TEST REPORT

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1. Report No : DRRFCC2405-0030(3)
2. Customer
   - Name : Point Mobile Co., LTD.
   - Address : B-9F Kabul Great Valley, 32, Digital-ro 9-gil, Geumcheon-gu, Seoul, Korea, 08512
3. Use of Report : FCC Original Grant
4. Product Name / Model Name : MOBILE COMPUTER / PM95
   FCC ID : V2X-PM95
5. FCC Regulation(s) : CFR 47 Part 2 subpart 2.1093
   Test Method Used : IEEE 1528-2013, FCC SAR KDB Publications (Details in test report)
   IEC/IEEE 62209-1528:2020
6. Date of Test : 2024.04.01 ~ 2024.05.07
7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing
8. Testing Environment : Refer to appended test report.
9. Test Result : Refer to attached test report.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test report is not related to KOLAS accreditation.

Affirmation	Tested by Name : WonJu Ji	Reviewed by Name : HakMin Kim

2024 . 09 . 26 .

Dt&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description	Tested by	Reviewed by
DRRFCC2405-0030	May. 30, 2024	Initial issue	WonJu Ji	HakMin Kim
DRRFCC2405-0030(1)	Jun. 7, 2024	Revised Sec.1.7	WonJu Ji	HakMin Kim
DRRFCC2405-0030(2)	Jun. 25, 2024	Revised Sec.3.1	WonJu Ji	HakMin Kim
DRRFCC2405-0030(3)	Sep. 26, 2024	Revised Sec.8.2	WonJu Ji	HakMin Kim

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1. DESCRIPTION OF DEVICE

1.1 General Information

EUT type	MOBILE COMPUTER				
FCC ID	V2X-PM95				
Equipment model name	PM95				
Equipment add model name	N/A				
Equipment serial no.	Identical prototype				
FVIN (Firmware Version Identification Number)	95.00xx				
FCC & ISED MRA Designation No.	KR0034				
ISED#	5740A				
TX Frequency Range	**Band**	**Mode**	**Operating Modes**	**Bandwidth**	**Frequency**
	2.4 GHz WLAN	802.11b/g/n/ac	Data	HT20/VHT20	2 412 ~ 2 462 MHz
		802.11n/ac	Data	HT40/VHT40	2 422 ~ 2 452 MHz
	5 GHz W-LAN (UNII 1)	802.11a/n/ac	Data	HT20/VHT20	5 180 ~ 5 240 MHz
		802.11n/ac	Data	HT40/VHT40	5 190 ~ 5 230 MHz
		802.11ac	Data	VHT80	5 210 MHz
	5 GHz W-LAN (UNII 2A)	802.11a/n/ac	Data	HT20/VHT20	5 260 ~ 5 320 MHz
		802.11n/ac	Data	HT40/VHT40	5 270 ~ 5 310 MHz
		802.11ac	Data	VHT80	5 290 MHz
	5 GHz W-LAN (UNII 2C)	802.11a/n/ac	Data	HT20/VHT20	5 500 ~ 5 720 MHz
		802.11n/ac	Data	HT40/VHT40	5 510 ~ 5 710 MHz
		802.11ac	Data	VHT80	5 530 ~ 5 690 MHz
	5 GHz W-LAN (UNII 3)	802.11a/n/ac	Data	HT20/VHT20	5 745 ~ 5 825 MHz
		802.11n/ac	Data	HT40/VHT40	5 755 ~ 5 795 MHz
		802.11ac	Data	VHT80	5 775 MHz
	6 GHz W-LAN (UNII 5)	802.11a/ax	Data	HT20/HE20	5 935 MHz ~ 6 415 MHz
		802.11ax	Data	HE40	5 965 MHz ~ 6 405 MHz
		802.11ax	Data	HE80	5 985 MHz ~ 6 385 MHz
		802.11ax	Data	HE160	6 025 MHz ~ 6 345 MHz
	6 GHz W-LAN (UNII 6)	802.11a/ax	Data	HT20/HE20	6 435 MHz ~ 6 515 MHz
		802.11ax	Data	HE40	6 445 MHz ~ 6 525 MHz
		802.11ax	Data	HE80	6 465 MHz
		802.11ax	Data	HE160	6 505 MHz
	6 GHz W-LAN (UNII 7)	802.11a/ax	Data	HT20/HE20	6 535 MHz ~ 6 855 MHz
		802.11ax	Data	HE40	6 565 MHz ~ 6 845 MHz
		802.11ax	Data	HE80	6 545 MHz ~ 6 865 MHz
		802.11ax	Data	HE160	6 665 MHz ~ 6 825 MHz
	6 GHz W-LAN (UNII 8)	802.11a/ax	Data	HT20/HE20	6 875 MHz ~ 7 115 MHz
		802.11ax	Data	HE40	6 885 MHz ~ 7 085 MHz
		802.11ax	Data	HE80	6 945 MHz ~ 7 025 MHz
		802.11ax	Data	HE160	6 985 MHz
	Bluetooth	-	Data	-	2 402 ~ 2 480 MHz
	NFC	-	Data	-	13.56 MHz

Equipment Class	**Band**	**Reported SAR**			
		1g SAR (W/kg)			**10g SAR (W/kg)**
		Head	**Body-Worn**	**Hotspot**	**Phablet/Extremity**
DTS	2.4 GHz W-LAN	0.29	0.14	0.24	-
UNII 1	5 GHz W-LAN	0.38	0.26	0.51	0.95
UNII 2A					
UNII 2C					
UNII 3					
UNII 5	6 GHz W-LAN	0.19	0.10	-	0.42
UNII 6					
UNII 7					
UNII 8					
DSS	Bluetooth(Ant.8)	< 0.1	< 0.1	< 0.1	-
DTS	Bluetooth LE(Ant.8)	< 0.1	< 0.1	< 0.1	-
DTS	Bluetooth LE(Ant.12)	< 0.1	< 0.1	< 0.1	-
DXX	NFC	-	-	-	< 0.1
Simultaneous SAR per KDB 690783 D01v01r03		**1.26**	**1.12**	**1.23**	**3.12**

Equipment Class	**Band**	**Reported APD (W/m²)**			
		Head	**Body-Worn**	**Hotspot**	**Phablet**
6CD	6 GHz W-LAN	**1.24**	**0.96**	-	**9.76**
		Reported PD (W/m²)			
		3.85			
TER		**0.72**	**0.79**	-	**0.87**

FCC Equipment Class	Part 15 Spread Spectrum Transmitter(DSS) Digital Transmission System(DTS) Unlicensed National Information Infrastructure (UNII) 6 GHz Low Power Dual Client (6CD) Low Power Communications Device Transmitter (DXX)
Date(s) of Tests	2024.04.01 ~ 2024.05.07
Antenna Type	Internal Antenna
Functions	● VoIP is supported.
Note	● Simultaneous SAR's WWAN SAR data was calculated by referring to BV SAR Report (Report No.: W7L-P23120020SA02) Data.

1.2 Power Reduction for SAR

There is no power reduction used for 2.4 GHz/5 GHz/6 GHz W-LAN, Bluetooth and NFC band/mode implemented in this device for SAR purposes.

1.3 Nominal and Maximum Output Power Specifications

The Nominal and Maximum Output Power Specifications are in section 8 of this test report.

