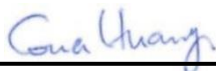


FCC WiFi 6E RF Exposure

FCC ID : MSQI005D
Equipment : ASUS Phone(Mobile Phone)
Brand Name : ASUS
Model Name : ASUS_I005D
ASUS_I005DC
Marketing Name : ROG Phone 5 (ZS673KS)
Applicant : ASUSTeK COMPUTER INC.
1F., No. 15, Lide Rd., Beitou Dist., Taipei City 112, Taiwan
Manufacturer 1 : Guangdong Enok Communication Co., Ltd.
No. 137, 139, Lixiang Road., Songmushan Village, Dalang
Town, Dongguan City, Guangdong Province, China
Manufacturer 2 : PT. SAT NUSAPERSADA TBK
JALAN PELITA VI. NO. 99, BATAM, 29443,INDONESIA
Standard : FCC 47 CFR Part 2 (2.1093)

The product was received on Dec 30, 2020 and testing was started from Jan. 18, 2021 and completed on Jan. 26, 2021 We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample provide by manufacturer and the test data has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been pass the FCC requirement.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Cona Huang / Deputy Manager



SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for ASUSTeK COMPUTER INC., ASUS Phone(Mobile Phone), ASUS_I005D;ASUS_I005DC, are as follows.

Band	Tx Frequency (MHz)	Reported SAR			APD			Reported PD
		Head (1g SAR W/kg)	Body Worn (1g SAR W/kg)	Phablet (10g SAR W/kg)	Head (W/m ²)	Body Worn (W/m ²)	Phablet (W/m ²)	PsPD (mW/cm ²)
WIFI6E	5925-7125	0.209	0.103	0.127	1.09	0.84	2.64	0.1927

Sporton ab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test.(FCC) This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR, 4.0 W/kg for Product Specific 10g SAR) and Power density exposure limit (1.0mW/cm²) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

Reviewed by: Jason Wang
Report Producer: Carlie Tsai

2. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards, the below KDB, IEC/IEEE standard may not including in the TAF code without accreditation.

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- IEC/IEEE 62209-1528:2020
- SPEAG DASY6 System Handbook
- SPEAG DASY6 Application Note (Interim Procedure for Device Operation at 6GHz-10GHz)
- IEC TE63170:2018
- IEC 62479:2010
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02



3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	ASUS Phone(Mobile Phone)
Brand Name	ASUS
Model Name	ASUS_I005D, ASUS_I005DC
Marketing Name	ROG Phone 5 (ZS673KS)
FCC ID	MSQI005D
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 30: 2305 MHz ~ 2315 MHz LTE Band 38: 2570 MHz ~ 2620 MHz LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 42: 3550 MHz ~ 3600 MHz LTE Band 48: 3550 MHz ~ 3700 MHz LTE Band 66: 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz 5G NR n2: 1850 MHz ~ 1910 MHz 5G NR n5: 824 MHz ~ 849 MHz 5G NR n7: 2500 MHz ~ 2570 MHz 5G NR n12: 699 MHz ~ 716 MHz 5G NR n25: 1850 MHz ~ 1915 MHz 5G NR n38: 2570 MHz ~ 2620 MHz 5G NR n41: 2496 MHz ~ 2690 MHz 5G NR n66: 1710 MHz ~ 1780 MHz 5G NR n71: 663 MHz ~ 698 MHz 5G NR n77: 3700 MHz ~ 3980 MHz 5G NR n78: 3700 MHz ~ 3800 MHz WLAN 2.4GHz Band: 2400 MHz ~ 2483.5 MHz WLAN U-NII 1: 5150 MHz ~ 5250 MHz WLAN U-NII 2: 5250 MHz ~ 5350 MHz WLAN U-NII 3: 5470 MHz ~ 5725 MHz WLAN U-NII 4: 5725 MHz ~ 5825 MHz WLAN U-NII 5: 5925 MHz ~ 6425 MHz WLAN U-NII 6: 6425 MHz ~ 6525 MHz WLAN U-NII 7: 6525 MHz ~ 6875 MHz WLAN U-NII 8: 6875 MHz ~ 7125 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz NFC: 13.56 MHz
Mode	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM, 64QAM 5G NR: DFT-s-OFDM/CP-OFDM, Pi/2 BPSK/QPSK/16QAM/64QAM/256QAM WLAN: 802.11a/b/g/n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/VHT160/HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE NFC: ASK
Remark:	1. The device support additional accessories of AeroActive cooler, this accessory will attach the device to do spot check worst case to ensure the RF Exposures compliance.



3.2 Maximum Tune-up Limit

<WiFi6E Tune-up Limit>

<Portrait Mode>

WiFi 6E		Ant 4	Ant 5	Ant 4+5
WiFi 6E	Mode	Tune-Up Limit	Tune-Up Limit	Tune-Up Limit
	802.11a 6Mbps	1.5	1.5	4.5
	802.11n-HT20 MCS0	1.5	1.5	4.5
	802.11n-HT40 MCS0	4.5	4.5	7.5
	802.11ac-VHT20 MCS0	1.5	1.5	4.5
	802.11ac-VHT40 MCS0	4.5	4.5	7.5
	802.11ac-VHT80 MCS0	8.5	8.5	11.5
	802.11ax-HE80 MCS0	8.5	8.5	11.5
802.11ax-HE160 MCS0	11.5	11.5	14.5	

<Landscape Mode>

WiFi 6E		Ant 6	Ant 5	Ant 6+5
WiFi 6E	Mode	Tune-Up Limit	Tune-Up Limit	Tune-Up Limit
	802.11a 6Mbps	-1.5	-1.5	1.5
	802.11n-HT20 MCS0	-1	-1	2
	802.11n-HT40 MCS0	2.5	2.5	5.5
	802.11ac-VHT20 MCS0	-1	-1	2
	802.11ac-VHT40 MCS0	2.5	2.5	5.5
	802.11ac-VHT80 MCS0	6	6	9
	802.11ax-HE80 MCS0	6	6	9
802.11ax-HE160 MCS0	8.5	8.5	11.5	



4. RF Exposure Limits

4.1 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.

4.2 Controlled Environment

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

4.3 RF Exposure limit for below 6GHz

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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



4.4 RF Exposure limit for above 6GHz

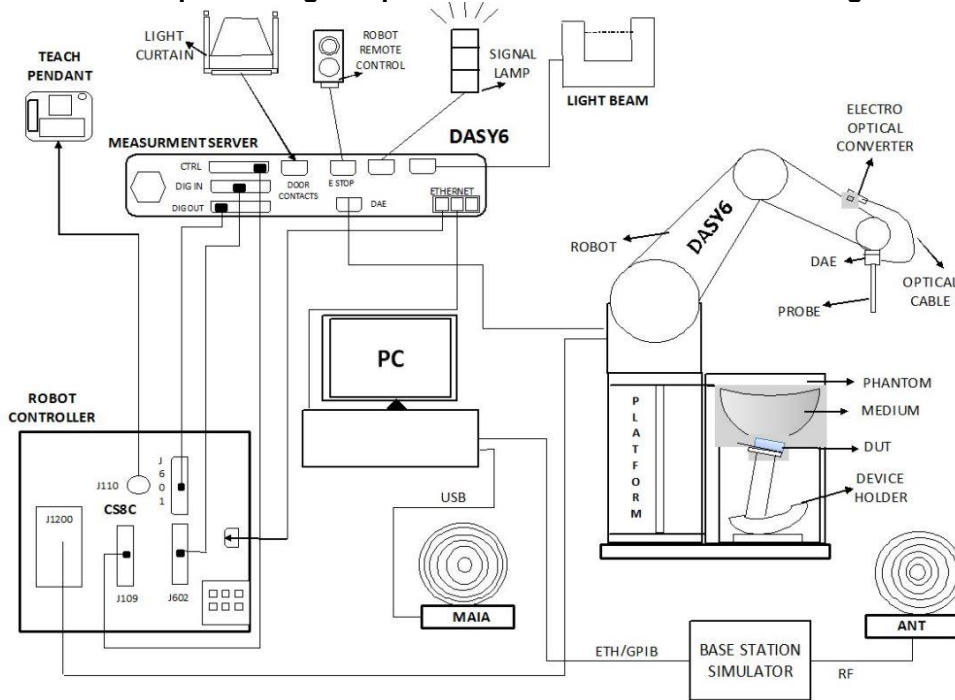
According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Peak Spatially Averaged Power Density was evaluated over a circular area of 4cm² per interim FCC Guidance for near-field power density evaluations per October 2018 TCB Workshop notes

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

5. System Description and Setup

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 10 and the DASY6 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.

