FCC SAR Test Report

Applicant:	Bluebird Inc.
EUT Description:	Enterprise Full Touch Handheld Computer
Model:	S20
Brand:	BLUEBIRD
FCC ID:	SS4S20W1
Standards:	FCC 47CFR §2.1093
Date of Receipt:	2025/05/16
Date of Test:	2025/05/21 to 2025/05/25
Date of Issue:	2025/05/26

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	2025/05/26	Original	Li Wei

Table of Contents

1 Summary of Test Results

Band	Highest SAR(W/kg)	Highest PD (W/m^2)
	Body 1g SAR	
WIFI 6E	0.17	6.23
Limit	1.6	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:	Bluebird Inc.
Address:	3F, 115, Irwon-ro, Gangnam-gu, Seoul, Republic of Korea

4.2 Manufacturer

Manufacturer:	Bluebird Inc.
Address:	3F, 115, Irwon-ro, Gangnam-gu, Seoul, Republic of Korea

5 Product Information

EUT Description	Enterprise Full Touch Handheld Computer	
Model	S20	
Brand	BLUEBIRD	
Hardware Version	V1.01	
Software Version	R1.00	
SN.	S20ANLBBH102	
Device Capabilities:		
Band	Frequency Range (MHz)	Modulation Type
WIFI 6E	5925 ~ 6425 6425 ~ 6525 6525 ~ 6875 6875 ~ 7125	802.11ax
Antenna Type	☐ External, ☒ Integrated	
Battery Information	Model:	BAT-400002
	Normal Voltage:	+3.85V
	Rated capacity:	3900mAh
	Manufacturer:	SHENZHEN GUANGWEI ELECTRONIC TECHNOLOGY 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.

5.1 Antenna Locations

Note:
Only WIFI 6E test data included in this report:

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:

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

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

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

Where:

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

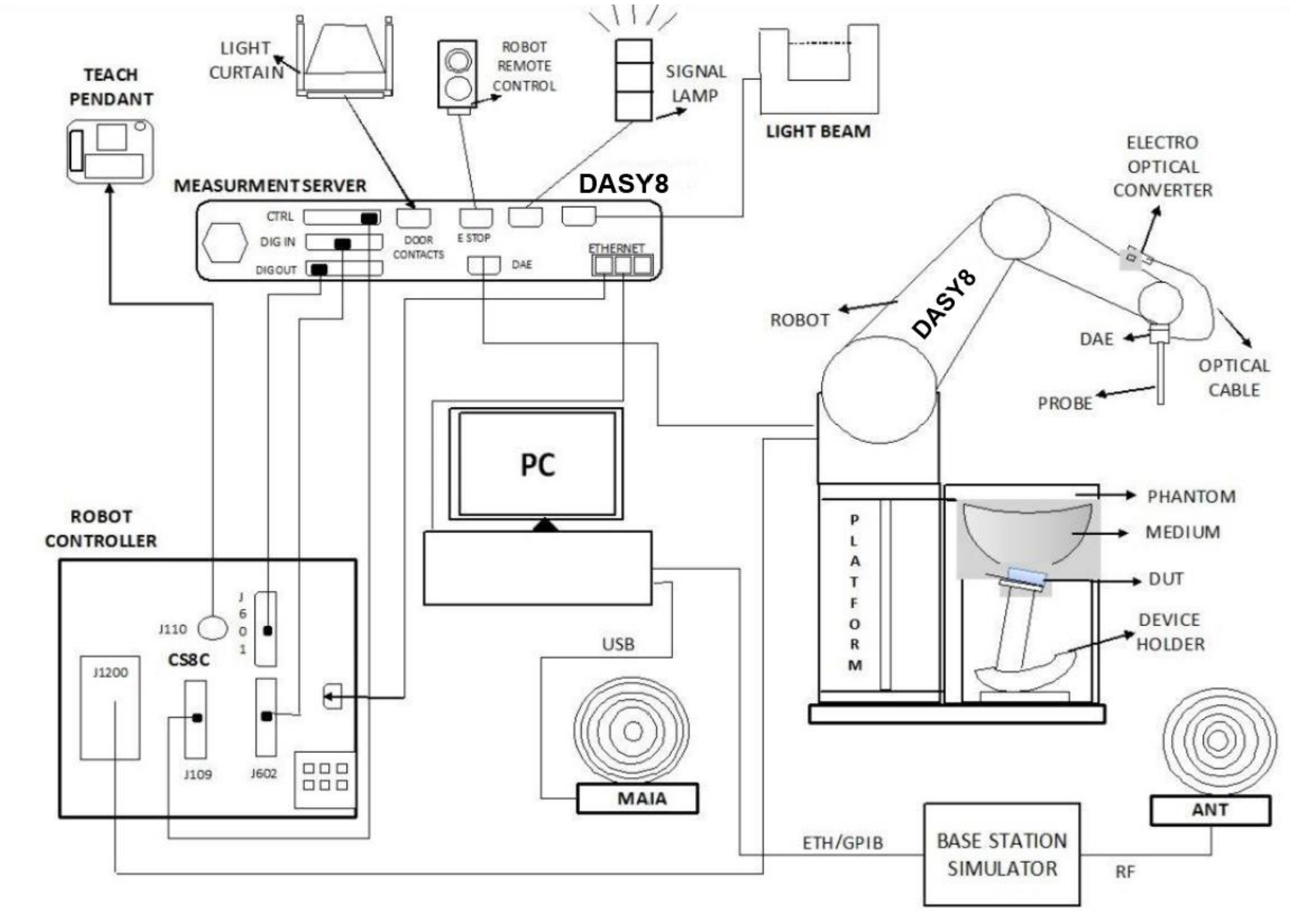
ρ is the mass density of the tissue material (kg/m^3)