1.4 DUT Antenna Locations

The overall dimensions of this device are > 9 x 5 cm. A diagram showing the location of the device of the device antenna can be found in (PM95)_Antenna Location. Since the diagonal dimension of this device is > 160 mm and < 200 mm. it is considered a “phablet”

Mode	Device Sides for SAR Testing					
	Top	Bottom	Front	Rear	Right	Left
2.4 GHz W-LAN (ANT8)	O	X	O	O	O	X
2.4 GHz W-LAN (ANT9)	O	X	O	O	X	O
2.4 GHz W-LAN (ANT8+ANT9)	O	X	O	O	O	O
5 GHz W-LAN (ANT8)	O Note 2	X	O	O	O Note 2	X
5 GHz W-LAN (ANT9)	O Note 2	X	O	O	X	O Note 2
5 GHz W-LAN (ANT8+ANT9)	O Note 2	X	O	O	O Note 2	O Note 2
6 GHz W-LAN (ANT8)	O	X	O	O	O	X
6 GHz W-LAN (ANT9)	O	X	O	O	X	O
6 GHz W-LAN (ANT8+ANT9)	O	X	O	O	O	O
Bluetooth (ANT8)	O	X	O	O	O	X
Bluetooth (ANT12)	X	X	O	O	O	X
NFC	O	O	O	O	O	O

Note 1: Particular DUT edges were not required to be evaluated for Hotspot or Phablet SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 648474 D04v01r03.The antenna document shows the distances between the transmit antennas and the edges of the device.

Note 2: WLAN Hotspot UNII-1, 3 supported.

Note 3: O - Test / X - Not test.

Note 4: This DUT has NFC operations. The NFC antenna is integrated into the back side.
A diagram showing the location of the device antenna can be found in (PM95)_Antenna Location.

1.5 Simultaneous Transmission Capabilities

The Simultaneous Transmission Capabilities are in section 11 of this test report.

1.6 Miscellaneous SAR Test Considerations

WIFI

Since U-NII-1 and U-NII-2A bands have the same maximum output power and the highest reported SAR for U-NII-2A is less than 1.2 W/kg, SAR is not required for U-NII-1 band according to FCC KDB publication 248227 D01v02r02.

Per FCC guidance, SAR was performed using 6.5 GHz SAR probe calibration factors. FCC KDB 648474 and FCC KDB 248227 were followed for test positions, distances, and modes. Per TCB workshop October 2020 notes, 5 channels were tested. Absorbed power density (APD) using a $4cm^2$ averaging area is reported based on SAR measurements. Incident power density is evaluated at 2mm ensuring that the resolution is sufficient such that integrated power density (iPD) between d=2mm and d=λ/5mm varies by < 1dB per equipment manufacturer guidance. Power density results are scaled up for uncertainty above 30%.

Per FCC KDB Publication 648474 D04v01r03, this device is considered a "phablet" since the diagonal dimension is greater than 160mm and less than 200mm. Therefore, phablet SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR > 1.2 W/kg.

6 GHz WIFI results are used for simultaneous transmission analysis with the other transmitters and total exposure ratio (TER).

1.7 Guidance Applied

- IEEE 1528-2013
- IEC/IEEE 62209-1528:2020
- IEC/IEEE 63195:2022
- IEC 62479:2010
- FCC KDB Publication 248227 D01v02r02 (802.11 Wi-Fi SAR)
- FCC KDB Publication 447498 D01v06 (General RF Exposure Guidance)
- FCC KDB Publication 648474 D04v01r03 (Handset SAR)
- FCC KDB Publication 690783 D01v01r03 (SAR Listings on Grants)
- FCC KDB Publication 865664 D01v01r04 (SAR Measurement 100 MHz to 6 GHz)
- FCC KDB Publication 865664 D02v01r02 (RF Exposure Reporting)
- April 2015 TCB Workshop Notes (Simultaneous transmission summation clarified)
- October 2016 TCB Workshop Notes (Bluetooth Duty Factor)
- April 2019 TCB Workshop Notes (Tissue Simulating Liquids, IEEE 802.11ax)
- November 2017 TCB Workshop Notes (System Check, Spatial Averaging Requirements, Poynting Vector Considerations)
- October 2018, April 2019, November 2019, October 2020 TCB Workshop Notes
- April 2021 TCB Workshop Notes (U-NII 6-7 GHz Interim Procedures)
- October 2022 TCB Workshop Notes (IPD and SAR evaluation of f-above-6 GHz portable devices)
- SPEAG 5G Module Application Note (5G Compliance Testing)
- SPEAG DASY6 System Handbook (June 2020)
- SPEAG DASY6 Application Note (Interim Procedures for Devices Operating at 6-10 GHz)

1.8 Device Serial Numbers

The serial numbers used for each test are indicated alongside the results in Section 10.

2. INTROCUCTION

The FCC and Industry Canada have adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 and Health Canada Safety Code 6 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices.

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices. The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave is used for guidance in measuring SAR due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86 NCRP, 1986, Bethesda, MD 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ) It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Fig. 3.1)

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

Fig. 3.1 SAR Mathematical Equation

SAR is expressed in units of Watts per Kilogram (W/kg).

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

where:

σ = conductivity of the tissue-simulating material (S/m)
ρ = mass density of the tissue-simulating material (kg/m^3)
E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.

3. DOSIMETRIC ASSESSMENT

3.1 Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01r04 and IEC/IEEE 62209-1528:2020:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04 (See Table 4.1) and IEC/IEEE 62209-1528:2020.

2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.

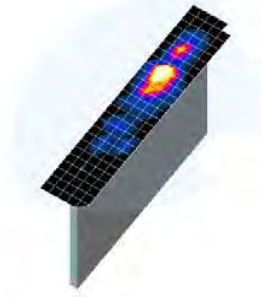

Figure 4.1
Sample SAR Area Scan

3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01r04 (See Table 4.1) and IEC/IEEE 62209-1528:2020. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):

   a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 4.1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).

   b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.

   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 mm ± 1 mm	½·δ·ln(2) mm ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$ mm	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.

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

Table 3.1 Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04*

4. DEFINITION OF REFERENCE POINTS

4.1 Ear Reference Point

Figure 5.1 shows the front, back and side views of the SAM Twin Phantom. The point"M" is the reference point for the center of the mouth, "LE" is the left ear reference point(ERP), and "RE" is the right ERP. The ERPs are 15 mm posterior to the entrance to the Ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 5.1. The plane Passing, through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck- Front) is perpendicular to the reference plane and passing through the RE (or LE) is called the Reference Pivoting Line (see Figure 5.1). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning.

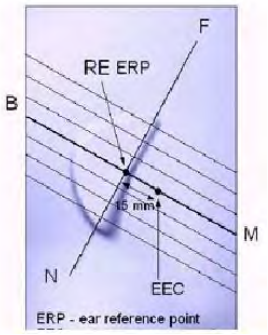

Figure 5.1
Close-up side view of ERP

4.2 Handset Reference Points

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point" (See Fig. 5.3). The "test device reference point" was than located at the same level as the center of the ear reference point. The test device was positioned so that the "vertical centerline" was bisecting the front surface of the handset at it's top and bottom edges, positioning the "ear reference point" on the outer surface of the both the left and right head phantoms on the ear reference point.

Figure 5.2 Front, back and side view SAM Twin Phantom

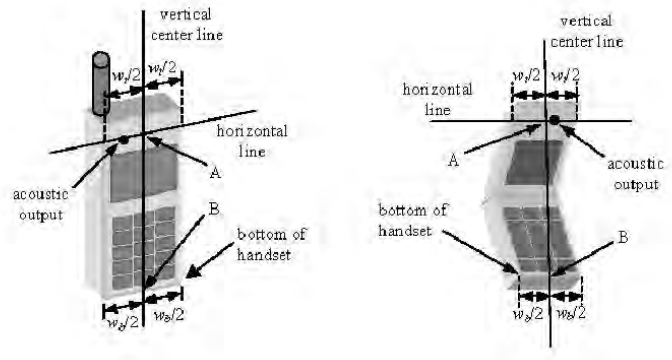

Figure 5.3 Handset Vertical Center & Horizontal Line Reference Points

5. TEST CONFIGURATION POSITIONS FOR HANDSETS

5.1 Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02.

