NCR
SPEAG	mmWave Phantom	mmWave	1121	NCR	NCR
SPEAG	E-Field Probe	EX3DV4	7858	2024/01/09	2025/01/08
SPEAG	EUmmWV Probe Tip Protection	EUmmWV4	9499	2023/11/29	2024/11/28
SPEAG	Data Acquisition Electronics	DAE4	1846	2023/11/29	2024/11/28
SPEAG	Data Acquisition Electronics	DAE4	1847	2024/01/04	2025/01/03
SPEAG	System Validation Kits	D6.5GHzV2	1096	2023/05/11	2026/05/10
SPEAG	5G Verification Source	10GHz	1075	2023/11/28	2024/11/27
SPEAG	Dielectric parameter probes	DAK3.5	1341	2024/07/15	2025/07/14
R&S	Vector network analyzer	ZNB8	101413	2024/07/17	2025/07/16
R&S	Signal Generator	SMR20	100621	2024/03/25	2025/03/24
R&S	AVG Power Sensor	NRP-Z21	101651	2024/03/25	2025/03/24
R&S	AVG Power Sensor	NRP-Z21	104189	2024/03/25	2025/03/24
HAISIDIKE	Thermometer	TP300	TOWE-EQ-SR-023	2024/03/27	2025/03/26
BingYu	Temperature and Humidity Indicator	HTC-1	TOWE-EQ-SR-024	2024/03/26	2025/03/25
BingYu	Temperature and Humidity Indicator	HTC-1	TOWE-EQ-SR-027	2024/06/03	2025/06/02
Talent Microwave	Directional Coupler	TC-05180-10S	220420003	NCR	NCR
QiJi	Amplifier	YX28982301	TOWE-EQ-SR-020	NCR	NCR

Note:

1. 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.

2. The justification data of dipole can be found in Appendix C. The return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration.

10 SAR measurement variability

SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue equivalent medium.

The following procedures are applied to determine if repeated measurements are required.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 or 2 W/kg (1-g or 10-g respectively); steps2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 or 2 W/kg (1-g or 10-g respectively), repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 or 3.6W/kg (~ 10% from the 1-g or 10-g respective SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 or 3.75 W/kg (1-g or 10-g respectively) and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20

11 Description of Test Position

11.1 Ear Reference Point

Figure 11-2 shows the front, back and side views of the SAM Twin 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 ERP is 15mm posterior to the entrance to the ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 11-1. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front), also called the Reference Pivoting Line, is not perpendicular to the reference plane (see Figure 11-1). 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.

11.2 Handset Reference Point

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The device under test was placed in a normal operating position with the acoustic output located along the "vertical centerline" on the front of the device aligned to the "ear reference point" (see Figure 11-3). The acoustic output was than located at the same level as the center of the ear reference point. The device under test was positioned so that the "vertical centerline" was bisecting the front surface of the handset at its top and bottom edges, positioning the "ear reference point" on the outer surface of the both the left and right head phantoms on the ear reference point.

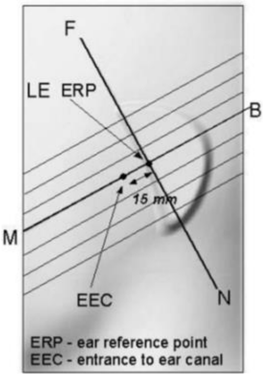


Figure 11-1: Close-up side view of phantom showing the ear region, N-F and B-M lines, and seven cross-sectional plane locations.

Figure 11-2: Front, back and side view of SAM Twin Phantom.

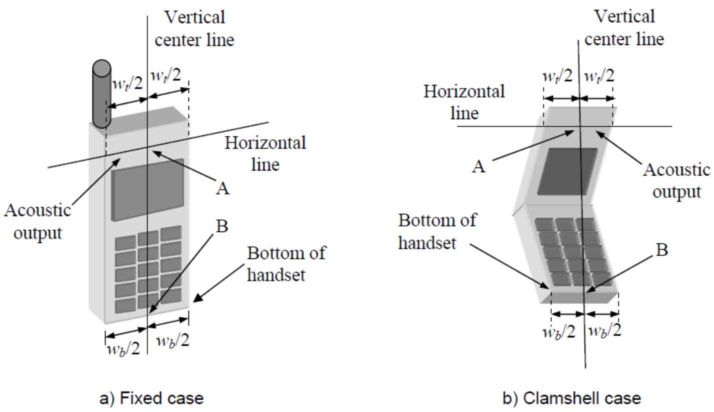


Figure 11-3: Handset vertical and horizontal reference lines

11.3 Definition of the cheek position

The test device was positioned with 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 11-4), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.