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 SAR measurement as below:

Parameter	DUT transmit frequency being tested	
	$f \leq 3$ GHz	3 GHz < $f \leq 10$ GHz
Maximum distance between the measured points (geometric centre of the sensors) and the inner phantom surface (z_{M1} in Figure 20 in mm)	5 ± 1	δ ln(2)/2 ± 0,5 [a]
Maximum spacing between adjacent measured points in mm (see O.8.3.1)[b]	20, or half of the corresponding zoom scan length, whichever is smaller	60 / f, or half of the corresponding zoom scan length, whichever is smaller
Maximum angle between the probe axis and the phantom surface normal (α in Figure 20)[c]	5° (flat phantom only) 30° (other phantoms)	5° (flat phantom only) 20° (other phantoms)
Tolerance in the probe angle	1°	1°

[a] δ is the penetration depth for a plane-wave incident normally on a planar half-space.

[b] See Clause O.8 on how Δx and Δy may be selected for individual area scan requirements.

[c] The probe angle relative to the phantom surface normal is restricted due to the degradation in the measurement accuracy in fields with steep spatial gradients. The measurement accuracy decreases with increasing probe angle and increasing frequency. This is the reason for the tighter probe angle restriction at frequencies above 3 GHz.

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 SAR measurement as below:

Parameter	DUT transmit frequency being tested	
	$f \le 3$ GHz	3 GHz < $f \le 10$ GHz
Maximum distance between the closest measured points and the phantom surface (z_{M1} in Figure 20 and Table 3, in mm)	5	δ ln(2)/2 [a]
Maximum angle between the probe axis and the phantom surface normal (α in Figure 20)	5° (flat phantom only) 30° (other phantoms)	5° (flat phantom only) 20° (other phantoms)
Maximum spacing between measured points in the x- and y-directions (Δx and Δy, in mm)	8	24 / f [b]
For uniform grids: Maximum spacing between measured points in the direction normal to the phantom shell (Δz_1 in Figure 20, in mm)	5	10 / (f − 1)
For graded grids: Maximum spacing between the two closest measured points in the direction normal to the phantom shell (Δz_1 in Figure 20, in mm)	4	12 / f
For graded grids: Maximum incremental increase in the spacing between measured points in the direction normal to the phantom shell ($R_z = \Delta z_2 / \Delta z_1$ in Figure 20)	1,5	1,5
Minimum edge length of the zoom scan volume in the x- and y-directions (L_z in O.8.3.2, in mm)	30	22
Minimum edge length of the zoom scan volume in the direction normal to the phantom shell (L_h in O.8.3.2 in mm)	30	22
Tolerance in the probe angle	1°	1°
[a] δ is the penetration depth for a plane-wave incident normally on a planar half-space. [b] This is the maximum spacing allowed, which might not work for all circumstances.		

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	2173	NCR	NCR
SPEAG	mmWave Phantom	mmWave	1121	NCR	NCR
SPEAG	E-Field Probe	EX3DV4	7858	2025/02/20	2026/02/19
SPEAG	EUmmWV Probe Tip Protection	EUmmWV4	9499	2024/12/06	2025/12/05
SPEAG	Data Acquisition Electronics	DAE4	1847	2024/12/31	2025/12/30
SPEAG	System Validation Kits	D6.5GHzV2	1096	2023/05/11	2026/05/10
SPEAG	5G Verification Source	10GHz	1075	2024/12/03	2025/12/02
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	100648	2025/03/11	2026/03/10
R&S	AVG Power Sensor	NRP-Z21	101651	2025/03/11	2026/03/10
R&S	AVG Power Sensor	NRP-Z21	104189	2025/03/11	2026/03/10
HAISIDIKE	Thermometer	TP300	TOWE-EQ-SR-023	2025/03/12	2026/03/11
BingYu	Temperature and Humidity Indicator	HTC-1	TOWE-EQ-SR-025	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 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.