5.2 Positioning for Cheek/Touch

1. The test device was positioned with 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 6.1), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.

Figure 6.1 Front, Side and Top View of Cheek/Touch Position

2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the ear.
3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the plane normal to MB-NF including the line MB (reference plane).
4. The phone was hen rotated around the vertical centerline until the phone (horizontal line) was symmetrical was respect to the line NF.
5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, the handset was rotated about the line NF until any point on the handset made contact with a phantom point below the ear (cheek). (See Figure 6.2)

5.3 Positioning for Ear / 15 ° Tilt

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

1. While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15 degree.
2. The phone was then rotated around the horizontal line by 15 degree.
3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the phone touches the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. The tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head (see Figure 6.3).

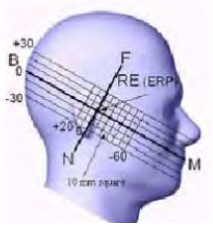

Figure 6.2 Side view w/relevant markings

Figure 6.3 Front, Side and Top View of Ear/15º Position

5.4 Body-Worn Accessory Configurations

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 6.4). Per FCC KDB Publication 648474 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 Publication 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 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.

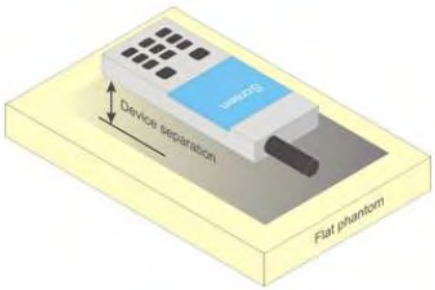

Figure 6.4 Sample Body-Worn Diagram

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.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented.
Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

5.5 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions; i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and 10-g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D01v06 should be applied to determine SAR test requirements.

Per KDB Publication 447498 D01v06, Cell phones (handsets) are not normally designed to be used on extremities or operated in extremity only exposure conditions. The maximum output power levels of handsets generally do not require extremity SAR testing to show compliance. Therefore, extremity SAR was not evaluated for this device.

5.6 Phablet Configurations

For smart phones with a display diagonal dimension > 150 mm or an overall diagonal dimension > 160 mm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, the phablets procedures outlined in KDB Publication 648474 D04v01r03 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally required head and body-worn accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna ≤25 mm from that surface or edge, in direct contact with the phantom, for 10g SAR. The UMPC mini-tablet 1g SAR at 5 mm is not required. When hotspot mode applies, 10g SAR is required only for the surfaces and edges with hotspot mode 1g SAR > 1.2 W/kg.

6. RF EXPOSURE LIMITS

Uncontrolled Environment:

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

Controlled Environment:

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

RF Exposure Limits for Frequencies Below 6 GHz

Table 6.1. SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	General Public Exposure (W/kg) or (mW/g)	Occupational Exposure (W/kg) or (mW/g)
SPATIAL PEAK SAR * (Brain)	1.60	8.00
SPATIAL AVERAGE SAR ** (Whole Body)	0.08	0.40
SPATIAL PEAK SAR *** (Hands / Feet / Ankle / Wrist)	4.00	20.0

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.

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).

RF Exposure Limits for Frequencies Above 6 GHz

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 4 cm^2 per interim FCC Guidance for near-field power density evaluations per October 2018 TCB Workshop notes.

Table 6.2. SAR Human Exposure Specified in FCC 47 CFR §1.1310

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 W/m^2

7. FCC MEASUREMENT PROCEDURES

7.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v06, When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as reported SAR. The highest reported SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r03.

7.2 SAR Testing with 802.11 Transmitters

The normal network operating configurations are not suitable for measuring the SAR of 802.11 b/g/n transmitters. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227D01v02r02 for more details.

7.2.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

A periodic duty factor is required for current generation SAR systems to measure SAR. When 802.11 frame gaps are accounted for in the in the transmission, a maximum transmission duty factor of 92-96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR is scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

7.2.2 U-NII and U-NII-2A

For devices that operate in only one of the U-NII-1 and U-NII-2A bands, the normally required SAR procedures for OFDM configurations are applied. For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following, with respect to the highest reported SAR and maximum output power specified for production units. The procedures are applied independently to each exposure configuration; for example, head, body, hotspot mode etc.

1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, each band is tested independently for SAR.
2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, each band is tested independently for SAR.

7.2.3 U-NII-2C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements.
When Terminal Doppler Weather Rader (TDWR) restriction applies, the channels at 5.60 – 5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification.
Unless band gap channels are permanently disabled, SAR must be considered for these channels. When band gap channels are disabled, each band is tested independently according to the normally required OFDM SAR measurements and probe calibration frequency points requirements.

7.2.4 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all position in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is ≤ 0.8 W/kg or all test position are measured. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

7.2.5 2.4 GHz SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
2) When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

2.4 GHz 802.11 g/n OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power is > 1.2 W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Procedures should be followed.

7.2.6 OFDM Transmission Mode and SAR Test Channel Selection

For the 2.4 GHz and 5 GHz bands, when the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a and 802.11n or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11a, then 80211n or 802.11g then 802.11n is used for SAR measurement. When the maximum output power ware the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

7.2.7 Initial Test Configuration Procedure

For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, and lowest data rate. The channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required.
Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements (See Section 7.2.6). When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

7.2.8 Subsequent Test Configuration Procedures

For OFDM configurations, in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position procedure, when applicable. When the highest reported SAR for the initial test configuration, adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power is ≤ 1.2 W/kg, no additional SAR testing for the subsequent test configurations is required. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

7.2.9 MIMO SAR Considerations

Per KDB Publication 248227 D01v02r02, the simultaneous SAR provisions in KDB Publication 447498 D01v06 should be applied to determine simultaneous transmission SAR test exclusion for WIFI MIMO. If the sum of 1g single transmission chain SAR measurements is < 1.6 W/kg, no additional SAR measurements for MIMO are required. Alternatively, SAR for MIMO can be measured with all antennas transmitting simultaneously at the specified maximum output power of MIMO operation. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

8. RF CONDUCTED POWERS

8.1 Nominal and Maximum Output Power Spec and Conducted Powers (WLAN 2.4 GHz/5 GHz)

Band (GHz)	Mode	Ch	Modulated Average[dBm]					
			Ant.8		Ant.9		MIMO(CDD/SDM)	
			Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
2.4	**802.11b**	1-11	15.50	14.50	16.70	15.70	-	-
	802.11g	1-11	15.00	14.00	16.50	15.50	-	-
	802.11n (HT20)	1-11	14.50	13.50	14.50	13.50	17.51	16.51
	802.11ac (VHT20)	1-11	14.50	13.50	14.50	13.50	17.51	16.51
	802.11n (HT40)	1-11	14.50	13.50	14.50	13.50	17.51	16.51
	802.11ac (VHT40)	1-11	14.70	13.70	14.70	13.70	17.71	16.71
	802.11ax (HE20)	1-11	12.50	11.50	14.00	13.00	16.32	15.32
	802.11ax (HE40)	1-11	12.50	11.50	14.00	13.00	16.32	15.32