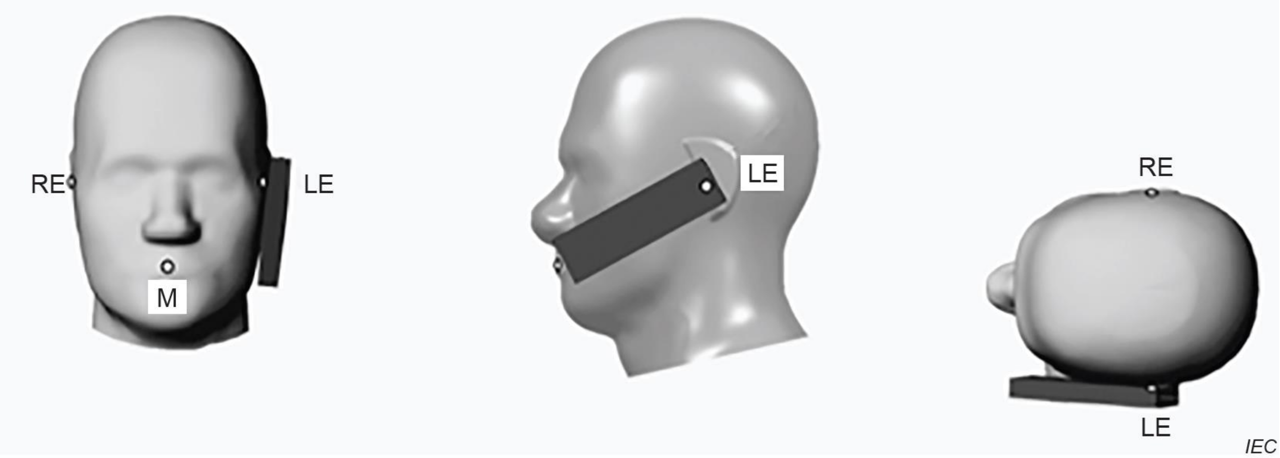


Figure 11-4: Front, Side and Top View of Cheek or Touch Position

1) Position the handset 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 11-4), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
2) Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
3) While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
4) Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
5) While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Figure 11-4. The actual rotation angles should be documented in the test report.

11.4 Definition of the tilt position

Figure 11-5. shows tilted position. Place the device in the cheek position. Then while maintaining the orientation of the device, retract the device parallel to the reference plane far enough away from the phantom to enable a rotation of the device by 15°.

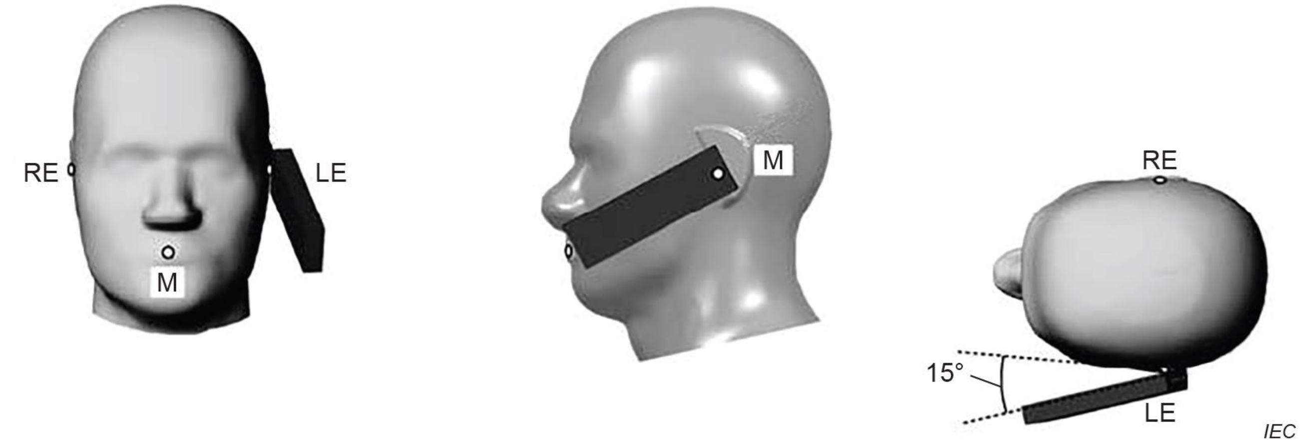


Figure 11-5: Front, Side and Top View of Tilt 15° Position

11.5 Body-worn accessory exposure conditions

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 11-6). Per FCC KDB Publication 648474 D04, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

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

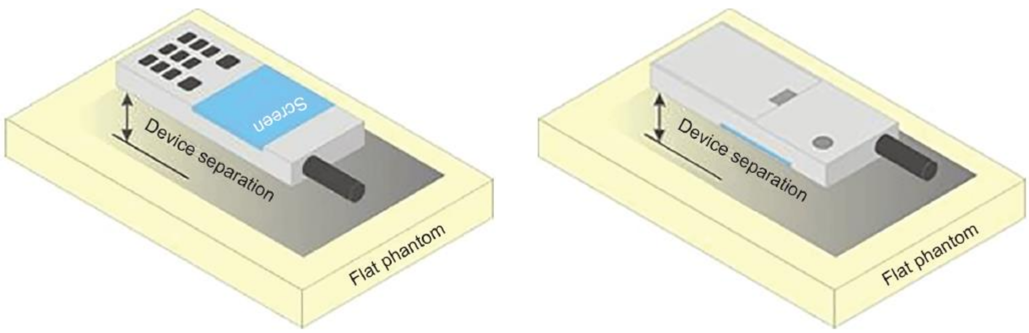


Figure 11-6: Test positions for body-worn devices

11.6 Product Specific 10g SAR exposure conditions

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions, i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user’s body, SAR compliance for the body is also required. The 1g body and 10g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D01 should be applied to determine SAR test requirements.

For smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear. the phablets procedures outlined in KDB Publication 648474 D04 v01r03 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally required head and body-worm accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna ≤25 mm from that surface or edge, in direct contact with the phantom, for 10-g SAR. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g SAR is required only for the surfaces and edges with hotspot mode scaled to the maximum output power (including tolerance) is 1-g SAR > 1.2 W/kg.