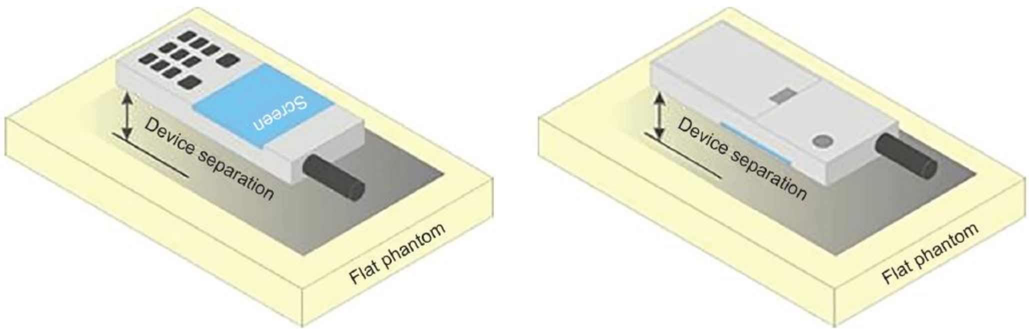


Figure 11-6: Test positions for body-worn devices

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).

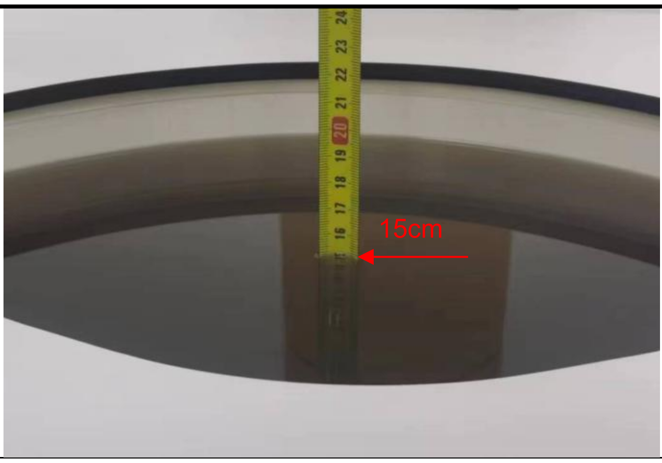


Figure 12-1 Liquid depth in the Flat Phantom

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	22.2	34.50	6.07	35.000	6.140	1.45%	1.15%	2025/05/21

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.