Table 8.1.1 Nominal and Maximum Output Power Spec

Mode	Freq. (MHz)	Channel	IEEE 802.11 (2.4 GHz) Conducted Power[dBm]			
			Ant.8	Ant.9	MIMO(CDD)	MIMO(SDM)
802.11b	2 412	1	15.11	16.39	-	-
	2 437	6	15.45	16.66	-	-
	2 462	11	15.26	16.59	-	-
802.11g	2 412	1	14.81	16.29	-	-
	2 437	6	14.90	16.32	-	-
	2 462	11	14.92	16.36	-	-
802.11n (HT20)	2 412	1	13.03	13.66	16.37	16.23
	2 437	6	13.25	13.68	16.48	16.28
	2 462	11	13.32	13.98	16.67	16.41
802.11ac (VHT20)	2 412	1	12.96	13.62	16.31	16.15
	2 437	6	13.04	13.71	16.40	16.10
	2 462	11	13.08	14.00	16.57	16.44
802.11n (HT40)	2 422	3	13.81	14.44	17.15	17.03
	2 437	6	13.94	14.40	17.19	16.84
	2 452	9	13.17	13.42	16.31	16.21
802.11ac (VHT40)	2 422	3	14.32	14.60	17.47	17.37
	2 437	6	14.55	14.66	17.62	17.29
	2 452	9	13.47	13.56	16.53	16.26
802.11ax (HE20)	2 412	1	11.92	13.37	15.72	15.95
	2 437	6	11.99	13.77	15.98	15.64
	2 462	11	12.48	13.94	16.28	15.52
802.11ax (HE40)	2 422	3	12.11	13.66	15.96	15.77
	2 437	6	12.48	13.55	16.06	15.57
	2 452	9	12.10	13.53	15.88	15.46

Table 8.1.2 IEEE 802.11 Average RF Power

Band (GHz)	Mode	Ch	Modulated Average[dBm]					
			Ant.8		Ant.9		MIMO(CDD/SDM)	
			Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
5 (UNII)	802.11a/n/ac (20MHz)	36-64	14.00	13.00	14.00	13.00	17.01	16.01
		100-165	13.00	12.00	13.00	12.00	16.01	15.01
	802.11ax (20MHz)	36-165	13.50	12.50	13.50	12.50	16.51	15.51
	802.11n/ac (40MHz)	38-62	14.50	13.50	14.50	13.50	17.51	16.51
		102-159	14.00	13.00	14.00	13.00	17.01	16.01
	802.11ax (40MHz)	38-159	14.00	13.00	14.00	13.00	17.01	16.01
	802.11ac (80MHz)	42-58	14.00	13.00	14.00	13.00	17.01	16.01
		106-155	13.50	12.50	13.50	12.50	16.51	15.51
	802.11ax (80MHz)	42-155	13.50	12.50	13.50	12.50	16.51	15.51
	802.11ac (160MHz)	50-114	13.90	12.90	13.90	12.90	16.91	15.91
	802.11ax (160MHz)	50-114	13.90	12.90	13.90	12.90	16.91	15.91

Table 8.1.3 Nominal and Maximum Output Power Spec

Mode	Freq. (MHz)	Channel	IEEE 802.11a (5 GHz) Conducted Power[dBm]			
			Ant.8	Ant.9	MIMO(CDD)	MIMO(SDM)
802.11a	5 180	36	13.16	13.88	16.55	-
	5 200	40	13.13	13.46	16.31	-
	5 220	44	13.50	13.24	16.38	-
	5 240	48	13.44	13.38	16.42	-
	5 260	52	13.52	13.43	16.49	-
	5 280	56	13.47	13.28	16.39	-
	5 300	60	13.14	13.38	16.27	-
	5 320	64	13.07	13.22	16.16	-
	5 500	100	12.96	12.90	15.94	-
	5 600	120	12.86	12.44	15.67	-
	5 660	132	12.74	12.24	15.51	-
	5 720	144	12.70	12.22	15.48	-
	5 745	149	12.58	12.05	15.33	-
	5 785	157	12.76	11.79	15.31	-
	5 825	165	12.83	11.54	15.24	-

Table 8.1.4 IEEE 802.11a Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11n HT20 (5 GHz) Conducted Power[dBm]			
			Ant.8	Ant.9	MIMO(CDD)	MIMO(SDM)
802.11n (HT20)	5 180	36	13.06	13.81	16.46	16.37
	5 200	40	12.77	13.16	15.98	15.82
	5 220	44	13.24	12.98	16.12	15.43
	5 240	48	13.15	13.06	16.12	15.81
	5 260	52	13.19	13.05	16.13	15.87
	5 280	56	13.11	12.94	16.04	15.40
	5 300	60	12.76	12.95	15.87	15.62
	5 320	64	12.70	12.87	15.80	15.62
	5 500	100	12.87	12.66	15.78	15.72
	5 600	120	12.63	12.08	15.37	15.24
	5 660	132	12.50	11.90	15.22	15.13
	5 720	144	12.44	11.87	15.17	14.98
	5 745	149	12.42	11.75	15.11	14.96
	5 785	157	12.48	11.39	14.98	14.60
	5 825	165	12.59	11.29	15.00	14.65

Table 8.1.5 IEEE 802.11n HT20 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT20 (5 GHz) Conducted Power[dBm]			
			Ant.8	Ant.9	MIMO(CDD)	MIMO(SDM)
802.11ac (VHT20)	5 180	36	12.83	13.85	16.38	16.19
	5 200	40	12.84	13.08	15.97	15.80
	5 220	44	13.20	13.06	16.14	15.61
	5 240	48	13.15	13.09	16.13	15.95
	5 260	52	13.08	13.10	16.10	15.93
	5 280	56	13.16	12.98	16.08	15.39
	5 300	60	12.86	12.99	15.94	15.61
	5 320	64	12.73	12.92	15.84	15.74
	5 500	100	12.80	12.62	15.72	15.58
	5 600	120	12.46	12.02	15.26	15.26
	5 660	132	12.48	11.91	15.21	15.03
	5 720	144	12.38	11.79	15.11	14.89
	5 745	149	12.26	11.68	14.99	14.80
	5 785	157	12.45	11.41	14.97	14.76
	5 825	165	12.46	11.24	14.90	14.63

Table 8.1.6 IEEE 802.11ac VHT20 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT20 (5 GHz) Conducted Power[dBm]			
			Ant.8	Ant.9	MIMO(CDD)	MIMO(SDM)
802.11ax (VHT20)	5 180	36	12.87	13.17	16.03	15.97
	5 200	40	12.86	13.15	16.02	15.81
	5 220	44	13.11	12.93	16.03	15.55
	5 240	48	13.17	13.08	16.14	15.94
	5 260	52	13.09	13.03	16.07	15.87
	5 280	56	13.19	12.95	16.08	15.54
	5 300	60	12.70	13.12	15.93	15.69
	5 320	64	12.75	13.02	15.90	15.66
	5 500	100	12.79	12.71	15.76	15.63
	5 600	120	12.59	12.37	15.49	15.36
	5 660	132	12.39	11.99	15.20	15.32
	5 720	144	12.24	11.90	15.08	14.85
	5 745	149	12.12	11.64	14.90	14.65
	5 785	157	12.27	11.59	14.95	14.76
	5 825	165	12.43	11.56	15.03	14.75

Table 8.1.7 IEEE 802.11ax VHT20 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11n HT40 (5 GHz) Conducted Power[dBm]			
			Ant.8	Ant.9	MIMO(CDD)	MIMO(SDM)
802.11n (HT40)	5 190	38	13.96	14.05	17.02	16.89
	5 230	**46**	14.45	14.44	17.46	17.02
	5 270	**54**	14.46	14.43	17.46	16.94
	5 310	62	13.95	13.80	16.89	16.61
	5 510	**102**	13.90	13.89	16.91	16.68
	5 590	118	13.78	13.74	16.77	16.62
	5 670	134	13.75	13.61	16.69	16.46
	5 710	142	13.70	13.50	16.61	16.23
	5 755	**151**	13.93	13.31	16.64	16.47
	5 795	159	13.66	13.19	16.44	16.26