12 System Verification

12.1 Tissue Verification

The Conductivity (σ) and Permittivity (ρ) are listed in bellow table. The temperature variation of the Tissue Simulate Liquids was 22±2°C, the liquid depth of the ear reference point or the flat phantom was at least 15 cm (which is shown in Figure 12-1/12-2).

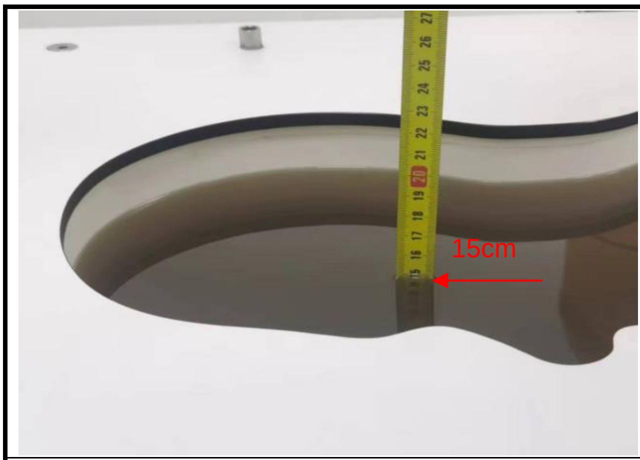


Figure 12-1 Liquid depth in the Head Phantom

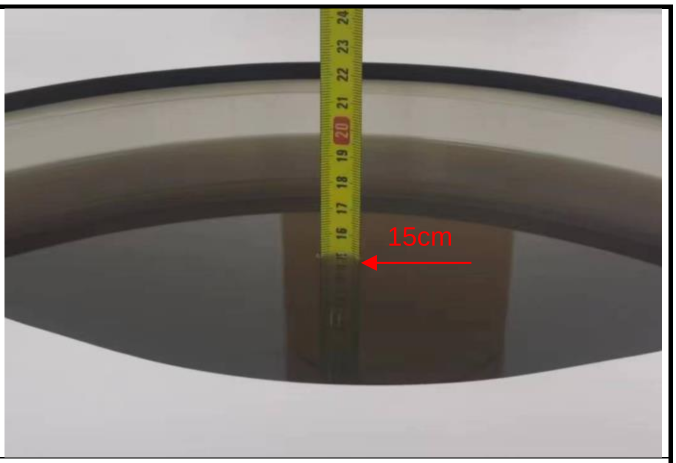


Figure 12-2 Liquid depth in the Flat Phantom

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Target Tissue		Measured Tissue		Deviation (Limit ±5%)		Date
			Permittivity ε_r	Conductivity σ(S/m)	Permittivity ε_r	Conductivity σ(S/m)	$\Delta\varepsilon_r$	Δσ	
6500	Head	22.6	34.50	6.07	34.900	6.190	1.16%	1.98%	2024/08/01

Table 1： Measurement Tissue Parameters

12.2 SAR System Check

Prior to SAR assessment, a SAR system Check measurement was performed to see if the measured SAR was within ±10% from the target SAR values. The System Performance Check Setup in Figure 12-3.