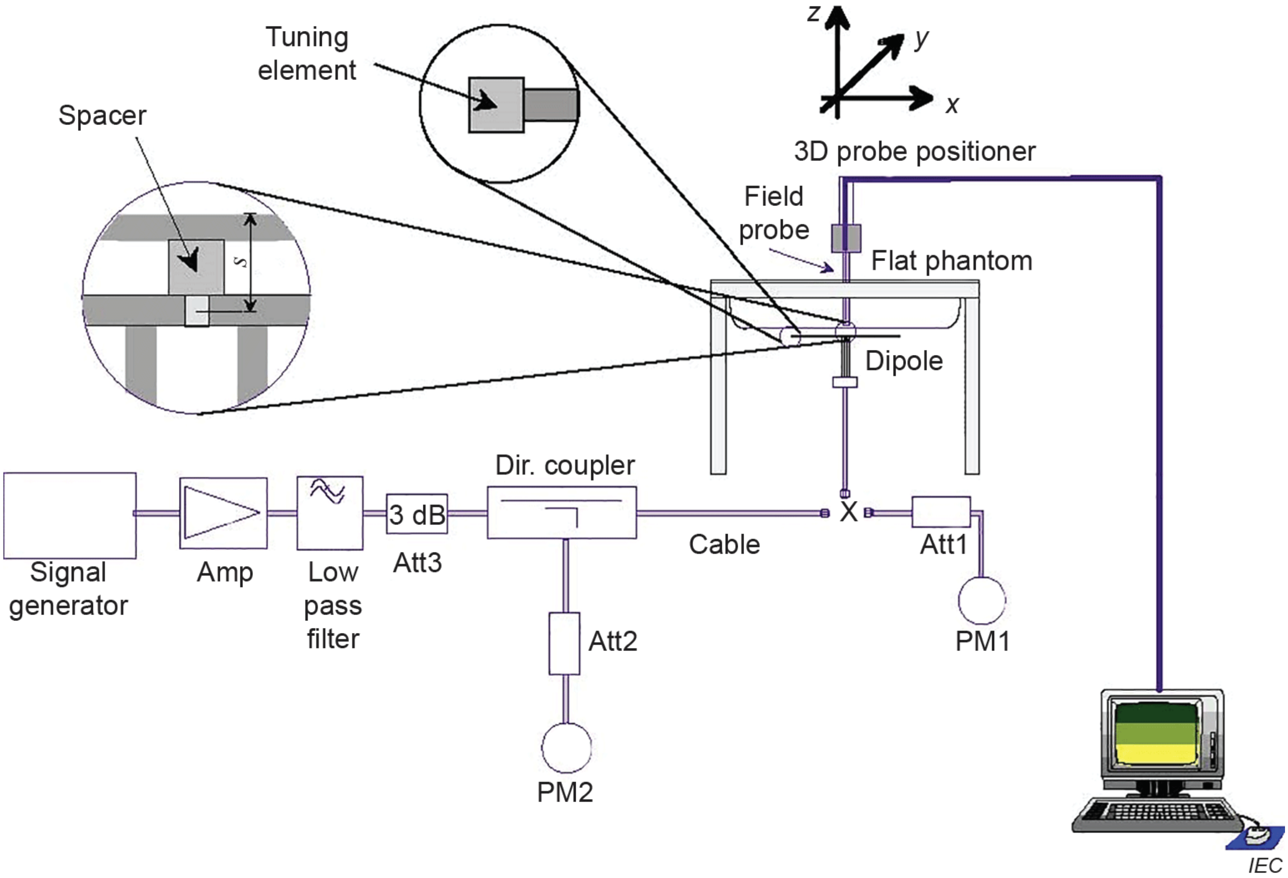


Figure 12-3 System Performance Check Setup

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	31.30	5.79	313.00	57.90	8.30%	8.43%	2025/05/21