Table 8.1.8 IEEE 802.11n HT40 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT40 (5 GHz) Conducted Power[dBm]			
			Ant.8	Ant.9	MIMO(CDD)	MIMO(SDM)
802.11ac (VHT40)	5 190	38	13.96	14.07	17.03	16.82
	5 230	46	14.47	13.87	17.19	17.11
	5 270	54	14.17	13.89	17.04	16.93
	5 310	62	13.94	13.87	16.92	16.80
	5 510	102	13.93	13.67	16.81	16.61
	5 590	118	13.67	13.38	16.54	16.28
	5 670	134	13.48	13.00	16.26	16.21
	5 710	142	13.46	13.12	16.30	16.13
	5 755	151	13.63	12.79	16.24	16.07
	5 795	159	13.65	12.63	16.18	15.82

Table 8.1.9 IEEE 802.11ac VHT40 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ax HE40 (5 GHz) Conducted Power[dBm]			
			Ant.8	Ant.9	MIMO(CDD)	MIMO(SDM)
802.11ax (HE40)	5 190	38	13.63	13.65	16.65	16.47
	5 230	46	13.95	13.51	16.75	16.54
	5 270	54	13.94	13.50	16.74	16.59
	5 310	62	13.98	13.67	16.84	16.69
	5 510	102	13.64	13.24	16.45	16.22
	5 590	118	13.47	13.11	16.30	16.06
	5 670	134	13.19	12.59	15.91	15.62
	5 710	142	13.28	12.88	16.09	15.89
	5 755	151	13.42	12.44	15.97	15.78
	5 795	159	13.35	12.36	15.89	15.78

Table 8.1.10 IEEE 802.11ax HE40 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT80 (5 GHz) Conducted Power[dBm]			
			Ant.8	Ant.9	MIMO(CDD)	MIMO(SDM)
802.11ac (VHT80)	5 210	42	13.85	13.55	16.71	16.61
	5 290	58	13.78	13.45	16.63	16.46
	5 530	106	13.35	13.25	16.31	16.22
	5 610	122	12.96	12.73	15.86	15.72
	5 690	138	13.23	12.83	16.04	15.77
	5 775	155	13.12	12.32	15.75	15.68

Table 8.1.11 IEEE 802.11ac VHT80 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ax HE80 (5 GHz) Conducted Power[dBm]			
			Ant.8	Ant.9	MIMO(CDD)	MIMO(SDM)
802.11ax (HE80)	5 210	42	13.38	13.45	16.43	16.25
	5 290	58	13.45	13.28	16.38	16.16
	5 530	106	13.38	13.36	16.38	16.26
	5 610	122	12.91	12.56	15.75	15.59
	5 690	138	13.04	13.00	16.03	15.65
	5 775	155	13.48	12.26	15.92	15.57

Table 8.1.12 IEEE 802.11ax HE80 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT160 (5 GHz) Conducted Power[dBm]			
			Ant.8	Ant.9	MIMO(CDD)	MIMO(SDM)
802.11ac (VHT160)	5 250	50	12.84	13.35	16.11	15.95
	5 570	114	13.40	13.44	16.43	16.20

Table 8.1.13 IEEE 802.11ac VHT160 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ax HE160 (5 GHz) Conducted Power[dBm]			
			Ant.8	Ant.9	MIMO(CDD)	MIMO(SDM)
802.11ax (HE160)	5 250	50	13.88	13.82	16.86	16.77
	5 570	114	13.87	13.66	16.78	16.75

Table 8.1.14 IEEE 802.11ax HE160 Average RF Power

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 D01v02r02:

- Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.
- For transmission modes with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.
- For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.
- For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 3 channels supported. For configurations with multiple mid-band channels, duo to an even number of channels, both channels were measured.
- Output Power and SAR is not required for 802.11 g/n HT20/ac VHT20 channels when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjust SAR is ≤ 1.2 W/kg.
- The underlined data rate and channel above were tested for SAR.

The average output powers of this device were tested by below configuration.

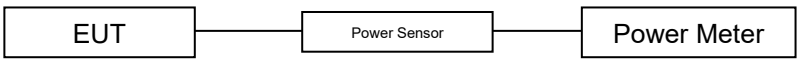

Figure 8.1.1 Power Measurement Setup

8.2 Nominal and Maximum Output Power Spec and Conducted Powers (WLAN 6 GHz)

Band	Mode	Ch	Indoor AP Modulated Average[dBm]					
			Ant.8		Ant.9		MIMO	
			Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
Wi-Fi 6 GHz (UNII 5)	802.11a	2-93	-1.00	-2.00	-1.00	-2.00	2.01	1.01
	802.11ax HE20	2	-12.50	-13.50	-12.50	-13.50	-9.49	-10.49
		45	0.00	-1.00	0.00	-1.00	3.01	2.01
		93	-2.00	-3.00	-1.00	-2.00	1.54	0.54
	802.11ax HE40	3-91	2.00	1.00	3.50	2.50	5.82	4.82
	802.11ax HE80	7-87	3.50	2.50	5.00	4.00	7.32	6.32
	802.11ax HE160	15-47	10.00	9.00	10.00	9.00	13.01	12.01
		79	9.00	8.00	10.00	9.00	12.54	11.54
Wi-Fi 6 GHz (UNII 6)	802.11a	97-113	-1.00	-2.00	1.00	-2.00	3.12	2.12
	802.11ax HE20	97-113	0.00	-1.00	1.00	0.00	3.54	2.54
	802.11ax HE40	99-115	2.00	1.00	3.50	2.50	5.82	4.82
	802.11ax HE80	103	3.50	2.50	5.00	4.00	7.32	6.32
	802.11ax HE160	111	9.00	8.00	10.00	9.00	12.54	11.54
Wi-Fi 6 GHz (UNII 7)	802.11a	117-181	-1.00	-2.00	1.00	-2.00	3.12	2.12
	802.11ax HE20	117-181	0.00	-1.00	1.00	0.00	3.54	2.54
	802.11ax HE40	123-179	2.00	1.00	3.50	2.50	5.82	4.82
	802.11ax HE80	119-183	3.50	2.50	5.00	4.00	7.32	6.32
	802.11ax HE160	143-175	10.00	9.00	10.00	9.00	13.01	12.01
Wi-Fi 6 GHz (UNII 8)	802.11a	185-233	-1.00	-2.00	1.00	-2.00	3.12	2.12
	802.11ax HE20	185-209	0.00	-1.00	1.00	0.00	3.54	2.54
		233	-7.50	-8.50	-7.50	-8.50	-4.49	-5.49
	802.11ax HE40	187-227	2.00	1.00	3.50	2.50	5.82	4.82
	802.11ax HE80	199-215	3.50	2.50	5.00	4.00	7.32	6.32
	802.11ax HE160	207	10.00	9.00	10.00	9.00	13.01	12.01