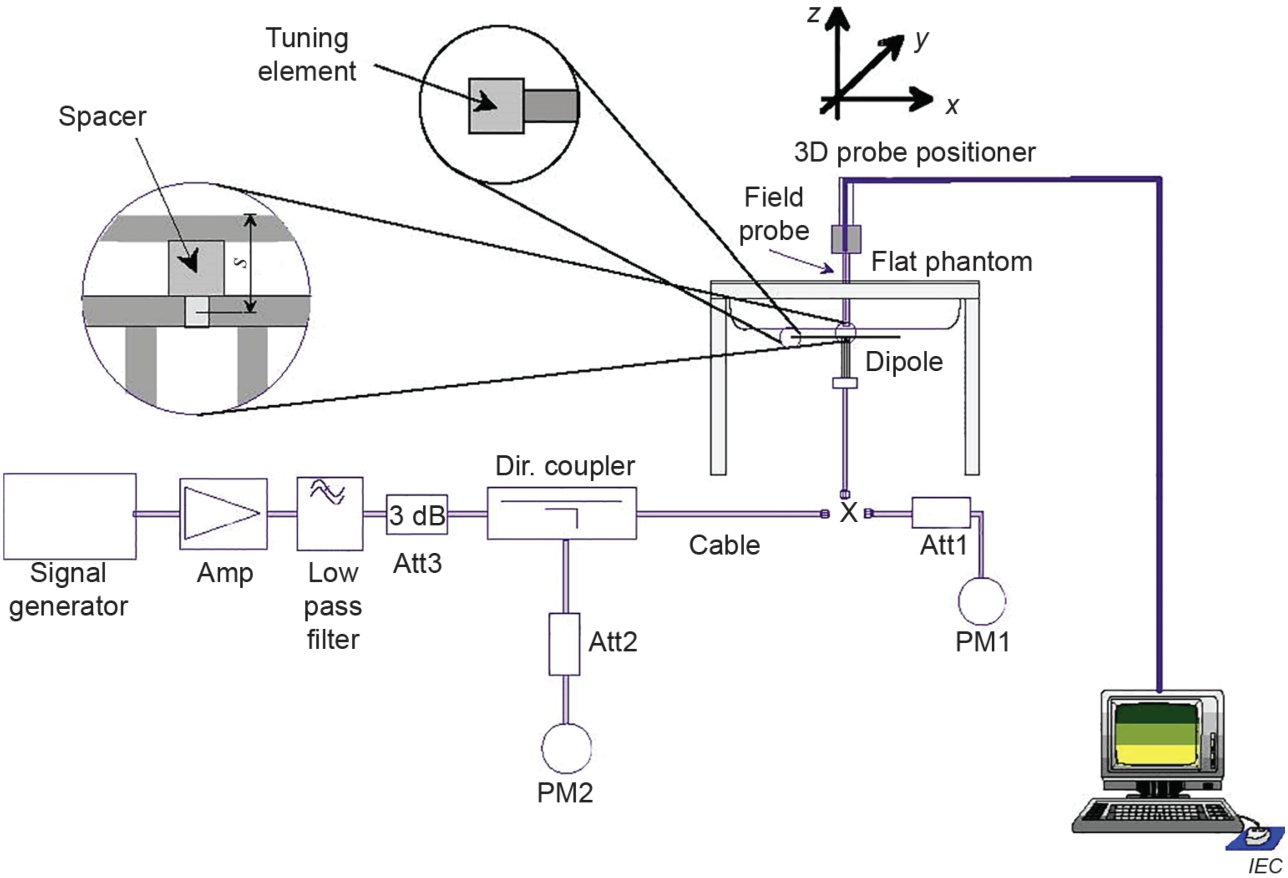


Figure 12-3 System Performance Check Setup

12.2.1 System Check Result

Frequency (MHz)	Tissue Type	Dipole	S/N	Target SAR (1W)		Measured SAR (250mW)		Measured SAR (normalized to 1W)		Deviation (Limit ±10%)		Date
				1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	1g (W/kg)	10g (W/kg)	Δ1g	Δ10g	
6500	Head	D6.5GHzV2	1096	289.00	53.40	28.60	5.45	286.00	54.50	-1.04%	2.06%	2024/08/01