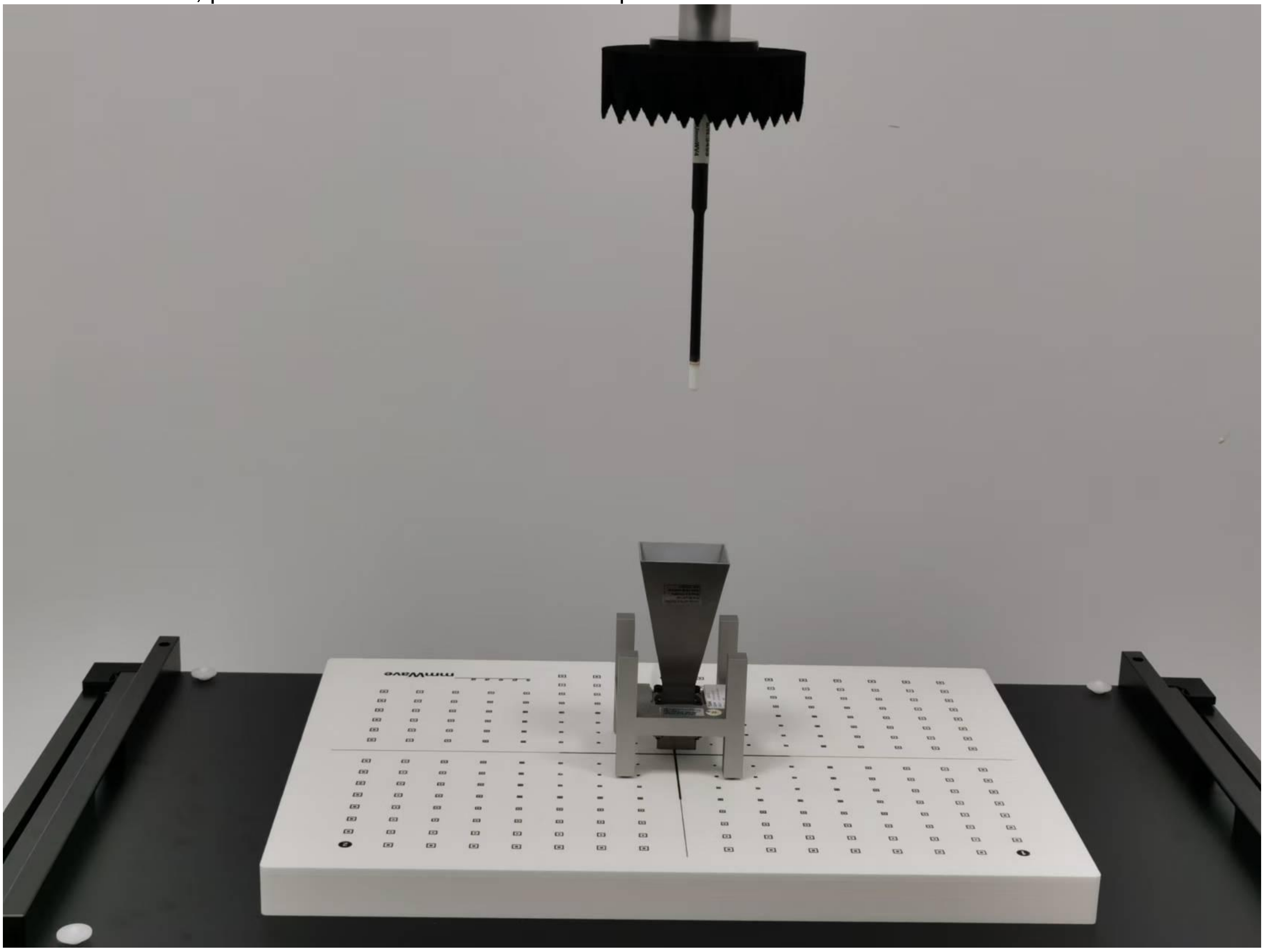
Table 2: SAR System Check Result

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	55.50	56.70	-0.09	2025/05/24

Detailed System Check Results Please see the Appendix A.

13 Conducted Power

13.1 Conducted Power of WIFI 6E

Note:

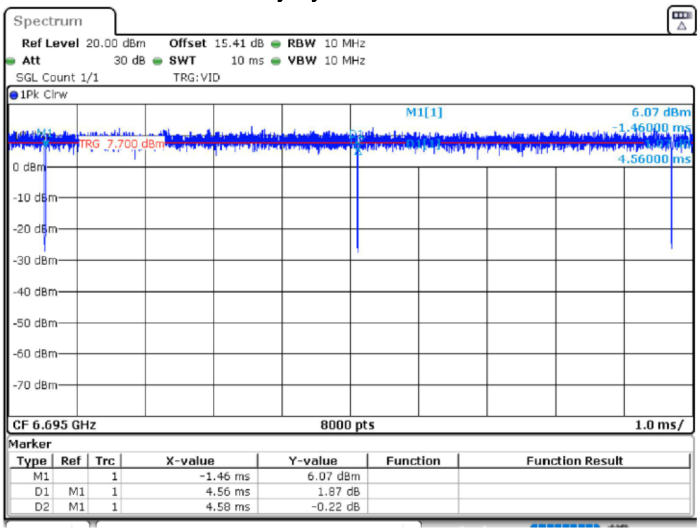
1. When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11ax mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
2. In applying the test guidance, the IEEE 802.11 mode with the maximum output power (out of all modes) should be considered for testing.
3. 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.

Ant1					
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Tune up (dBm)	SAR Test
802.11ax 20M	1	5955	5.52	6.00	Yes
	93	6415	4.39	6.00	Yes
	113	6515	5.00	6.00	Yes
	149	6695	5.69	6.00	Yes
	233	7115	7.06	7.50	Yes
802.11ax 40M	3	5965	No Required	6.00	No
	43	6165		6.00	
	99	6445		6.00	
	179	6845		6.00	
	227	7085		7.00	
802.11ax 80M	7	5985	No Required	6.00	No
	87	6385		6.00	
	103	6465		6.00	
	135	6625		6.00	
	215	7025		6.00	
802.11ax 160M	15	6025	No Required	6.00	Yes
	79	6345		6.00	
	111	6505		6.00	
	143	6665		6.00	
	207	6985		6.00	