5.1 Test Site Location

The SAR measurement facilities used to collect data are within both Sporton Lab list below test site location are accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190 and 0007) and the FCC designation No. TW1190 and TW0007 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test.

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory	
Test Site Location	TW1190 No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, CHINESE TAIPEI	TW0007 No. 58, Aly. 75, Ln. 564, Wehnuia 3rd, Rd., Guishan Dist., Taoyuan City, CHINESE TAIPEI
Test Site No.	SAR06-HY	SAR12-HY



6. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	6500MHz System Validation Kit ⁽²⁾	D6500V2	1003	Feb. 04, 2020	Feb. 02, 2022
SPEAG	5G Verification Source	10GHz	1012	Apr. 27, 2020	Apr. 26, 2021
SPEAG	Data Acquisition Electronics	DAE4	1399	Feb. 18, 2020	Feb. 17, 2021
SPEAG	Dosimetric E-Field Probe	EX3DV4	3728	Feb. 04, 2020	Feb. 03, 2021
SPEAG	EUmmWV Probe	EUmmWV3	9424	Mar. 20, 2020	Mar. 19, 2021
RCPTWN	Thermometer	HTC-1	TM685-1	Nov. 10, 2020	Nov. 09, 2021
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Rohde & Schwarz	Signal Generator	SMF100A	101107	Dec, 04, 2020	Dec, 03, 2021
Keysight	ENA Network Analyzer	E5071C	MY46101588	Jun. 10, 2020	Jun. 09, 2021
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 16, 2020	Sep. 15, 2021
LINE SEIKI	Digital Thermometer	DTM3000-spezial	2942	Nov. 06, 2020	Nov. 05, 2021
Anritsu	Power Meter	ML2495A	1804003	Oct. 21, 2020	Oct. 20, 2021
Anritsu	Power Sensor	MA2411B	1726150	Oct. 21, 2020	Oct. 20, 2021
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jun. 30, 2020	Jun. 29, 2021
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 21, 2020	Oct. 20, 2021
Agilent	Preamplifier	8449B	3008A02321	Oct. 28, 2020	Oct. 27, 2021
ATM	Dual Directional Coupler	C122H-10	P610410z-02	Note 1	
Warison	Directional Coupler	WCOU-10-50S-10	WR889BMC4B1	Note 1	
Woken	Attenuator 1	WK0602-XX	N/A	Note 1	
PE	Attenuator 2	PE7005-10	N/A	Note 1	
PE	Attenuator 3	PE7005- 3	N/A	Note 1	

General Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.
2. The dipole calibration interval can be extended to 3 years with justification according to KDB 865664 D01. The dipoles are also not physically damaged, or repaired during the interval. The justification data in appendix C can be found which the return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration for each dipole.

7. SAR System Verification

7.1 SAR Tissue Verification

The tissue dielectric parameters of tissue-equivalent media used for SAR measurements must be characterized within a temperature range of 18°C to 25°C, measured with calibrated instruments and apparatuses, such as network analyzers and temperature probes. The temperature of the tissue-equivalent medium during SAR measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized. The tissue dielectric measurement system must be calibrated before use. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements.

The liquid tissue depth was at least 15cm in the phantom for all SAR testing

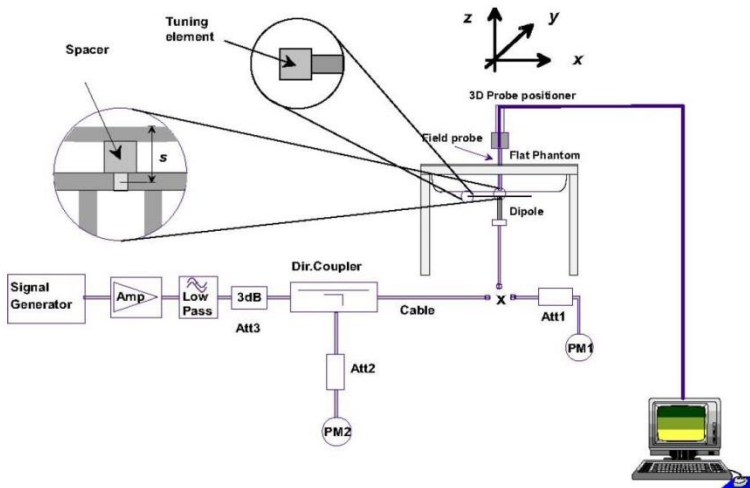
<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ε _r)	Conductivity Target (σ)	Permittivity Target (ε _r)	Delta (σ) (%)	Delta (ε _r) (%)	Limit (%)	Date
6500	22.5	6.010	34.400	6.07	34.50	-0.99	-0.29	±5	2021/1/18
6500	22.5	5.990	34.200	6.07	34.50	-1.32	-0.87	±5	2021/1/19

7.2 SAR System Performance Check Results

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

Date	Frequency (MHz)	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2021/1/18	6500	100	D6500HzV2-1003	EX3DV4 - SN3728	DAE4 Sn1399	29.80	299.00	298	-0.33
2021/1/19	6500	100	D6500HzV2-1003	EX3DV4 - SN3728	DAE4 Sn1399	28.90	299.00	289	-3.34



System Performance Check Setup

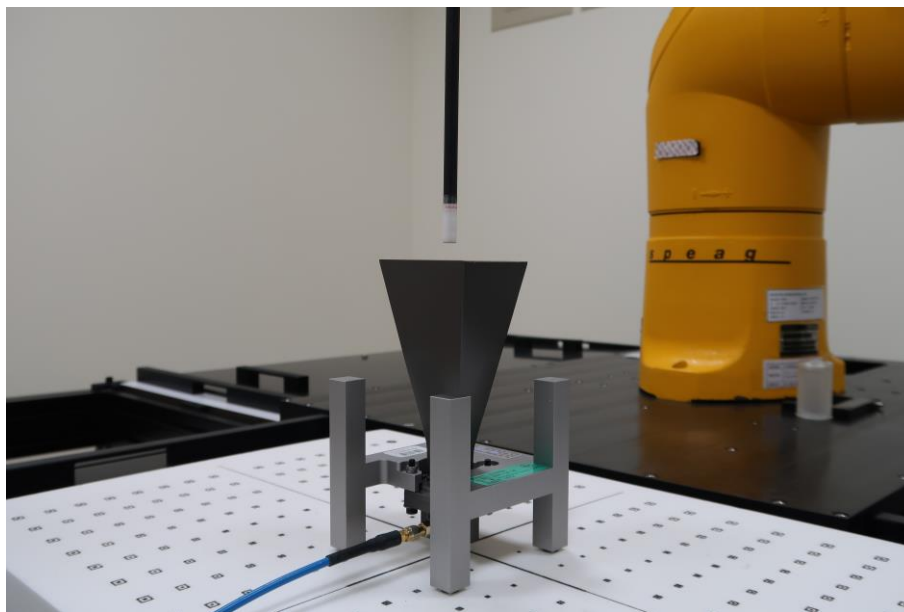


Setup Photo

7.3 PD System Verification Results

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.