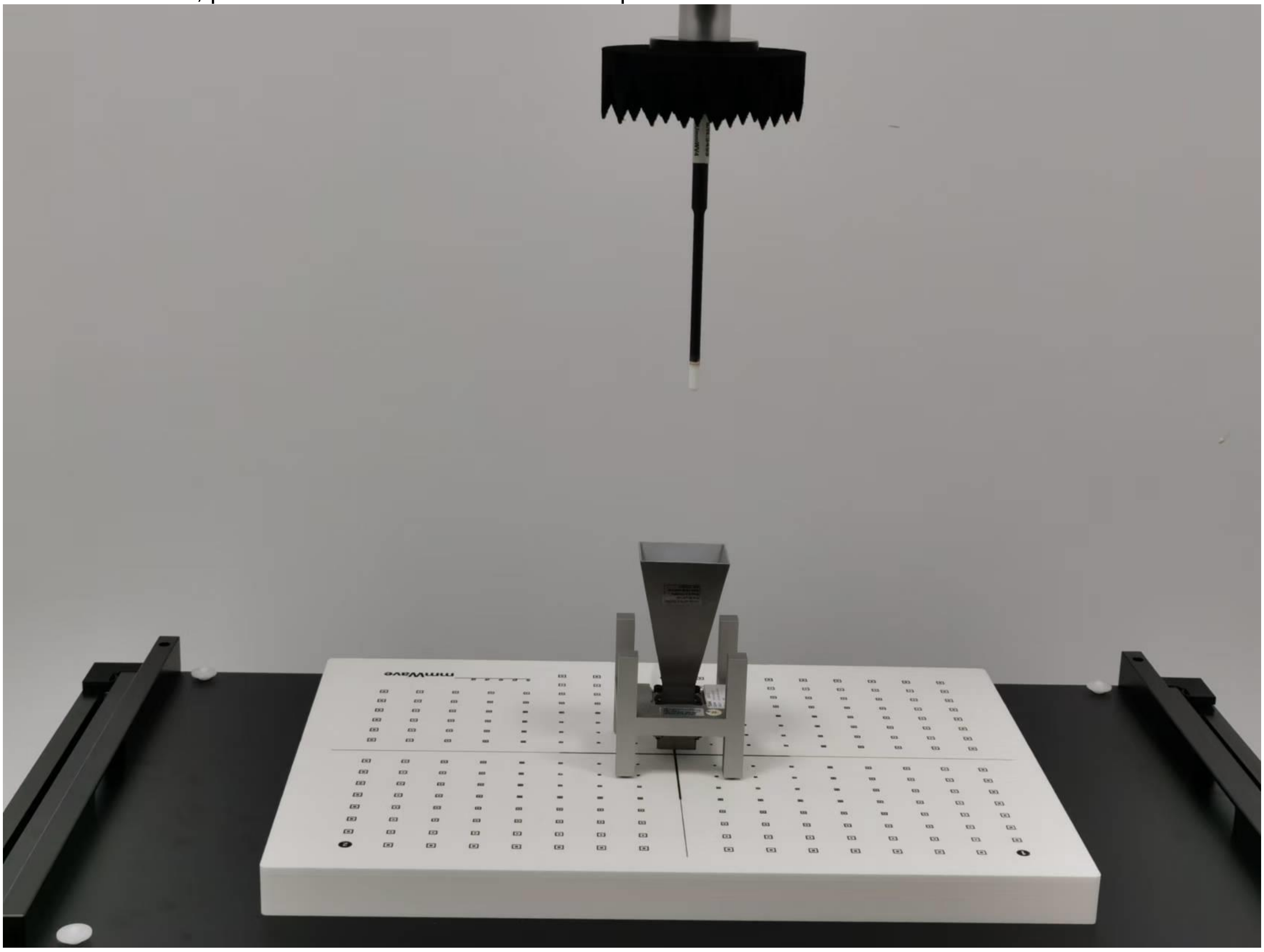
Table 2： SAR System Check Result

12.2.2 Detailed System Check Result

Please see the Appendix A

12.3 PD System Verification

The system was verified to be within ±0.66 dB of the power density targets on the calibration certificate according to the test system specification in the user's manual and calibration facility recommendation. The 0.66 dB deviation threshold represents the expanded uncertainty for system performance checks using SPEAG's mmWave verification sources. The same spatial resolution and measurement region used in the source calibration was applied during the system check.
The measured power density distribution of verification source was also confirmed through visual inspection to have no noticeable differences, both spatially (shape) and numerically (level) from the distribution provided by the manufacturer, per November 2017 TCBC Workshop Notes



System Verification Setup Photo

Frequency (GHz)	PD Verification Source	Distance (mm)	Measured 4cm^2 (W/m^2)	Target 4cm^2 (W/m^2)	Deviation (dB)	Measured Date
10G	10GHz_1075	10	61.2	57.5	0.27	2024/08/02

Detailed System Check Results Please see the Appendix A.

13 Conducted Power

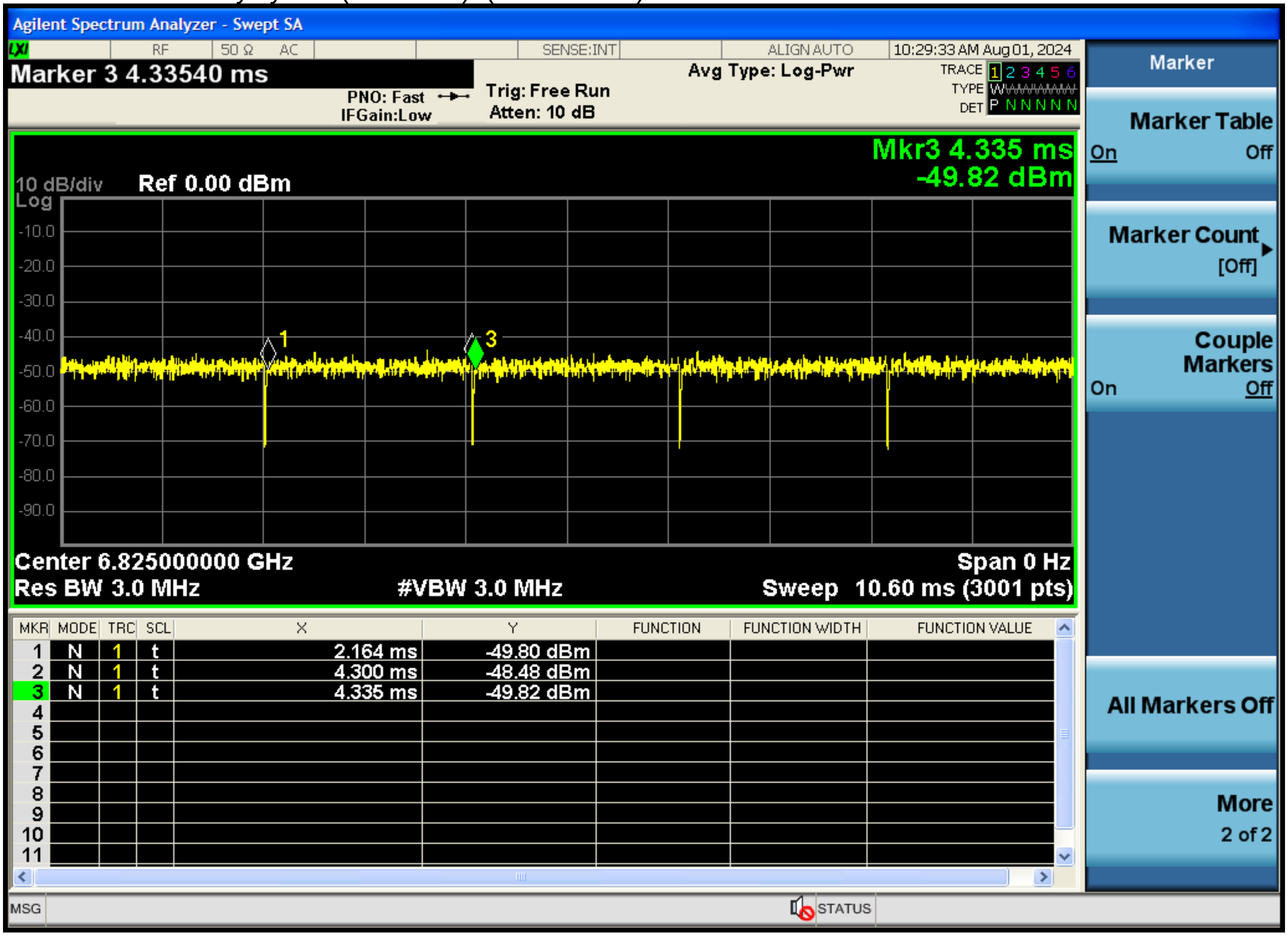
13.1 Conducted Power of WIFI 6E

Note:

1. WLAN 6GHz operations are limited to MIMO operations only (does not supported standalone mode), SAR and PD for MIMO was evaluated by making a measurement with both antennas transmitting simultaneously.
2. When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/ax mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
3. Per 201904 TCBC workshops, General principles of KDB 248227 D01 can be applied to determine the SAR initial Test Configurations and test reduction for 802.11ax SAR testing. For the table below the 802.11ax maximum power is SU (non-OFDMA), and the SU maximum power also higher than RU (OFDMA)
4. In applying the test guidance, the IEEE 802.11 mode with the maximum output power (out of all modes) should be considered for testing.
5. For modes with the same maximum output power, he guidance from section 5.3.2 a) of KDB 248227 D01 should be applied, with 802.11ax being considered as the highest 802.11 mode for the appropriate frequency bands.
6. 802.11 ax/be supports both full tone size mode and partial tone size mode, after verification on partial tone size mode that partial size tone mode power will not be higher than full tone size mode, therefore, full tone mode power was chosen to be measured in this report.

MIMO					
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Tune up	SAR Test
802.11a	1	5955	No Required	11.00	No
	45	6175		11.00	
	113	6515		11.00	
	181	6855		11.00	
	233	7115		11.00	
802.11ax 20M	1	5955	No Required	11.00	No
	45	6175		11.00	
	113	6515		11.00	
	181	6855		11.00	
	233	7115		11.00	
802.11ax 40M	3	5965	No Required	11.00	No
	43	6165		11.00	
	107	6485		11.00	
	179	6845		11.00	
	227	7085		11.00	
802.11ax 80M	7	5985	No Required	11.00	No
	87	6385		11.00	
	103	6465		11.00	
	167	6785		11.00	
	215	7025		11.00	
802.11ax 160M	15	6025	9.82	11.50	Yes
	79	6345	10.34	11.50	
	111	6505	10.49	11.50	
	175	6825	11.21	11.50	
	207	6985	9.62	11.50	

802.11ax 160M Duty cycle= (4.3-2.164)/ (4.335-2.164) =98.39%



14 Data Summary

General Notes:

1) The Highest Reported SAR Plot and PD Plot refer to Appendix B.
2) Per KDB 447498 D01, testing of other required channels within the operating mode of a frequency band is not required when the reported 1g or 10g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8W/kg for 1g or 2.0W/kg for 10g respectively, when the transmission band is ≤ 100MHz.
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1g or 10g respectively, when the transmission band is between 100 MHz and 200MHz.
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1g or 10g respectively, when the transmission band is ≥ 200MHz.
3) For WIFI 6E doesn't support wireless router capability.
4) Per October 2020 TCB Workshop interim procedures, start instead with a minimum of 5 test channels across the full band, then adapt and apply conducted power and SAR test reduction procedures of KDB 248227 v02r02.
5) Absorbed power density (APD) using a 4cm^2 averaging area is reported based on SAR measurements.
6) Per FCC guidance and equipment manufacturer guidance, the power density results were scaled according to IEC 62479:2010 for the portion of the measurement uncertainty > 30%. Total expanded uncertainty of 2.67 dB (84.93%) was used to determine the psPD measurement scaling factor.
7) Per April 2021 TCB Workshop, For the highest SAR test configurations also measure incident PD (total) using power-density reconstruction method in 2 mm closest measurement plane.
8) IPD is measured for all edges and surfaces of the device with a transmitting antenna located within 25 mm from that surface or edge.
9) The measurement procedure consists of measuring the PDinc at two different distances: 2 mm (compliance distance) and λ/5. The grid extents should be large enough to fully capture the transmitted energy. The grid step should be fine enough to demonstrate that the integrated Power Density iPDn fulfil the criterion described below. Since iPD ratio between the two distances is ≥ -1dB, the grid step (0.0625) was sufficient for determining compliance at d=2mm.