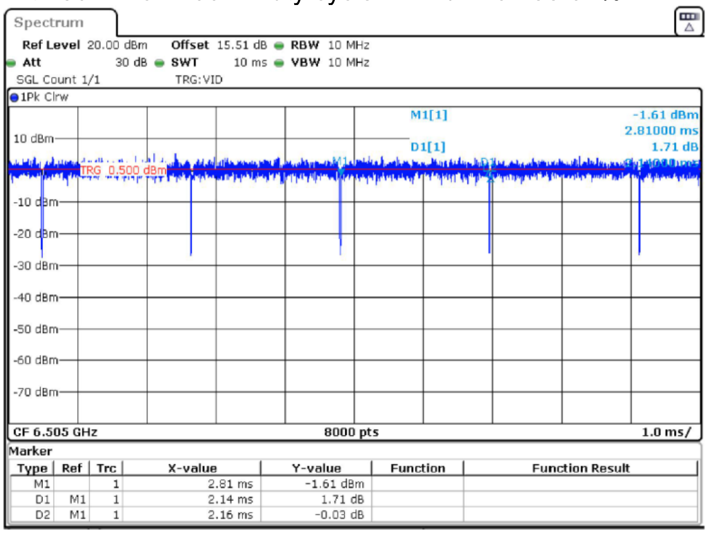
Ant2					
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Tune up (dBm)	SAR Test
802.11ax 20M	1	5955	No Required	7.50	No
	93	6415		7.50	
	113	6515		7.50	
	149	6695		6.00	
	233	7115		6.00	
802.11ax 40M	3	5965	No Required	7.50	No
	43	6165		7.50	
	99	6445		7.50	
	179	6845		6.00	
	227	7085		6.00	
802.11ax 80M	7	5985	No Required	7.50	No
	87	6385		7.50	
	103	6465		7.50	
	135	6625		6.50	
	215	7025		6.00	
802.11ax 160M	15	6025	6.95	7.50	Yes
	79	6345	7.14	7.50	
	111	6505	7.10	7.50	
	143	6665	6.02	7.50	
	207	6985	5.29	6.00	

MIMO					
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Tune up (dBm)	SAR Test
802.11ax 20M	1	5955	No Required	9.8	No
	93	6415		9.8	
	113	6515		9.8	
	149	6695		9.0	
	233	7115		9.8	
802.11ax 40M	3	5965	No Required	9.8	No
	43	6165		9.8	
	99	6445		9.8	
	179	6845		9.0	
	227	7085		9.5	
802.11ax 80M	7	5985	No Required	9.8	No
	87	6385		9.8	
	103	6465		9.8	
	135	6625		9.3	
	215	7025		9.0	
802.11ax 160M	15	6025	9.45	9.8	Yes
	79	6345	9.28	9.8	
	111	6505	9.20	9.8	
	143	6665	8.84	9.8	
	207	6985	8.17	9.0	

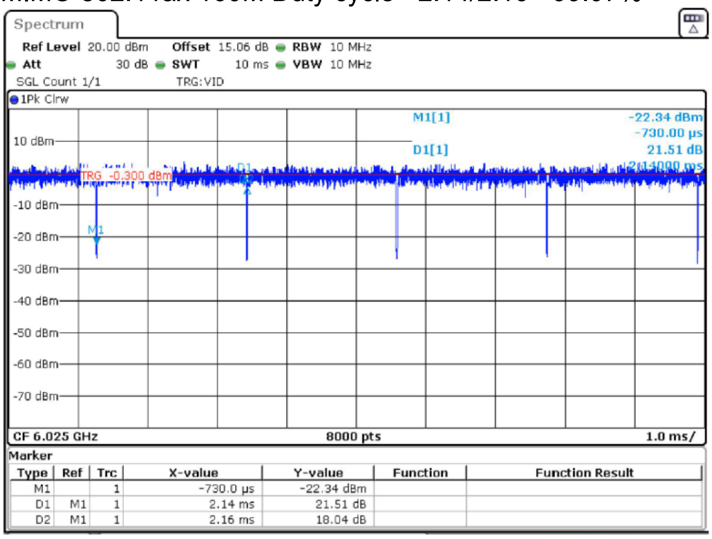
Ant1 802.11ax 20M Duty cycle= 4.56/4.58 =99.56%