Frequency (GHz)	5G Verification Source	Probe S/N	DAE S/N	Distance (mm)	Input Power (mW)	Measured 4 cm ² (W/m ²)	Normalized 4 cm ² (W/m ²)	Targeted 4 cm ² (W/m ²)	Deviation (dB)	Date
10G	10G	9424	1399	10mm	50.2	28.2	42.0	41.5	0.05	2021/1/23
10G	10G	9424	1399	10mm	50.2	27.6	41.1	41.5	-0.04	2021/1/26



System Verification Setup Photo

8. RF Exposure Positions

8.1 Ear and handset reference point

Figure 9.1.1 shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled “M,” the left ear reference point (ERP) is marked “LE,” and the right ERP is marked “RE.” Each ERP is 15 mm along the B-M (back-mouth) line behind the entrance-to-ear-canal (EEC) point, as shown in Figure 9.1.2 The Reference Plane is defined as passing through the two ear reference points and point M. The line N-F (neck-front), also called the reference pivoting line, is normal to the Reference Plane and perpendicular to both a line passing through RE and LE and the B-M line (see Figure 9.1.3). Both N-F and B-M lines should be marked on the exterior of the phantom shell to facilitate handset positioning. Posterior to the N-F line the ear shape is a flat surface with 6 mm thickness at each ERP, and forward of the N-F line the ear is truncated, as illustrated in Figure 9.1.2. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.

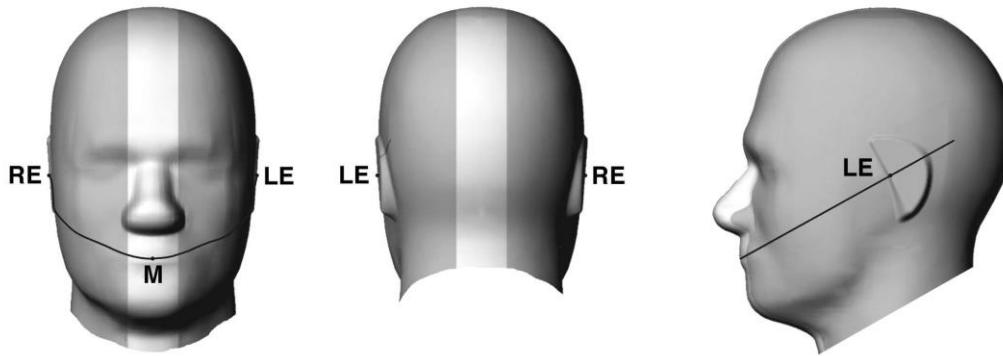


Fig 9.1.1 Front, back, and side views of SAM twin phantom

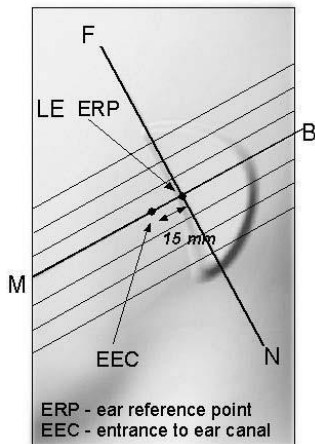


Fig 9.1.2 Close-up side view of phantom showing the ear region.

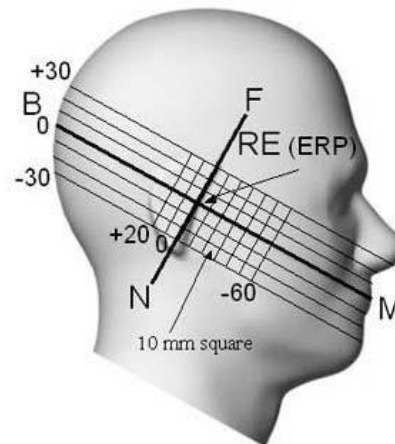


Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

8.2 Definition of the cheek position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline 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 (point A in Figure 9.2.1 and Figure 9.2.2), and the midpoint of the width w_b of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 9.2.1). 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 centerline is not necessarily parallel to the front face of the handset (see Figure 9.2.2), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
3. 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 9.2.3), 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.
4. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
5. 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.
6. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
7. 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 9.2.3. The actual rotation angles should be documented in the test report.

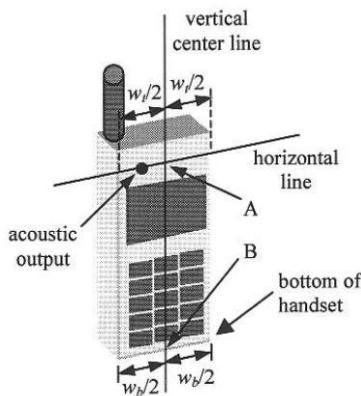


Fig 9.2.1 Handset vertical and horizontal reference lines—“fixed case”

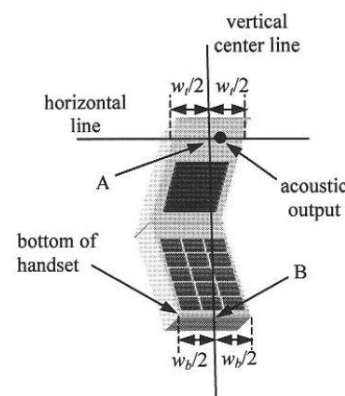


Fig 9.2.2 Handset vertical and horizontal reference lines—“clam-shell case”

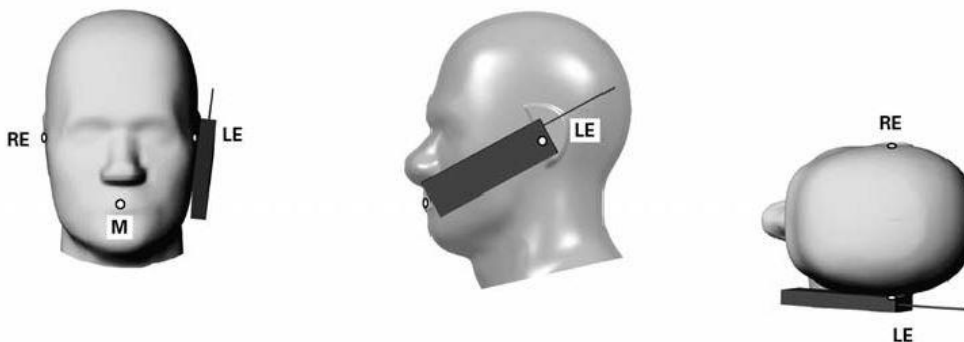


Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

8.3 Definition of the tilt position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. While maintaining the orientation of the handset, move the handset away from the pinna along the line passing through RE and LE far enough to allow a rotation of the handset away from the cheek by 15°.
3. Rotate the handset around the horizontal line by 15°.
4. While maintaining the orientation of the handset, move the handset towards the phantom on the line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact point is on the pinna. See Figure 9.3.1. If contact occurs at any location other than the pinna, e.g., the antenna at the back of the phantom head, the angle of the handset should be reduced. In this case, the tilt position is obtained if any point on the handset is in contact with the pinna and a second point

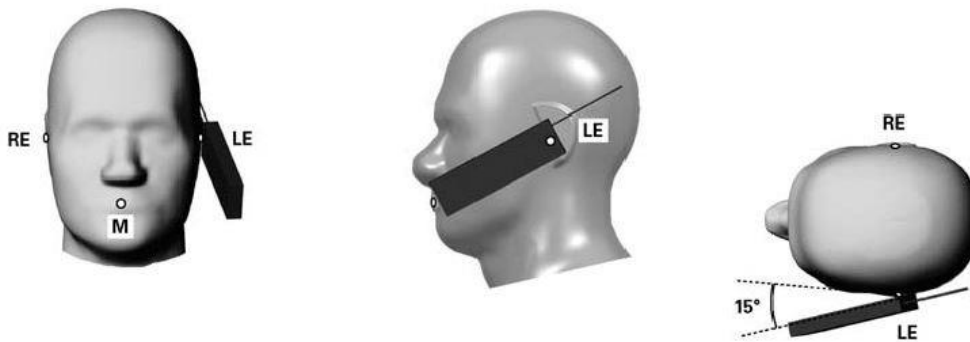


Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

8.4 Body Worn Accessory

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 9.4). Per KDB648474 D04v01r03, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.