Table 8.2.1 Nominal and Maximum Output Power Spec

Band	Mode	Ch	Indoor AP Modulated Average[dBm]		
			Ant.8	Ant.9	MIMO
Wi-Fi 6 GHz (UNII 5)	802.11a	2	-1.18	-1.98	1.45
		45	-1.11	-1.02	1.95
		93	-2.92	-2.06	0.54
	802.11ax HE20	2	-12.70	-12.90	-9.79
		45	-0.96	-1.86	1.62
		93	-2.48	-1.50	1.05
	802.11ax HE40	3	1.74	1.59	4.68
		43	1.08	2.69	4.97
		91	0.88	2.80	4.96
	802.11ax HE80	7	3.35	3.21	6.29
		39	2.61	4.45	6.64
		87	2.80	4.36	6.66
	802.11ax HE160	15	9.56	8.98	12.29
		47	9.60	9.68	12.65
		79	8.95	9.88	12.45
Wi-Fi 6 GHz (UNII 6)	802.11a	97	-1.32	-0.28	2.24
		105	-1.83	-0.57	1.86
		113	-2.16	-0.57	1.72
	802.11ax HE20	97	-1.13	0.27	2.64
		105	-1.67	-0.22	2.13
		113	-1.87	-0.22	2.04
	802.11ax HE40	99	0.73	2.53	4.73
		107	0.41	2.26	4.44
		115	0.28	2.05	4.26
	802.11ax HE80	103	2.11	4.23	6.31
	802.11ax HE160	111	8.80	9.87	12.38
Wi-Fi 6 GHz (UNII 7)	802.11a	117	-2.19	-0.43	1.79
		149	-1.44	-0.25	2.21
		181	-2.05	0.50	2.42
	802.11ax HE20	117	-1.79	-0.06	2.17
		149	-1.29	0.14	2.49
		181	-1.58	0.82	2.79
	802.11ax HE40	123	0.73	2.42	4.67
		147	1.29	2.22	4.79
		179	0.94	3.27	5.27
	802.11ax HE80	119	1.84	3.87	5.98
		151	2.54	4.29	6.51
		183	2.61	4.98	6.97
	802.11ax HE160	143	9.62	9.98	12.81
		175	9.17	9.75	12.48
Wi-Fi 6 GHz (UNII 8)	802.11a	185	-1.99	0.37	2.36
		209	-1.74	-0.03	2.21
		233	-2.01	-0.46	1.84
	802.11ax HE20	185	-1.53	0.73	2.76
		209	-1.47	0.30	2.51
		233	-8.76	-7.64	-5.15
	802.11ax HE40	187	0.88	3.06	5.12
		211	0.65	2.31	4.57
		227	0.22	1.71	4.04
	802.11ax HE80	199	2.05	4.59	6.51
		215	1.77	4.01	6.04
	802.11ax HE160	207	9.27	9.86	12.59

Table 8.2.2 Average RF Power

Note(s):

1. Per TCB workshop April 2021's guide, Channel power verification was performed for UNII 6E (5 925 MHz – 7 125 MHz). So, 5 test channels of 802.11ax (HE160) were determined for SAR test.

The average output powers of this device were tested by below configuration.

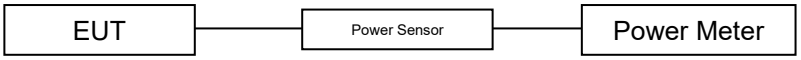

Figure 8.2.1 Power Measurement Setup

8.3 Nominal and Maximum Output Power Spec and Conducted Powers (Bluetooth)

Channel	Frequency	Burst AVG Output Power (1Mbps)	Frame AVG Output Power (1Mbps)	Burst AVG Output Power (2Mbps)	Frame AVG Output Power (2Mbps)	Burst AVG Output Power (3Mbps)	Frame AVG Output Power (3Mbps)
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2 402	3.00	1.85	1.00	-0.15	1.00	-0.15
Mid	2 441	5.00	3.85	3.00	1.85	3.00	1.85
High	2 480	5.00	3.85	3.00	1.85	3.00	1.85

Table 8.3.1 Nominal and Maximum Output Power Spec (Burst/Frame) (Ant.8)

Channel	Frequency	Burst AVG Output Power (1Mbps)	Frame AVG Output Power (1Mbps)	Burst AVG Output Power (2Mbps)	Frame AVG Output Power (2Mbps)	Burst AVG Output Power (3Mbps)	Frame AVG Output Power (3Mbps)
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2 402	2.75	1.60	0.85	-0.30	0.84	-0.31
Mid	2 441	4.90	3.75	2.97	1.82	2.99	1.84
High	2 480	4.17	3.02	2.26	1.11	2.25	1.10

Table 8.3.2 Bluetooth Burst and Frame Average RF Power (Ant.8)

Channel	Frequency	Burst AVG Output Power(LE / 1Mbps)	Frame AVG Output Power(LE / 1Mbps)	Burst AVG Output Power(LE / 2Mbps)	Frame AVG Output Power(LE / 2Mbps)
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2 402	3.00	2.30	3.00	0.61
Mid	2 440	5.00	4.30	**5.00**	2.61
High	2 480	5.00	4.30	5.00	2.61

Table 8.3.3 Nominal and Maximum Output Power Spec (Burst/Frame) (Ant.8)

Channel	Frequency	Burst AVG Output Power(LE / 1Mbps)	Frame AVG Output Power(LE / 1Mbps)	Burst AVG Output Power(LE / 2Mbps)	Frame AVG Output Power(LE / 2Mbps)
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2 402	2.84	2.14	2.81	0.42
Mid	2 440	4.90	4.20	4.89	2.50
High	2 480	4.15	3.45	4.13	1.74

Table 8.3.4 Bluetooth LE Burst and Frame Average RF Power (Ant.8)

Channel	Frequency	Burst AVG Output Power(LE / 1Mbps)	Frame AVG Output Power(LE / 1Mbps)	Burst AVG Output Power(LE / 2Mbps)	Frame AVG Output Power(LE / 2Mbps)
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2 402	-1.00	-1.69	-1.00	-3.45
Mid	2 440	-1.00	-1.69	-1.00	-3.45
High	2 480	-1.00	-1.69	-1.00	-3.45

Table 8.3.3 Nominal and Maximum Output Power Spec (Burst/Frame) (Ant.12)

Channel	Frequency	Burst AVG Output Power(LE / 1Mbps)	Frame AVG Output Power(LE / 1Mbps)	Burst AVG Output Power(LE / 2Mbps)	Frame AVG Output Power(LE / 2Mbps)
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2 402	-1.12	-1.82	-1.11	-3.56
Mid	2 440	-1.21	-1.91	-1.21	-3.66
High	2 480	-1.52	-2.22	-1.52	-3.97

Table 8.3.4 Bluetooth LE Burst and Frame Average RF Power (Ant.12)

- **Bluetooth Conducted Powers procedures**

1. Bluetooth (BDR, EDR)
   1) Enter DUT mode in EUT and operate it.
      When it operating, The EUT is transmitting at maximum power level and duty cycle fixed.
   2) Instruments and EUT were connected like Figure 8.3.1.
   3) The maximum output powers of BDR(1 Mbps), EDR(2, 3 Mbps) and each frequency were set by a Bluetooth Tester.
   4) Power levels were measured by a Power Meter.