$$10 \cdot log_{10}\frac{iPD_n(2mm)}{iPD_n(\lambda/5)} \geq -1$$

14.1 SAR Measurement Result of WIFI 6E

MIMO Test Results												
Test position	**Mode**	**Ch./Freq. (MHz)**	**SAR (W/kg) 1g**	**Power Drift (dB)**	**Duty Cycle**	**Duty Cycle Scaling Factor**	**Conducted Power (dBm)**	**Tune up Limit (dBm)**	**Scaling Factor**	**Reported 1g SAR (W/kg)**	**Measured APD (W/m^2)**	**Reported APD (W/m^2)**
Head												
Left cheek	802.11ax 160M	175/6825	0.016	0.00	98.39%	1.016	11.21	11.50	1.069	0.017	0.080	0.087
Left tilted	802.11ax 160M	175/6825	0.014	0.00	98.39%	1.016	11.21	11.50	1.069	0.015	0.082	0.089
Right cheek	802.11ax 160M	175/6825	0.014	0.00	98.39%	1.016	11.21	11.50	1.069	0.015	0.119	0.129
Right tilted	802.11ax 160M	175/6825	0.011	0.16	98.39%	1.016	11.21	11.50	1.069	0.012	0.070	0.076
Left cheek	802.11ax 160M	15/6025	0.016	0.09	98.39%	1.016	9.82	11.50	1.472	0.024	0.068	0.102
Left cheek	802.11ax 160M	79/6345	0.015	0.02	98.39%	1.016	10.34	11.50	1.306	0.020	0.075	0.100
Left cheek	802.11ax 160M	111/6505	0.027	0.00	98.39%	1.016	10.49	11.50	1.262	**0.035**	0.446	0.572
Left cheek	802.11ax 160M	207/6985	0.015	0.03	98.39%	1.016	9.62	11.50	1.542	0.023	0.108	0.169
Body worn 10mm												
Front side	802.11ax 160M	175/6825	0.009	0.00	98.39%	1.016	11.21	11.50	1.069	0.010	0.054	0.059
Back side	802.11ax 160M	175/6825	0.026	0.00	98.39%	1.016	11.21	11.50	1.069	0.028	0.121	0.131
Back side	802.11ax 160M	15/6025	0.017	0.00	98.39%	1.016	9.82	11.50	1.472	0.025	0.137	0.205
Back side	802.11ax 160M	79/6345	0.024	0.03	98.39%	1.016	10.34	11.50	1.306	0.032	0.159	0.211
Back side	802.11ax 160M	111/6505	0.031	0.03	98.39%	1.016	10.49	11.50	1.262	**0.040**	0.080	0.103
Back side	802.11ax 160M	207/6985	0.013	0.00	98.39%	1.016	9.62	11.50	1.542	0.020	0.131	0.205
Test position	**Mode**	**Ch./Freq. (MHz)**	**SAR (W/kg) 10g**	**Power Drift (dB)**	**Duty Cycle**	**Duty Cycle Scaling Factor**	**Conducted Power (dBm)**	**Tune up Limit (dBm)**	**Scaling Factor**	**Reported 10g SAR (W/kg)**	**Measured APD (W/m^2)**	**Reported APD (W/m^2)**
Product specific 10g SAR 0mm												
Front side	802.11ax 160M	175/6825	0.001	0.00	98.39%	1.016	11.21	11.50	1.069	0.001	0.033	0.036
Back side	802.11ax 160M	175/6825	0.024	0.00	98.39%	1.016	11.21	11.50	1.069	0.026	0.686	0.745
Right side	802.11ax 160M	175/6825	0.012	0.00	98.39%	1.016	11.21	11.50	1.069	0.013	0.280	0.304
Top side	802.11ax 160M	175/6825	< 0.001	0.00	98.39%	1.016	11.21	11.50	1.069	< 0.001	0.013	0.014
Back side	802.11ax 160M	15/6025	0.053	0.00	98.39%	1.016	9.82	11.50	1.472	0.079	1.200	1.795
Back side	802.11ax 160M	79/6345	0.036	0.00	98.39%	1.016	10.34	11.50	1.306	0.048	0.812	1.078
Back side	802.11ax 160M	111/6505	0.116	0.03	98.39%	1.016	10.49	11.50	1.262	**0.149**	2.730	3.500
Back side	802.11ax 160M	207/6985	0.027	0.00	98.39%	1.016	9.62	11.50	1.542	0.042	0.672	1.053

Table 3： SAR of WIFI 6E.

14.2 PD Measurement Result of WIFI 6E

Test position	Mode	Ch./Freq. (MHz)	Gap (mm)	Grid Step (λ)	Conducted Power(dBm)	Tune up Limit(dBm)	iPDn	iPD ratio (≥ -1)	Normal psPD (W/m^2)	Total psPD (W/m^2)
Back side	802.11ax 160M	175/6825	2.0	0.0625	11.21	11.50	150	-0.62	1.770	3.500
Back side	802.11ax 160M	175/6825	8.8	0.25	11.21	11.50	173		0.636	0.852

MIMO Test Results														
Test position	Mode	Ch./Freq. (MHz)	Gap (mm)	Grid Step (λ)	Normal psPD (W/m^2)	Total psPD (W/m^2)	Duty Cycle	Duty Cycle Scaling Factor	Conducted Power (dBm)	Tune up Limit (dBm)	Scaling Factor	Scaling Factor for Measurement Uncertainty	Reported Normal psPD (W/m^2)	Reported Total psPD (W/m^2)
Front side	802.11ax 160M	175/6825	2.0	0.0625	0.288	0.545	98.39%	1.016	11.21	11.50	1.069	1.5493	0.485	0.917
Back side	802.11ax 160M	175/6825	2.0	0.0625	1.770	3.500	98.39%	1.016	11.21	11.50	1.069	1.5493	2.979	5.890
Right side	802.11ax 160M	175/6825	2.0	0.0625	0.470	1.280	98.39%	1.016	11.21	11.50	1.069	1.5493	0.791	2.154
Top side	802.11ax 160M	175/6825	2.0	0.0625	1.660	3.190	98.39%	1.016	11.21	11.50	1.069	1.5493	2.793	5.368
Back side	802.11ax 160M	15/6025	2.0	0.0625	1.280	2.970	98.39%	1.016	9.82	11.50	1.472	1.5493	2.966	6.883
Back side	802.11ax 160M	79/6345	2.0	0.0625	1.620	3.560	98.39%	1.016	10.34	11.50	1.306	1.5493	3.331	**7.319**
Back side	802.11ax 160M	111/6505	2.0	0.0625	1.600	2.980	98.39%	1.016	10.49	11.50	1.262	1.5493	3.178	5.919
Back side	802.11ax 160M	207/6985	2.0	0.0625	1.300	2.170	98.39%	1.016	9.62	11.50	1.542	1.5493	3.155	5.266

Table 4： PD of WIFI 6E.