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

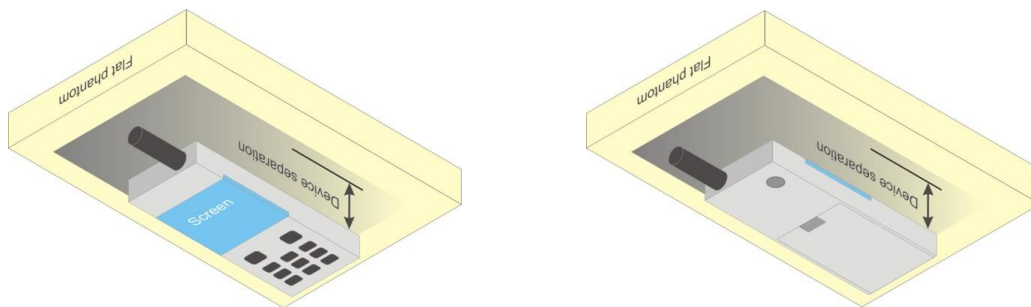


Fig 9.4 Body Worn Position

8.5 Product Specific/Extremity Exposure

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, According to KDB648474 D04v01r03, the following phablet procedures should be applied to evaluate SAR compliance for each applicable wireless mode and frequency band. Devices marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance

1. The normally required head and body-worn accessory SAR test procedures for handsets, including hotspot mode, must be applied.
2. The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for 10-g extremity SAR according to the equivalent tissue dielectric parameters in KDB 865664 to address interactive hand use exposure conditions. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.

8.6 Miscellaneous Testing Considerations

- Evaluate SAR using 6-7 GHz parameters per IEC/IEEE 62209-1528:2020.
- Per procedures of KDB Pubs. 447498 and 248227, and applicable product-specific procedures among KDB Pubs. 648474 (handsets/phablets).
- Where supported by the test system, also report estimated absorbed (epithelial) power density (for reference purposes only, not specifically for compliance) and estimated incident PD, derived from measured SAR.
- In addition, for the highest SAR test configurations evaluate incident PD using the mmw near-field probe and total-field/power-density reconstruction method (2 mm closest meas. plane)
 - Adjust measured results per amount that measurement uncertainty exceeds 30 % (see e.g. IEC 62479:2010)



9. WiFi 6E Output Power (Unit: dBm)

General Note:

- For each antenna, transmit power in SISO operation is larger than (or equal to) the power in MIMO operation, RF exposure compliance of MIMO mode can be deduced from the compliance simultaneous transmission of antennas operating in SISO mode.
- 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/g/n/ac mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
- Per 201904 TCBC workshops, General principles of FCC KDB Publication 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)
- In applying the test guidance, the IEEE 802.11 mode with the maximum output power (out of all modes) should be considered for testing
- For modes with the same maximum output power, the guidance from section 5.3.2 a) of FCC KDB Publication 248227 D01 should be applied, with 802.11ax being considered as the highest 802.11 mode for the appropriate frequency bands

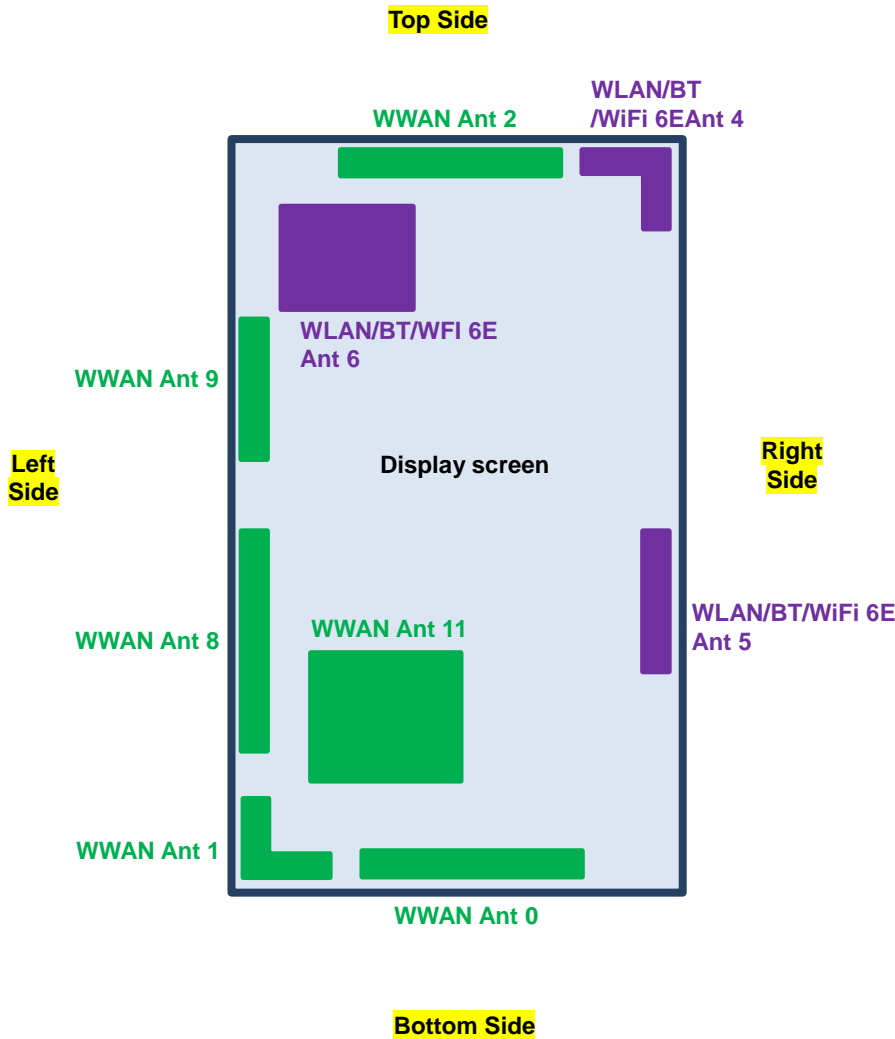
<Portrait Mode>

WiFi 6E				Ant 4			Ant 5			Ant 4+5		
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
WiFi 6E	802.11a 6Mbps	1	5955	Not required	1.50	Not required	Not required	1.50	Not required	Not required	4.50	
		57	6235		1.50			4.50				
		113	6515		1.50			4.50				
		173	6815		1.50			4.50				
		233	7115		1.50			4.50				
	802.11n-HT20 MCS0	1	5955		1.50			4.50				
		57	6235		1.50			4.50				
		113	6515		1.50			4.50				
		173	6815		1.50			4.50				
		233	7115		1.50			4.50				
	802.11n-HT40 MCS0	3	5965		4.50			7.50				
		59	6245		4.50			7.50				
		107	6485		4.50			7.50				
		171	6805		4.50			7.50				
		227	7085		4.50			7.50				
	802.11ac-VHT20 MCS0	1	5955		1.50			4.50				
		57	6235		1.50			4.50				
		113	6515		1.50			4.50				
		173	6815		1.50			4.50				
	802.11ac-VHT40 MCS0	3	5965		4.50			7.50				
59		6245	4.50	7.50								
107		6485	4.50	7.50								
171		6805	4.50	7.50								
227		7085	4.50	7.50								
802.11ac-VHT80 MCS0	7	5985	8.00	11.00								
	71	6305	8.00	11.00								
	119	6545	8.00	11.00								
	167	6785	8.00	11.00								
	215	7025	8.50	11.50								
802.11ax-HE80 MCS0	7	5985	8.00	11.00								
	71	6305	8.00	11.00								
	119	6545	8.00	11.00								
	167	6785	8.00	11.00								
	215	7025	8.50	11.50								
802.11ax-HE160 MCS0	15	6025	10.53	11.50	100.00	10.44	11.50	100.00	13.52	14.50		
	47	6185	10.33	11.50		10.33	11.50		13.31	14.50		
	111	6505	10.05	11.00		10.23	11.00		13.21	14.00		
	175	6825	10.00	11.50		10.24	11.50		13.21	14.50		
	207	6985	10.20	11.00		10.20	11.00		13.14	14.00		