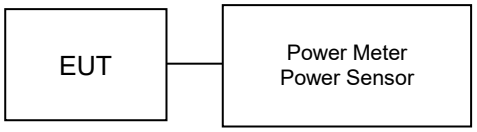

Figure 8.3.1 Average Power Measurement Setup

- **Bluetooth Transmission Plot (Ant.8)**

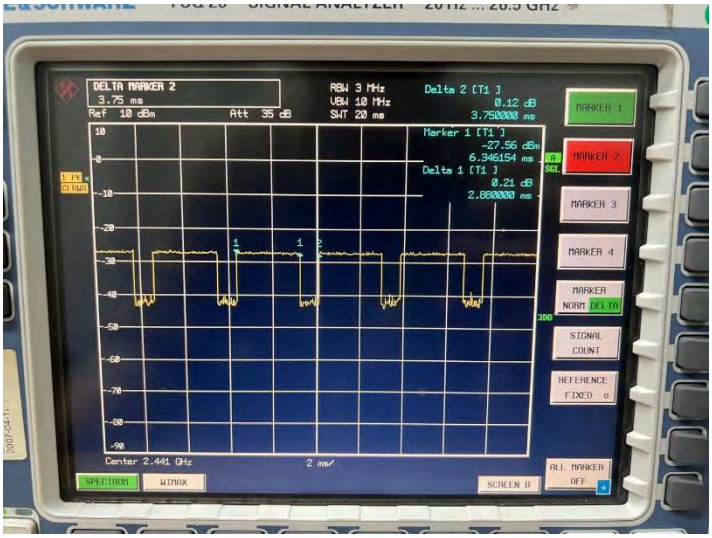

Figure 8.3.2 Bluetooth Transmission Plot

- **Bluetooth Duty Cycle Calculation**

Duty Cycle = Pulse/Period * 100% = (2.880/3.750) * 100 = 76.8%

- **Bluetooth LE Transmission Plot (Ant.8)**

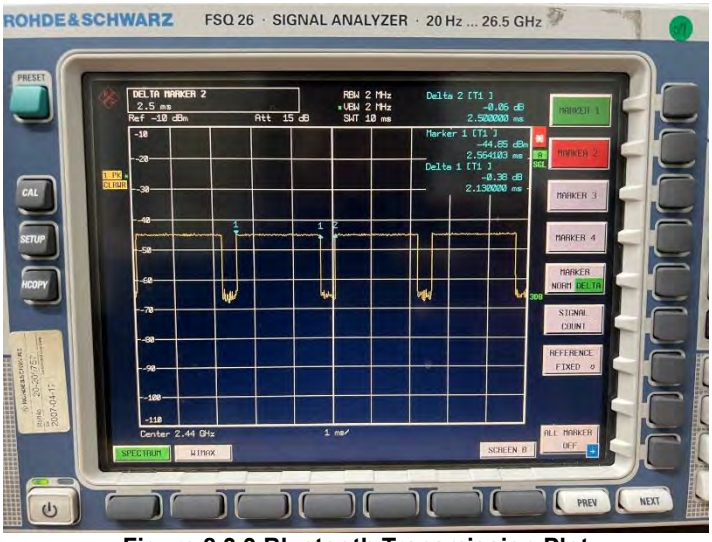

Figure 8.3.3 Bluetooth Transmission Plot

- **Bluetooth LE Duty Cycle Calculation**

Duty Cycle = Pulse/Period * 100% = (2.130/2.500) * 100 = 85.2%

- **Bluetooth LE Transmission Plot (Ant.12)**

Figure 8.3.4 Bluetooth Transmission Plot

- **Bluetooth LE Duty Cycle Calculation**

Duty Cycle = Pulse/Period * 100% = (2.140/2.510) * 100 = 85.3%

9. SYSTEM VERIFICATION

9.1 Tissue Verification

MEASURED TISSUE PARAMETERS										
Date(s)	Tissue Type	Ambient Temp.[°C]	Liquid Temp.[°C]	Measured Frequency [MHz]	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, εr	Measured Conductivity, σ (S/m)	Er Deviation [%]	σ Deviation [%]
Apr. 1. 2024	13 Head	21.0	20.9	12.0	55.000	0.750	54.410	0.725	-1.07	-3.33
				13.0	55.000	0.750	54.390	0.730	-1.11	-2.67
				13.6	55.000	0.750	54.300	0.730	-1.27	-2.67
				14.0	55.000	0.750	54.220	0.740	-1.42	-1.33
Apr. 1. 2024	2 450 Head	21.3	21.2	2 412.0	39.265	1.766	38.968	1.792	-0.76	1.47
				2 422.0	39.248	1.775	38.915	1.798	-0.85	1.30
				2 437.0	39.222	1.788	38.838	1.811	-0.98	1.29
				2 450.0	39.200	1.800	38.780	1.827	-1.07	1.50
				2 452.0	39.197	1.802	38.771	1.830	-1.09	1.55
				2 462.0	39.184	1.813	38.744	1.845	-1.12	1.77
Apr. 2. 2024	2 450 Head	21.6	21.5	2 412.0	39.265	1.766	38.944	1.793	-0.82	1.53
				2 422.0	39.248	1.775	38.892	1.799	-0.91	1.35
				2 437.0	39.222	1.788	38.816	1.812	-1.04	1.34
				2 450.0	39.200	1.800	38.760	1.828	-1.12	1.56
				2 452.0	39.197	1.802	38.751	1.831	-1.14	1.61
				2 462.0	39.184	1.813	38.723	1.846	-1.18	1.82
Apr. 3. 2024	2 450 Head	21.4	21.3	2 412.0	39.265	1.766	38.940	1.793	-0.83	1.53
				2 422.0	39.248	1.775	38.888	1.799	-0.92	1.35
				2 437.0	39.222	1.788	38.811	1.812	-1.05	1.34
				2 450.0	39.200	1.800	38.754	1.829	-1.14	1.61
				2 452.0	39.197	1.802	38.746	1.831	-1.15	1.61
				2 462.0	39.184	1.813	38.718	1.846	-1.19	1.82
Apr. 11. 2024	2 450 Head	21.3	21.2	2 402.0	39.282	1.757	39.023	1.786	-0.66	1.65
				2 440.0	39.217	1.791	38.827	1.814	-0.99	1.28
				2 441.0	39.215	1.792	38.822	1.816	-1.00	1.34
				2 450.0	39.200	1.800	38.784	1.827	-1.06	1.50
				2 480.0	39.160	1.832	38.709	1.874	-1.15	2.29
Apr. 2. 2024	5 200 Head	21.0	20.9	5 190.0	36.010	4.650	36.404	4.524	1.09	-2.71
				5 200.0	36.000	4.660	36.382	4.536	1.06	-2.66
				5 230.0	35.970	4.690	36.319	4.569	0.97	-2.58
Apr. 2. 2024	5 300 Head	21.0	20.9	5 270.0	35.930	4.730	36.236	4.622	0.85	-2.28
				5 300.0	35.900	4.760	36.186	4.655	0.80	-2.21
				5 310.0	35.890	4.770	36.163	4.668	0.76	-2.14
Apr. 3. 2024	5 600 Head	21.0	20.9	5 500.0	35.650	4.965	36.664	4.890	2.84	-1.51
				5 510.0	35.635	4.976	36.644	4.901	2.83	-1.51
				5 590.0	35.515	5.060	36.487	5.001	2.74	-1.17
				5 600.0	35.500	5.070	36.474	5.012	2.74	-1.14
				5 670.0	35.430	5.140	36.339	5.092	2.57	-0.93
				5 710.0	35.390	5.180	36.276	5.144	2.50	-0.69
Apr. 3. 2024	5 800 Head	21.0	20.9	5 755.0	35.345	5.225	36.181	5.196	2.37	-0.56
				5 795.0	35.305	5.265	36.106	5.247	2.27	-0.34
				5 800.0	35.300	5.270	36.099	5.254	2.26	-0.30
Apr. 8. 2024	6 500 Head	21.4	21.3	6 025.0	35.070	5.509	34.700	5.510	-1.06	0.02
				6 345.0	34.686	5.887	34.100	5.890	-1.69	0.05
				6 500.0	34.500	6.070	33.900	6.090	-1.74	0.33
				6 505.0	34.494	6.076	33.900	6.100	-1.72	0.39
				6 665.0	34.302	6.261	33.600	6.280	-2.05	0.30
				6 985.0	33.918	6.633	33.000	6.670	-2.71	0.56
				7 000.0	33.900	6.650	33.000	6.690	-2.65	0.60
Apr. 11. 2024	6 500 Head	21.3	21.2	6 025.0	35.070	5.509	34.600	5.470	-1.34	-0.71
				6 345.0	34.686	5.887	34.000	5.850	-1.98	-0.63
				6 500.0	34.500	6.070	33.600	6.030	-2.61	-0.66
				6 505.0	34.494	6.076	33.600	6.040	-2.59	-0.59
				6 665.0	34.302	6.261	33.300	6.230	-2.92	-0.50
				6 985.0	33.918	6.633	32.700	6.610	-3.59	-0.35
				7 000.0	33.900	6.650	32.700	6.640	-3.54	-0.15
Apr. 16. 2024	6 500 Head	21.1	21.0	6 025.0	35.070	5.509	34.700	5.520	-1.06	0.20
				6 345.0	34.686	5.887	34.200	5.900	-1.40	0.22
				6 500.0	34.500	6.070	33.900	6.110	-1.74	0.66
				6 505.0	34.494	6.076	33.900	6.110	-1.72	0.56
				6 665.0	34.302	6.261	33.600	6.290	-2.05	0.46
				6 985.0	33.918	6.633	33.000	6.670	-2.71	0.56
				7 000.0	33.900	6.650	33.000	6.710	-2.65	0.90