15 Measurement Uncertainty

Applicable for SAR Measurements							
a	c	d	e = f(d,k)	g	g	i = C*g/e	i = C*g/e
Uncertainty Component	Tol (%)	Prob. Dist.	Div.	Ci	Ci	u_i(%)	u_i(%)
				1g	10g	1g	10g
Measurement System							
Probe calibration	6.95	N	1	1	1	6.95	6.95
Axial isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.90	1.90
Hemispherical isotropy	9.6	R	$\sqrt{3}$	0.7	0.7	3.88	3.88
Linearity	4.7	R	$\sqrt{3}$	1	1	2.71	2.71
Modulation response	2.4	R	$\sqrt{3}$	1	1	1.39	1.39
Detection limits	0.25	R	$\sqrt{3}$	1	1	0.14	0.14
Boundary effect	2	R	$\sqrt{3}$	1	1	1.15	1.15
Readout electronics	0.3	N	1	1	1	0.3	0.3
Response time	0	R	$\sqrt{3}$	1	1	0.00	0.00
Integration time	2.6	R	$\sqrt{3}$	1	1	1.50	1.50
RF ambient conditions – noise	3	R	$\sqrt{3}$	1	1	1.73	1.73
RF ambient conditions – reflections	3	R	$\sqrt{3}$	1	1	1.73	1.73
Probe positioner mech. Restrictions	0.8	R	$\sqrt{3}$	1	1	0.46	0.46
Probe positioning with respect to phantom shell	6.7	R	$\sqrt{3}$	1	1	3.87	3.87
Post-processing	4	R	$\sqrt{3}$	1	1	2.31	2.31
Test sample related							
Device holder	3.6	N	1	1	1	3.60	3.60
Device positioning	1.89	N	1	1	1	1.89	1.89
Power scaling	5	R	$\sqrt{3}$	1	1	2.89	2.89
Output power variation-SAR drift measurement	5	R	$\sqrt{3}$	1	1	2.89	2.89
Phantom and set-up							
Phantom uncertainty	6.6	R	$\sqrt{3}$	1	1	3.81	3.81
uncertainty in SAR correction for deviations in permittivity and conductivity	1.2	N	1	1	0.84	1.20	1.01
Liquid conductivity measurement	0.82	N	1	0.78	0.71	0.64	0.58
Liquid permittivity measurement	2.39	N	1	0.23	0.26	0.55	0.62
Liquid permittivity –temperature	1.30	R	$\sqrt{3}$	0.78	0.71	0.59	0.53
Liquid conductivity –temperature	1.60	R	$\sqrt{3}$	0.23	0.26	0.21	0.24
Combined standard uncertainty						12.52	12.50
Expanded uncertainty (K=2)						**25.04**	**25.00**

Applicable for Power Density Measurements						
a	b	c	d	e	f=b*e/d	g
Error Description	Uncertainty Value (±dB)	Probability	Div.	Ci	Standard Uncertainty (±dB)	Vi (Veff)
Uncertainty terms dependent on the measurement system						
Probe Calibration	0.49	N	1	1	0.49	∞
Probe correction	0.00	R	1.732	1	0.00	∞
Frequency response (BW ≤1 GHz)	0.20	R	1.732	1	0.12	∞
Sensor cross coupling	0.00	R	1.732	1	0.00	∞
Isotropy	0.50	R	1.732	1	0.29	∞
Linearity	0.20	R	1.732	1	0.12	∞
Probe scattering	0.00	R	1.732	1	0.00	∞
Probe positioning offset	0.30	R	1.732	1	0.17	∞
Probe positioning repeatability	0.04	R	1.732	1	0.02	∞
Sensor mechanical offset	0.00	R	1.732	1	0.00	∞
Probe spatial resolution	0.00	R	1.732	1	0.00	∞
Field impedance dependance	0.00	R	1.732	1	0.00	∞
Amplitude and phase drift	0.00	R	1.732	1	0.00	∞
Amplitude and phase noise	0.04	R	1.732	1	0.02	∞
Measurement area truncation	0.00	R	1.732	1	0.00	∞
Data acquisition	0.03	N	1	1	0.03	∞
Sampling	0.00	R	1.732	1	0.00	∞
Field reconstruction	2.00	R	1.732	1	1.15	∞
Forward transformation	0.00	R	1.732	1	0.00	∞
Power density scaling	0.00	R	1.732	1	0.00	∞
Spatial averaging	0.10	R	1.732	1	0.06	∞
System detection limit	0.04	R	1.732	1	0.02	∞
Uncertainty terms dependent on the DUT and environmental factors						
Probe coupling with DUT	0.00	R	1.732	1	0.00	∞
Modulation response	0.40	R	1.732	1	0.23	∞
Integration time	0.00	R	1.732	1	0.00	∞
Response time	0.00	R	1.732	1	0.00	∞
Device holder influence	0.10	R	1.732	1	0.06	∞
DUT alignment	0.00	R	1.732	1	0.00	∞
RF ambient conditions	0.04	R	1.732	1	0.02	∞
Ambient reflections	0.04	R	1.732	1	0.02	∞
Immunity / secondary reception	0.00	R	1.732	1	0.00	∞
Drift of the DUT		R	1.732	1	0.00	∞
Combined Std. Uncertainty					1.33	
Expanded STD Uncertainty (95%)，K=2					2.67	

16 Calibration Certificate

Please see the Appendix C

17 Test Setup Photos

Please see the Appendix D

Appendix A: System Check Plots

Appendix B: SAR Test Plots

Appendix C: Calibration certificate

Appendix D: Test Setup Photos

--- The End ---