<Landscape Mode>

WiFi 6E				Ant 6			Ant 5			Ant 6+5		
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit ANT	Duty Cycle %	
802.11a 6Mbps	1	5955		-1.50			-1.50			1.50		
	57	6235		-1.50			1.50					
	113	6515		-1.50			1.50					
	173	6815		-1.50			1.50					
	233	7115		-1.50			1.50					
802.11n-HT20 MCS0	1	5955		-1.00			-1.00			2.00		
	57	6235		-1.00			2.00					
	113	6515		-1.00			2.00					
	173	6815		-1.00			2.00					
	233	7115		-1.00			2.00					
802.11n-HT40 MCS0	3	5965		2.50			2.50			5.50		
	59	6245		2.50			5.50					
	107	6485		2.50			5.50					
	171	6805		2.50			5.50					
	227	7085		2.50			5.50					
802.11ac-VHT20 MCS0	1	5955	Not required	-1.00	Not required	Not required	-1.00	Not required	Not required	2.00	Not required	
	57	6235		-1.00			2.00					
	113	6515		-1.00			2.00					
	173	6815		-1.00			2.00					
	233	7115		-1.00			2.00					
802.11ac-VHT40 MCS0	3	5965		2.50			2.50			5.50		
	59	6245		2.50			5.50					
	107	6485		2.50			5.50					
	171	6805		2.50			5.50					
	227	7085		2.50			5.50					
802.11ac-VHT80 MCS0	7	5985		6.00			6.00			9.00		
	71	6305		6.00			9.00					
	119	6545		6.00			9.00					
	167	6785		6.00			9.00					
	215	7025		6.00			9.00					
802.11ax-HE80 MCS0	7	5985		6.00			6.00			9.00		
	71	6305		6.00			9.00					
	119	6545		6.00			9.00					
	167	6785		6.00			9.00					
	215	7025		6.00			9.00					
802.11ax-HE160 MCS0	15	6025	8.41	8.50	100.00	8.33	8.50	100.00	11.49	11.50	100.00	
	47	6185	7.90	8.50		8.05	8.50		10.84	11.50		
	111	6505	8.45	8.50		8.35	8.50		11.23	11.50		
	175	6825	7.92	8.50		7.90	8.50		10.90	11.50		
	207	6985	8.16	8.50		8.10	8.50		11.14	11.50		

10. Antenna Location



- Ant0: Main Antenna Tx/Rx
 - GSM 850 MHz
 - WCDMA Band 5
 - LTE Band 5/12/13/17/26/71
 - 5G NR Sub-6G n5/n12/n71/n77/n78 (only Rx)
- Ant1: Main Antenna Tx/Rx
 - GSM 1900 MHz
 - WCDMA Band 2/4
 - LTE Band 2/4/7/25/30/38/41/66
 - 5G NR Sub-6G n2/n4/n7/n25/n38/n41/n66
- Ant2: Div. Antenna Tx/Rx
 - GSM 850 MHz
 - WCDMA Band 5
 - LTE Band 5/12/13/17/26/71
 - 5G NR Sub-6G n5/n12/n71/n77/n78
- Ant3: Div. Antenna Tx/Rx
 - GSM 1900 MHz
 - WCDMA Band 2/4
 - LTE Band 2/4/7/25/30/38/41/66
 - 5G NR Sub-6G n2/n4/n7/n25/n38/n41/n66
 - GPS L1
- Ant4: WiFi Antenna Tx/Rx
 - 2.4/5 GHz
 - GPS L5
- Ant5: WiFi Antenna Tx/Rx
 - 2.4/5 GHz
- Ant6: WiFi Antenna Tx/Rx
 - 2.4/5 GHz
- Ant8: MHB Ant for ENDC/ULCA
 - LTE Band 2/4/7/25/66/41 (RX only)
 - 5G NR Sub-6G n2/n4/n7/n25/n38/n41/n66
- Ant9: Main Antenna Tx/Rx
 - LTE Band 42/48
 - 5G NR Sub-6G Antenna Tx/Rx
 - 5G NR Sub-6G n41#0/n38#0/n77/n78
- Ant11: Div. Antenna Tx/Rx
 - LTE Band 42/48
 - 5G NR Sub-6G Antenna Div.
 - 5G NR Sub-6G n41#0/n38#0/n77/n78

Front View



11. Antenna operation description

1. Because of antenna performance would be affected and detuned by the various user interactions. So that we define two modes to satisfy and cover which are used in daily life mostly to the end-user, one is "Portrait mode" another is "Landscape Mode"
2. When the device is turn on or the user is calling the device will be into "Portrait mode".
3. When the device into "Landscape Mode" the WiFi antenna will be switch to another transmit antenna and list as below

Mode	Antenna	Detection mechanism
Portrait Mode	WiFi is transmitting on Ant 4 and Ant 5	When the device detect audio receiver is active and the device is Upright
Landscape Mode	WiFi is transmitting on Ant 6 and Ant 5	When the device is lying

12. RF Exposure Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
 - a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
 - b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
 - c. For WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:
 - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
 - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
 - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. 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.
5. Per KDB648474 D04v01r03, this device is considered a phablet since the display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm. Therefore, phablet SAR tests are required when wireless mode does not apply or if wireless router 1g SAR >1.2W/kg
6. For WIFI6E doesn't support wireless router capability.
7. Per FCC guidance, SAR was performed using 6.5 GHz SAR probe calibration factors.
8. 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 Pub. 248227 v02r02
9. Absorbed power density (APD) using a 4cm2 averaging area is reported based on SAR measurements.
10. Per FCC guidance, the WiFi 6E Sim-Tx analysis are using the SAR results with the conventional SPLSR etc procedures from KDB 447498 D01. And the Sim-Tx analysis result refer to Sporton SAR report no.: FA082411A.



WLAN SAR Note:

1. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
2. For all positions / configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions / configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
3. For WLAN SAR testing was performed on single antenna RF power in SISO mode is larger or equal to the single antenna RF power in MIMO mode, and for RF exposure assessment of MIMO mode simultaneous transmission exclusion analysis was performed with SAR test results of each antenna in SISO mode.
4. During SAR testing the WIFI6E transmission was verified using a spectrum analyzer.
5. When SAR testing for 802.11ax is required
 - a. If the maximum output power is highest for OFDMA scenarios, choose the tone size with the maximum number of tones and the highest maximum output power
 - b. Otherwise, consider the fully allocated channel for SAR testing
 - c. When SAR testing is required on RU sizes less than the fully allocated channel, use the RU number closest to the middle of the channel, choosing the higher RU number when two RUs are equidistant to the middle of the channel.