Ant2 802.11ax 160M Duty cycle= 2.14/2.16 =99.07%



MIMO 802.11ax 160M Duty cycle= 2.14/2.16 =99.07%



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

Ant1 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)**
Body 5mm												
Front side	802.11ax 20M	233/7115	0.089	-0.12	99.56%	1.004	7.06	7.50	1.107	0.099	0.329	0.366
Back side	802.11ax 20M	233/7115	0.052	0.06	99.56%	1.004	7.06	7.50	1.107	0.058	0.299	0.332
Left side	802.11ax 20M	233/7115	0.018	0.09	99.56%	1.004	7.06	7.50	1.107	0.020	0.102	0.113
Right side	802.11ax 20M	233/7115	0.035	-0.05	99.56%	1.004	7.06	7.50	1.107	0.039	0.138	0.153
Top side	802.11ax 20M	233/7115	0.084	0.04	99.56%	1.004	7.06	7.50	1.107	0.093	0.631	0.701
Bottom side	802.11ax 20M	233/7115	0.004	-0.15	99.56%	1.004	7.06	7.50	1.107	0.004	0.029	0.032
Front side	802.11ax 20M	1/5955	0.085	0.06	99.56%	1.004	5.52	6.00	1.117	0.095	0.595	0.667
Front side	802.11ax 20M	93/6415	0.075	0.09	99.56%	1.004	4.39	6.00	1.449	0.109	0.512	0.745
Front side	802.11ax 20M	113/6515	0.079	-0.09	99.56%	1.004	5.00	6.00	1.259	0.100	0.529	0.669
Front side	802.11ax 20M	149/6695	0.115	-0.12	99.56%	1.004	5.69	6.00	1.074	**0.124**	0.765	0.825
Ant2 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)**
Body 5mm												
Front side	802.11ax 160M	79/6345	0.007	0.16	99.07%	1.009	7.14	7.50	1.086	0.008	0.044	0.048
Back side	802.11ax 160M	79/6345	0.026	0.04	99.07%	1.009	7.14	7.50	1.086	0.029	0.095	0.104
Left side	802.11ax 160M	79/6345	0.018	-0.09	99.07%	1.009	7.14	7.50	1.086	0.020	0.068	0.075
Right side	802.11ax 160M	79/6345	0.030	0.11	99.07%	1.009	7.14	7.50	1.086	0.033	0.052	0.057
Top side	802.11ax 160M	79/6345	0.071	-0.08	99.07%	1.009	7.14	7.50	1.086	0.078	0.443	0.486
Bottom side	802.11ax 160M	79/6345	0.004	0.03	99.07%	1.009	7.14	7.50	1.086	0.004	0.032	0.035
Top side	802.11ax 160M	15/6025	0.048	-0.08	99.07%	1.009	6.95	7.50	1.135	0.055	0.352	0.403
Top side	802.11ax 160M	111/6505	0.079	-0.09	99.07%	1.009	7.10	7.50	1.096	**0.087**	0.554	0.613
Top side	802.11ax 160M	143/6665	0.054	0.09	99.07%	1.009	6.02	7.50	1.406	0.077	0.346	0.491
Top side	802.11ax 160M	207/6985	0.044	0.06	99.07%	1.009	5.29	6.00	1.178	0.052	0.240	0.285
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)**
Body 5mm												
Front side	802.11ax 160M	15/6025	0.070	0.03	99.07%	1.009	9.45	9.80	1.083	0.076	0.434	0.474
Back side	802.11ax 160M	15/6025	0.066	0.07	99.07%	1.009	9.45	9.80	1.083	0.072	0.451	0.493
Left side	802.11ax 160M	15/6025	0.017	0.08	99.07%	1.009	9.45	9.80	1.083	0.019	0.170	0.186
Right side	802.11ax 160M	15/6025	0.082	0.12	99.07%	1.009	9.45	9.80	1.083	0.090	0.479	0.523
Top side	802.11ax 160M	15/6025	0.153	0.16	99.07%	1.009	9.45	9.80	1.083	**0.167**	1.140	1.246
Bottom side	802.11ax 160M	15/6025	0.006	0.00	99.07%	1.009	9.45	9.80	1.083	0.007	0.090	0.098
Top side	802.11ax 160M	79/6345	0.136	0.01	99.07%	1.009	9.28	9.80	1.128	0.155	0.990	1.127
Top side	802.11ax 160M	111/6505	0.108	0.05	99.07%	1.009	9.20	9.80	1.148	0.125	0.876	1.015
Top side	802.11ax 160M	143/6665	0.109	0.06	99.07%	1.009	8.84	9.80	1.246	0.137	0.796	1.001
Top side	802.11ax 160M	207/6985	0.077	-0.03	99.07%	1.009	8.17	9.00	1.210	0.094	0.508	0.620

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)
Top side	802.11ax 160M	79/6345	2.000	0.0625	7.14	7.50	34.2	0.746	0.593	1.290
Top side	802.11ax 160M	79/6345	9.500	0.125	7.14	7.50	28.8		0.317	0.573

Ant1 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 20M	233/7115	2.000	0.0625	0.730	1.510	99.56%	1.004	7.06	7.50	1.107	1.5493	1.257	2.599
Front side	802.11ax 20M	1/5955	2.000	0.0625	1.050	2.880	99.56%	1.004	5.52	6.00	1.117	1.5493	1.824	5.003
Front side	802.11ax 20M	93/6415	2.000	0.0625	1.080	2.590	99.56%	1.004	4.39	6.00	1.449	1.5493	2.434	**5.837**
Front side	802.11ax 20M	113/6515	2.000	0.0625	0.801	2.020	99.56%	1.004	5.00	6.00	1.259	1.5493	1.569	3.956
Front side	802.11ax 20M	149/6695	2.000	0.0625	0.757	1.910	99.56%	1.004	5.69	6.00	1.074	1.5493	1.265	3.191
Ant2 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)
Top side	802.11ax 160M	79/6345	2.000	0.0625	0.593	1.290	99.07%	1.009	7.14	7.50	1.086	1.5493	1.007	2.191
Top side	802.11ax 160M	15/6025	2.000	0.0625	0.432	1.357	99.07%	1.009	6.95	7.50	1.135	1.5493	0.766	2.408
Top side	802.11ax 160M	111/6505	2.000	0.0625	0.448	1.460	99.07%	1.009	7.10	7.50	1.096	1.5493	0.768	2.503
Top side	802.11ax 160M	143/6665	2.000	0.0625	0.645	1.150	99.07%	1.009	6.02	7.50	1.406	1.5493	1.418	**2.528**
Top side	802.11ax 160M	207/6985	2.000	0.0625	0.598	1.020	99.07%	1.009	5.29	6.00	1.178	1.5493	1.101	1.878
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)
Top side	802.11ax 160M	15/6025	2.000	0.0625	0.866	2.430	99.07%	1.009	9.45	9.80	1.083	1.5493	1.466	4.114
Top side	802.11ax 160M	79/6345	2.000	0.0625	0.960	2.280	99.07%	1.009	9.28	9.80	1.128	1.5493	1.693	4.021
Top side	802.11ax 160M	111/6505	2.000	0.0625	1.380	3.470	99.07%	1.009	9.20	9.80	1.148	1.5493	2.476	**6.226**
Top side	802.11ax 160M	143/6665	2.000	0.0625	1.210	3.060	99.07%	1.009	8.84	9.80	1.246	1.5493	2.357	5.961
Top side	802.11ax 160M	207/6985	2.000	0.0625	1.030	2.870	99.07%	1.009	8.17	9.00	1.210	1.5493	1.948	5.429

Table 4: PD of WIFI 6E.

15 Measurement Uncertainty

The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k = 2.

Input quantity X_i (source of uncertainty)	**Unc. (±)**	**Prob. Dist. PDF_i**	**Unc. $a(x_i)$**	**c_i (1g)**	**c_i (10g)**	**u_i (1g) (%)**	**u_i (10g) (%)**
Measurement system errors							
Probe calibration	18.6	N (k = 2)	2	1	1	9.3	9.3
Probe calibration drift	1.7	R	√3	1	1	1.0	1.0
Probe linearity and detection limit	0.9	R	√3	1	1	0.5	0.5
Broadband signal	0.5	R	√3	1	1	0.3	0.3
Probe isotropy	3.2	R	√3	1	1	1.8	1.8
Other probe and data acquisition errors	0.6	N	1	1	1	0.6	0.6
RF ambient and noise	3.0	R	√3	1	1	1.7	1.7
Probe positioning errors	0.5	N	1	0.33	0.33	0.2	0.2
Data processing errors	4.0	R	√3	1	1	2.3	2.3
Phantom and device (DUT or validation antenna) errors							
Measurement of phantom conductivity(σ)	2.5	N	1	0.78	0.71	2.0	1.8
Temperature effects (medium)	2.7	R	√3	0.78	0.71	1.2	1.1
Shell permittivity	14.0	R	√3	0.5	0.5	4.0	4.0
Distance between the radiating element of the DUT and the phantom medium	2.0	N	1	2	2	4.0	4.0
Repeatability of positioning the DUT or source against the phantom	2.9	N	1	1	1	2.9	2.9
Device holder effects	3.6	N	1	1	1	3.6	3.6
Effect of operating mode on probe sensitivity	2.4	R	√3	1	1	1.4	1.4
Time-average SAR	0.0	R	√3	1	1	0.0	0.0
Variation in SAR due to drift in output of DUT	2.5	N	1	1	1	2.5	2.5
Validation antenna uncertainty (validation measurement only)	0.0	N	1	1	1	0.0	0.0
Uncertainty in accepted power (validation measurement only)	0.0	N	1	1	1	0.0	0.0
Corrections to the SAR result (if applied)							
Phantom deviation from target (ε',σ)	1.9	N	1	1	0.84	1.9	1.6
SAR scaling	0.0	R	√3	1	1	0.0	0.0
Combined uncertainty	\					14.30	14.20
Expanded uncertainty and effective degrees of freedom（k = 2）	\					28.59	28.39

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 ---