12.1 Head SAR Test Result

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	User-Mode	Accessory	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured APD W/m ² (4cm ²)
	WLAN 6E	802.11ax-HE160 MCS0	Right Cheek	0mm	Ant 4	Portrait Mode	W/o	15	6025	10.53	11.50	1.250	100	1.000	0.01	0.009	0.011	0.043
	WLAN 6E	802.11ax-HE160 MCS0	Right Tilted	0mm	Ant 4	Portrait Mode	W/o	15	6025	10.53	11.50	1.250	100	1.000	0.18	0.015	0.019	0.119
	WLAN 6E	802.11ax-HE160 MCS0	Left Cheek	0mm	Ant 4	Portrait Mode	W/o	15	6025	10.53	11.50	1.250	100	1.000	-0.02	0.042	0.053	0.266
	WLAN 6E	802.11ax-HE160 MCS0	Left Cheek	0mm	Ant 4	Portrait Mode	W/o	47	6185	10.33	11.50	1.309	100	1.000	0.12	0.056	0.073	0.434
	WLAN 6E	802.11ax-HE160 MCS0	Left Cheek	0mm	Ant 4	Portrait Mode	W/o	111	6505	10.05	11.00	1.245	100	1.000	0.05	0.068	0.085	0.541
01	WLAN 6E	802.11ax-HE160 MCS0	Left Cheek	0mm	Ant 4	Portrait Mode	W/o	175	6825	10.00	11.50	1.413	100	1.000	-0.06	0.148	0.209	1.09
	WLAN 6E	802.11ax-HE160 MCS0	Left Cheek	0mm	Ant 4	Portrait Mode	With	175	6825	10.00	11.50	1.413	100	1.000	-0.14	0.116	0.164	0.797
	WLAN 6E	802.11ax-HE160 MCS0	Left Cheek	0mm	Ant 4	Portrait Mode	W/o	207	6985	10.20	11.00	1.202	100	1.000	-0.09	0.123	0.148	0.951
	WLAN 6E	802.11ax-HE160 MCS0	Left Tilted	0mm	Ant 4	Portrait Mode	W/o	15	6025	10.53	11.50	1.250	100	1.000	0.05	0.023	0.029	0.155
	WLAN 6E	802.11ax-HE160 MCS0	Right Cheek	0mm	Ant 5	Portrait Mode	W/o	15	6025	10.44	11.50	1.276	100	1.000	0.13	0.003	0.004	0
	WLAN 6E	802.11ax-HE160 MCS0	Right Cheek	0mm	Ant 5	Portrait Mode	With	15	6025	10.44	11.50	1.276	100	1.000	0.01	0.001	0.001	0
	WLAN 6E	802.11ax-HE160 MCS0	Right Tilted	0mm	Ant 5	Portrait Mode	W/o	15	6025	10.44	11.50	1.276	100	1.000	0.02	0.002	0.003	0
	WLAN 6E	802.11ax-HE160 MCS0	Left Cheek	0mm	Ant 5	Portrait Mode	W/o	15	6025	10.44	11.50	1.276	100	1.000	-0.06	0.002	0.003	0
	WLAN 6E	802.11ax-HE160 MCS0	Left Tilted	0mm	Ant 5	Portrait Mode	W/o	15	6025	10.44	11.50	1.276	100	1.000	0.15	0.003	0.004	0



12.2 Body Worn SAR Test Result

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	User-Mode	Accessory	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured APD W/m ² (4cm ²)
	WLAN 6E	802.11ax-HE160 MCS0	Front	15mm	Ant 4	Portrait Mode	W/o	15	6025	10.53	11.50	1.250	100	1.000	0.02	0.001	0.001	0
	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 4	Portrait Mode	W/o	15	6025	10.53	11.50	1.250	100	1.000	0.06	0.016	0.020	0.132
	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 4	Portrait Mode	With	15	6025	10.53	11.50	1.250	100	1.000	0	0.006	0.008	0.031
	WLAN 6E	802.11ax-HE160 MCS0	Front	15mm	Ant 5	Portrait Mode	W/o	15	6025	10.44	11.50	1.276	100	1.000	-0.01	0.010	0.013	0.087
	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 5	Portrait Mode	W/o	15	6025	10.44	11.50	1.276	100	1.000	0.08	0.047	0.060	0.462
	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 5	Portrait Mode	W/o	47	6185	10.33	11.50	1.309	100	1.000	0.03	0.057	0.075	0.544
	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 5	Portrait Mode	W/o	111	6505	10.23	11.00	1.194	100	1.000	-0.11	0.028	0.033	0.277
	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 5	Portrait Mode	W/o	175	6825	10.24	11.50	1.337	100	1.000	0.14	0.067	0.090	0.617
02	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 5	Portrait Mode	W/o	207	6985	10.20	11.00	1.202	100	1.000	0.12	0.086	0.103	0.84
	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 5	Portrait Mode	With	207	6985	10.00	11.00	1.259	100	1.000	0.07	0.024	0.030	0.157
	WLAN 6E	802.11ax-HE160 MCS0	Front	15mm	Ant 6	Landscape Mode	W/o	111	6505	8.45	8.50	1.012	100	1.000	0.07	0.001	0.001	0
	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 6	Landscape Mode	W/o	111	6505	8.45	8.50	1.012	100	1.000	0.11	0.021	0.021	0.167
03	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 6	Landscape Mode	W/o	15	6025	8.41	8.50	1.021	100	1.000	0.16	0.038	0.039	0.355
	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 6	Landscape Mode	With	15	6025	8.41	8.50	1.021	100	1.000	0.01	0.015	0.015	0.146
	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 6	Landscape Mode	W/o	47	6185	7.90	8.50	1.148	100	1.000	-0.03	0.021	0.024	0.192
	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 6	Landscape Mode	W/o	175	6825	7.92	8.50	1.143	100	1.000	-0.11	0.001	0.001	0
	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 6	Landscape Mode	W/o	207	6985	8.16	8.50	1.081	100	1.000	0.05	0.001	0.001	0
	WLAN 6E	802.11ax-HE160 MCS0	Front	15mm	Ant 5	Landscape Mode	W/o	111	6505	8.35	8.50	1.035	100	1.000	0.02	0.020	0.021	0.07
	WLAN 6E	802.11ax-HE160 MCS0	Front	15mm	Ant 5	Landscape Mode	With	111	6505	8.35	8.50	1.035	100	1.000	0	0.009	0.009	0.068
	WLAN 6E	802.11ax-HE160 MCS0	Back	15mm	Ant 5	Landscape Mode	W/o	111	6505	8.35	8.50	1.035	100	1.000	0.09	0.001	0.001	0



12.1 Product Specific SAR Test Result

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	User-Mode	Accessory	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)	Measured APD W/m ² (4cm ²)
	WLAN 6E	802.11ax-HE160 MCS0	Front	0mm	Ant 4	Portrait Mode	W/o	15	6025	10.53	11.50	1.250	100	1.000	0.02	0.034	0.043	0.847
	WLAN 6E	802.11ax-HE160 MCS0	Front	0mm	Ant 4	Portrait Mode	With	15	6025	10.53	11.00	1.114	100	1.000	-0.04	0.015	0.017	0.378
	WLAN 6E	802.11ax-HE160 MCS0	Back	0mm	Ant 4	Portrait Mode	W/o	15	6025	10.53	11.50	1.250	100	1.000	0.07	0.032	0.040	0.798
	WLAN 6E	802.11ax-HE160 MCS0	Left Side	0mm	Ant 4	Portrait Mode	W/o	15	6025	10.53	11.50	1.250	100	1.000	-0.12	0.005	0.006	0.118
	WLAN 6E	802.11ax-HE160 MCS0	Right Side	0mm	Ant 4	Portrait Mode	W/o	15	6025	10.53	11.50	1.250	100	1.000	-0.06	0.011	0.014	0.272
	WLAN 6E	802.11ax-HE160 MCS0	Top Side	0mm	Ant 4	Portrait Mode	W/o	15	6025	10.53	11.50	1.250	100	1.000	0.18	0.017	0.021	0.416
	WLAN 6E	802.11ax-HE160 MCS0	Front	0mm	Ant 5	Portrait Mode	W/o	15	6025	10.44	11.50	1.276	100	1.000	0.03	0.079	0.101	1.98
	WLAN 6E	802.11ax-HE160 MCS0	Front	0mm	Ant 5	Portrait Mode	W/o	47	6185	10.33	11.50	1.309	100	1.000	-0.02	0.078	0.102	1.96
	WLAN 6E	802.11ax-HE160 MCS0	Front	0mm	Ant 5	Portrait Mode	W/o	111	6505	10.23	11.00	1.194	100	1.000	0.17	0.047	0.056	1.18
	WLAN 6E	802.11ax-HE160 MCS0	Front	0mm	Ant 5	Portrait Mode	W/o	175	6825	10.24	11.50	1.337	100	1.000	0.02	0.068	0.091	1.7
04	WLAN 6E	802.11ax-HE160 MCS0	Front	0mm	Ant 5	Portrait Mode	W/o	207	6985	10.20	11.00	1.202	100	1.000	-0.16	0.106	0.127	2.64
	WLAN 6E	802.11ax-HE160 MCS0	Front	0mm	Ant 5	Portrait Mode	With	207	6985	10.20	11.00	1.202	100	1.000	0.18	0.062	0.075	1.56
	WLAN 6E	802.11ax-HE160 MCS0	Back	0mm	Ant 5	Portrait Mode	W/o	15	6025	10.44	11.50	1.276	100	1.000	-0.05	0.047	0.060	1.18
	WLAN 6E	802.11ax-HE160 MCS0	Left Side	0mm	Ant 5	Portrait Mode	W/o	15	6025	10.44	11.50	1.276	100	1.000	0.01	0.001	0.001	0
	WLAN 6E	802.11ax-HE160 MCS0	Right Side	0mm	Ant 5	Portrait Mode	W/o	15	6025	10.44	11.50	1.276	100	1.000	-0.05	0.077	0.098	1.92
	WLAN 6E	802.11ax-HE160 MCS0	Bottom Side	0mm	Ant 5	Portrait Mode	W/o	15	6025	10.44	11.50	1.276	100	1.000	0.12	0.001	0.001	0
	WLAN 6E	802.11ax-HE160 MCS0	Front	0mm	Ant 6	Landscape Mode	W/o	111	6505	8.45	8.50	1.012	100	1.000	0.12	0.005	0.005	0.126
	WLAN 6E	802.11ax-HE160 MCS0	Back	0mm	Ant 6	Landscape Mode	W/o	111	6505	8.45	8.50	1.012	100	1.000	0.02	0.054	0.055	1.36
05	WLAN 6E	802.11ax-HE160 MCS0	Back	0mm	Ant 6	Landscape Mode	W/o	15	6025	8.41	8.50	1.021	100	1.000	0.04	0.084	0.086	2.1
	WLAN 6E	802.11ax-HE160 MCS0	Back	0mm	Ant 6	Landscape Mode	With	15	6025	8.41	8.50	1.021	100	1.000	0.14	0.014	0.014	0.341
	WLAN 6E	802.11ax-HE160 MCS0	Back	0mm	Ant 6	Landscape Mode	W/o	47	6185	7.90	8.50	1.148	100	1.000	-0.05	0.063	0.072	1.57
	WLAN 6E	802.11ax-HE160 MCS0	Back	0mm	Ant 6	Landscape Mode	W/o	175	6825	7.92	8.50	1.143	100	1.000	-0.09	0.026	0.030	0.651
	WLAN 6E	802.11ax-HE160 MCS0	Back	0mm	Ant 6	Landscape Mode	W/o	207	6985	8.16	8.50	1.081	100	1.000	0.12	0.033	0.036	0.829
	WLAN 6E	802.11ax-HE160 MCS0	Left Side	0mm	Ant 6	Landscape Mode	W/o	111	6505	8.45	8.50	1.012	100	1.000	0.16	0.034	0.034	0.859
	WLAN 6E	802.11ax-HE160 MCS0	Right Side	0mm	Ant 6	Landscape Mode	W/o	111	6505	8.45	8.50	1.012	100	1.000	-0.02	0.001	0.001	0
	WLAN 6E	802.11ax-HE160 MCS0	Top Side	0mm	Ant 6	Landscape Mode	W/o	111	6505	8.45	8.50	1.012	100	1.000	-0.06	0.002	0.002	0.061
	WLAN 6E	802.11ax-HE160 MCS0	Front	0mm	Ant 5	Landscape Mode	W/o	111	6505	8.35	8.50	1.035	100	1.000	0.08	0.033	0.034	0.825
	WLAN 6E	802.11ax-HE160 MCS0	Front	0mm	Ant 5	Landscape Mode	With	111	6505	8.35	8.50	1.035	100	1.000	0	0.006	0.006	0.15
	WLAN 6E	802.11ax-HE160 MCS0	Back	0mm	Ant 5	Landscape Mode	W/o	111	6505	8.35	8.50	1.035	100	1.000	0.02	0.008	0.008	0.2
	WLAN 6E	802.11ax-HE160 MCS0	Left Side	0mm	Ant 5	Landscape Mode	W/o	111	6505	8.35	8.50	1.035	100	1.000	-0.11	0.001	0.001	0
	WLAN 6E	802.11ax-HE160 MCS0	Right Side	0mm	Ant 5	Landscape Mode	W/o	111	6505	8.35	8.50	1.035	100	1.000	-0.18	0.013	0.013	0.335
	WLAN 6E	802.11ax-HE160 MCS0	Bottom Side	0mm	Ant 5	Landscape Mode	W/o	111	6505	8.35	8.50	1.035	100	1.000	0.03	0.001	0.001	0

12.2 PD Test Result

Power Density General Notes:

1. Power density was calculated by repeated E-field measurements on two measurement planes separated by $\lambda/4$.
2. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools.
3. According to FCC test guidance and equipment manufacturer guidance, power density results were scaled according to IEC 62479:2010 for the portion of the measurement uncertainty > 30%. Total expanded uncertainty of 2.68 dB (85.4%) was used to determine the psPD measurement scaling factor.
4. Per equipment manufacturer guidance, power density was measured at $d=2\text{mm}$ and $d=\lambda/5\text{mm}$ using the same grid size and grid step size for some frequencies, surfaces and each antennas. The integrated Power Density (iPD) was calculated based on these measurements. Since iPD ratio between the two distances is < 1dB, the grid step (0.0625) was sufficient for determining compliance at $d=2\text{mm}$.
5. Per October 2020 TCB Workshop Interim procedures, start instead with a minimum of 5 test channels across the full band.
6. Since this device is considered a phablet and there is no different PD limit on different exposure conditions, therefore select highest phablet SAR at 0 mm test distance and configurations evaluate power density.
7. Since there is no different PD limit on different exposure conditions, therefore the PD test was performed of a 2mm separation between sensor and EUT surface to cover all exposure conditions of phablet.

<WLAN PD>

Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Power scenario	Average Power (dBm)	Grip Step (λ)	iPD (W/m^2)	iPD ratio (<1dB)	Normal psPD(W/m^2)	Total psPD(W/m^2)
WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 4	15	6025	Portrait Mode	10.53	0.0625	78.37	-0.6431847	0.165	0.204
WIFI6E	802.11ax-HE160 MCS0	Front	10 mm	Antenna 4	15	6025	Portrait Mode	10.53	0.0625	90.88		0.125	0.135
WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 4	207	6985	Portrait Mode	10.20	0.0625	234.45	0.9223481	0.555	0.755
WIFI6E	802.11ax-HE160 MCS0	Front	8.59 mm	Antenna 4	207	6985	Portrait Mode	10.20	0.0625	189.59		0.352	0.371
WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 5	15	6025	Portrait Mode	10.44	0.0625	223.50	0.9793137	0.614	0.696
WIFI6E	802.11ax-HE160 MCS0	Front	10 mm	Antenna 5	15	6025	Portrait Mode	10.44	0.0625	178.38		0.257	0.291
WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 5	207	6985	Portrait Mode	10.20	0.0625	320.55	-0.0228367	0.793	0.951
WIFI6E	802.11ax-HE160 MCS0	Front	8.59 mm	Antenna 5	207	6985	Portrait Mode	10.20	0.0625	322.24		0.386	0.416
WIFI6E	802.11ax-HE160 MCS0	Back	2 mm	Antenna 6	15	6025	Landscape Mode	8.41	0.0625	324.62	0.9707059	1.000	1.190
WIFI6E	802.11ax-HE160 MCS0	Back	10 mm	Antenna 6	15	6025	Landscape Mode	8.41	0.0625	259.60		0.607	0.660
WIFI6E	802.11ax-HE160 MCS0	Back	2 mm	Antenna 6	207	6985	Landscape Mode	8.16	0.0625	178.00	0.4189803	0.355	0.468
WIFI6E	802.11ax-HE160 MCS0	Back	8.59 mm	Antenna 6	207	6985	Landscape Mode	8.16	0.0625	161.63		0.113	0.125



Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	User-Mode	Accessory	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Grip Step (A)	Scaling Factor for measurement uncertainty	Power Drift (dB)	Normal psPD(W/m^2)	Scaled Normal psPD (W/m^2)	Total psPD (W/m^2)	Scaled Total psPD (W/m^2)
	WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 4	15	6025	Portrait Mode	W/o	10.53	11.50	1.250	100.00	1.000	0.0625	1.5535	0.06	0.165	0.320	0.204	0.396
	WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 4	47	6185	Portrait Mode	W/o	10.33	11.50	1.309	100.00	1.000	0.0625	1.5535	-0.09	0.163	0.332	0.293	0.596
	WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 4	111	6505	Portrait Mode	W/o	10.05	11.00	1.245	100.00	1.000	0.0625	1.5535	-0.13	0.467	0.903	0.538	1.040
01	WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 4	175	6825	Portrait Mode	W/o	10.00	11.50	1.413	100.00	1.000	0.0625	1.5535	0.08	0.701	1.538	0.878	1.927
	WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 4	207	6985	Portrait Mode	W/o	10.20	11.00	1.202	100.00	1.000	0.0625	1.5535	0.12	0.555	1.037	0.755	1.410
	WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 4	175	6825	Portrait Mode	With	10.00	11.50	1.413	100.00	1.000	0.0625	1.5535	0.04	0.483	1.060	0.578	1.268
	WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 5	15	6025	Portrait Mode	W/o	10.44	11.50	1.276	100.00	1.000	0.0625	1.5535	0.04	0.614	1.218	0.696	1.380
	WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 5	47	6185	Portrait Mode	W/o	10.33	11.50	1.309	100.00	1.000	0.0625	1.5535	-0.08	0.391	0.795	0.493	1.003
	WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 5	111	6505	Portrait Mode	W/o	10.23	11.00	1.194	100.00	1.000	0.0625	1.5535	-0.17	0.318	0.590	0.372	0.690
	WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 5	175	6825	Portrait Mode	W/o	10.24	11.50	1.337	100.00	1.000	0.0625	1.5535	0	0.347	0.721	0.429	0.891
02	WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 5	207	6985	Portrait Mode	W/o	10.20	11.00	1.202	100.00	1.000	0.0625	1.5535	0	0.793	1.481	0.951	1.776
	WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 5	207	6985	Landscape Mode	W/o	8.10	8.50	1.096	100.00	1.000	0.0625	1.5535	-0.1	0.270	0.460	0.347	0.591
	WIFI6E	802.11ax-HE160 MCS0	Front	2 mm	Antenna 5	207	6985	Portrait Mode	With	10.20	11.00	1.202	100.00	1.000	0.0625	1.5535	0.1	0.744	1.390	0.933	1.743
03	WIFI6E	802.11ax-HE160 MCS0	Back	2 mm	Antenna 6	15	6025	Landscape Mode	W/o	8.41	8.50	1.021	100.00	1.000	0.0625	1.5535	-0.19	1.000	1.586	1.190	1.887
	WIFI6E	802.11ax-HE160 MCS0	Back	2 mm	Antenna 6	47	6185	Landscape Mode	W/o	7.90	8.50	1.148	100.00	1.000	0.0625	1.5535	-0.13	0.526	0.938	0.937	1.671
	WIFI6E	802.11ax-HE160 MCS0	Back	2 mm	Antenna 6	111	6505	Landscape Mode	W/o	8.45	8.50	1.012	100.00	1.000	0.0625	1.5535	-0.16	0.535	0.841	0.817	1.284
	WIFI6E	802.11ax-HE160 MCS0	Back	2 mm	Antenna 6	175	6825	Landscape Mode	W/o	7.92	8.50	1.143	100.00	1.000	0.0625	1.5535	-0.10	0.228	0.405	0.360	0.639
	WIFI6E	802.11ax-HE160 MCS0	Back	2 mm	Antenna 6	207	6985	Landscape Mode	W/o	8.16	8.50	1.081	100.00	1.000	0.0625	1.5535	-0.02	0.355	0.596	0.468	0.786
	WIFI6E	802.11ax-HE160 MCS0	Back	2 mm	Antenna 6	15	6025	Landscape Mode	With	8.41	8.50	1.021	100.00	1.000	0.0625	1.5535	-0.14	0.231	0.366	0.319	0.506

Test Engineer : Mood Huang and Lemon Su



13. Uncertainty Assessment

Declaration of Conformity:

The test results with all measurement uncertainty excluded is presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

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

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

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

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor ^(a)	1/k ^(b)	1/√3	1/√6	1/√2

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

(b) κ is the coverage factor

Standard Uncertainty for Assumed Distribution

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

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

The judgment of conformity in the report is based on the measurement results excluding the measurement uncertainty.



DASY6 Uncertainty Budget (Frequency band: 4 MHz - 10 GHz range)							
Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)
Measurement System							
Probe Calibration	18.60	N	2	1	1	9.3	9.3
Probe Calibration Drift	1.00	N	1	1	1	1.0	1.0
Probe Linearity	4.70	R	1.732	1	1	2.7	2.7
Broadband Signal	3.00	N	1	1	1	3.0	3.0
Probe Isotropy	7.60	R	2	1	1	3.8	3.8
Data Acquisition	0.30	N	1.732	1	1	0.2	0.2
RF Ambient	1.80	N	1	1	1	1.8	1.8
Probe Positioning	0.20	N	1	0.33	0.33	0.1	0.1
Data Processing	3.50	N	1	1	1	3.5	3.5
Phantom and Device Errors							
Conductivity (meas.) DAK	2.50	N	1	0.78	0.71	2.0	1.8
Conductivity (temp.) BB	5.40	R	1.732	0.78	0.71	2.4	2.2
Phantom Permittivity	14.00	R	1.732	0.5	0.5	4.0	4.0
Distance DUT - TSL	2.00	N	1	2	2	4.0	4.0
Device Holder	3.60	N	1	1	1	3.6	3.6
DUT Modulationm	2.40	R	1.732	1	1	1.4	1.4
Time-average SAR	2.60	R	1.732	1	1	1.5	1.5
DUT drift	5.00	N	1	1	1	5.0	5.0
Correction to the SAR results							
Deviation to Target	1.90	N	1	1	0.84	1.9	1.6
SAR scalingp	0.00	R	1.732	1	1	0.0	0.0
Combined Std. Uncertainty						14.9%	14.8%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						29.8%	29.6%

SAR Uncertainty Budget for frequency range 4MHz to 10GHz



cDASY6 Module mmWave Uncertainty Budget Evaluation Distances to the Antennas > $\lambda/2\pi$ In Compliance with IEC/IEEE 63195					
Error Description	Uncertainty Value (\pm dB)	Probability	Divisor	(Ci)	Standard Uncertainty (\pm dB)
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 \leq 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 dependence	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	0.0
Modulation response	0.40	R	1.732	1	0.2
Integration time	0.00	R	1.732	1	0.0
Response time	0.00	R	1.732	1	0.0
Device holder influence	0.10	R	1.732	1	0.1
DUT alignment	0.00	R	1.732	1	0.0
RF ambient conditions	0.04	R	1.732	1	0.0
Ambient reflections	0.04	R	1.732	1	0.0
Immunity / secondary reception	0.00	R	1.732	1	0.0
Drift of the DUT		R	1.732	1	
Combined Std. Uncertainty					1.34
Expanded STD Uncertainty (95%)					2.68

PD Uncertainty Budget



14. References

- [1] FCC 47 CFR Part 2 "Frequency Allocations and Radio Treaty Matters; General Rules and Regulations"
- [2] ANSI/IEEE Std. C95.1-1992, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", September 1992
- [3] IEEE Std. 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", Sep 2013
- [4] SPEAG DASY System Handbook
- [5] FCC KDB 248227 D01 v02r02, "SAR Guidance for IEEE 802.11 (WiFi) Transmitters", Oct 2015.
- [6] FCC KDB 447498 D01 v06, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Oct 2015
- [7] FCC KDB 648474 D04 v01r03, "SAR Evaluation Considerations for Wireless Handsets", Oct 2015.
- [8] FCC KDB 941225 D06 v02r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", Oct 2015.
- [9] FCC KDB 941225 D07 v01r02, " SAR Evaluation Procedures for UMPC Mini-Tablet Devices", Oct 2015.
- [10] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [11] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.



Appendix A. Plots of System Performance Check

The plots are shown as follows.



Appendix B. Plots of SAR Measurement

The plots are shown as follows.



Appendix C. DASYS Calibration Certificate

The DASYS calibration certificates are shown as follows.