The above measured tissue parameters were used in the DASY software. The DASY software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies (per KDB 865664 and IEEE 1528-2013 6.6.1.2). The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

Measurement Procedure for Tissue verification:

1) The network analyzer and probe system was configured and calibrated.
2) The probe was immersed in the sample which was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
3) The complex admittance with respect to the probe aperture was measured
4) The complex relative permittivity , for example from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\varepsilon_r\varepsilon_0}{[\ln(b/a)]^2}\int_a^b\int_a^b\int_0^\pi \cos\phi' \frac{\exp\left[-j\omega r(\mu_0\varepsilon_r'\varepsilon_0)^{1/2}\right]}{r} d\phi' d\rho' d\rho$$

where Y is the admittance of the probe in contact with the sample, the primed and unprimed coordinates refer to source and observation points, respectively, $r^2 = \rho^2 + \rho'^2 - 2\rho\rho'\cos\phi'$, ω is the angular frequency, and $j = \sqrt{-1}$.

9.2 Test System Verification

Prior to assessment, the system is verified to the ± 10 % of the specifications at using the SAR Dipole kit(s). (Graphic Plots Attached)

Table 9.2.1 System Verification Results (SAR, 1g)

SYSTEM DIPOLE VERIFICATION TARGET & MEASURED												
SAR System #	Freq. [MHz]	SAR Dipole kits	Date(s)	Tissue Type	Ambient Temp. [°C]	Liquid Temp. [°C]	Probe S/N	Input Power (mW)	1 W Target SAR_{1g} (W/kg)	Measured SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	Deviation [%]
A	2 450	D2450V2, SN: 726	Apr. 1. 2024	Head	21.3	21.2	3327	100	52.7	5.34	53.4	1.33
A	2 450	D2450V2, SN: 726	Apr. 2. 2024	Head	21.6	21.5	3327	100	52.7	5.43	54.3	3.04
A	2 450	D2450V2, SN: 726	Apr. 3. 2024	Head	21.4	21.3	3327	100	52.7	5.33	53.3	1.14
A	2 450	D2450V2, SN: 726	Apr. 11. 2024	Head	21.3	21.2	3327	100	52.7	5.36	53.6	1.71
A	2 450	D2450V2, SN: 726	Apr. 11. 2024	Head	21.3	21.2	3930	100	52.7	5.53	55.3	4.93
A	2 450	D2450V2, SN: 726	Apr. 11. 2024	Head	21.3	21.2	3916	100	52.7	5.05	50.5	-4.17
D	5 200	D5GHzV2, SN:1212	Apr. 2. 2024	Head	21.0	20.9	3933	100	77.7	7.37	73.7	-5.15
D	5 300	D5GHzV2, SN:1212	Apr. 2. 2024	Head	21.0	20.9	3933	100	79.9	7.81	78.1	-2.25
D	5 500	D5GHzV2, SN:1212	Apr. 3. 2024	Head	21.0	20.9	3933	100	83.1	7.79	77.9	-6.26
D	5 600	D5GHzV2, SN:1212	Apr. 3. 2024	Head	21.0	20.9	3933	100	84.4	8.42	84.2	-0.24
D	5 800	D5GHzV2, SN:1212	Apr. 3. 2024	Head	21.0	20.9	3933	100	78.8	7.63	76.3	-3.17
A	6 500	D6.5GHzV2, SN:1017	Apr. 8. 2024	Head	21.4	21.3	7368	25	291.0	6.87	274.8	-5.57
A	6 500	D6.5GHzV2, SN:1017	Apr. 11. 2024	Head	21.3	21.2	7368	25	291.0	6.95	278.0	-4.47
A	6 500	D6.5GHzV2, SN:1017	Apr. 16. 2024	Head	21.1	21.0	7368	25	291.0	6.93	277.2	-4.74
A	7 000	D7GHzV2, SN:1015	Apr. 8. 2024	Head	21.4	21.3	7368	25	281.0	6.88	275.2	-2.06
A	7 000	D7GHzV2, SN:1015	Apr. 11. 2024	Head	21.3	21.2	7368	25	281.0	6.84	273.6	-2.63
A	7 000	D7GHzV2, SN:1015	Apr. 16. 2024	Head	21.1	21.0	7368	25	281.0	6.95	278.0	-1.07

Table 9.2.2 System Verification Results (SAR, 10g)

SYSTEM DIPOLE VERIFICATION TARGET & MEASURED												
SAR System #	Freq. [MHz]	SAR Dipole kits	Date(s)	Tissue Type	Ambient Temp. [°C]	Liquid Temp. [°C]	Probe S/N	Input Power (mW)	1 W Target SAR_{10g} (W/kg)	Measured SAR_{10g} (W/kg)	1 W Normalized SAR_{10g} (W/kg)	Deviation [%]
D	13	CLA13, SN:1030	Apr. 1. 2024	Head	21.0	20.9	3933	250	0.324	0.080	0.320	-1.23
D	5 300	D5GHzV2, SN:1212	Apr. 2. 2024	Head	21.0	20.9	3933	100	22.8	2.22	22.2	-2.63
D	5 500	D5GHzV2, SN:1212	Apr. 3. 2024	Head	21.0	20.9	3933	100	23.7	2.21	22.1	-6.75
D	5 600	D5GHzV2, SN:1212	Apr. 3. 2024	Head	21.0	20.9	3933	100	24.0	2.39	23.9	-0.42
A	6 500	D6.5GHzV2, SN:1017	Apr. 8. 2024	Head	21.4	21.3	7368	25	53.9	1.25	50.0	-7.24
A	6 500	D6.5GHzV2, SN:1017	Apr. 11. 2024	Head	21.3	21.2	7368	25	53.9	1.26	50.4	-6.49
A	6 500	D6.5GHzV2, SN:1017	Apr. 16. 2024	Head	21.1	21.0	7368	25	53.9	1.25	50.0	-7.24
A	7 000	D7GHzV2, SN:1015	Apr. 8. 2024	Head	21.4	21.3	7368	25	49.0	1.17	46.8	-4.49
A	7 000	D7GHzV2, SN:1015	Apr. 11. 2024	Head	21.3	21.2	7368	25	49.0	1.17	46.8	-4.49
A	7 000	D7GHzV2, SN:1015	Apr. 16. 2024	Head	21.1	21.0	7368	25	49.0	1.19	47.6	-2.86

Table 9.2.3 System Verification Results (APD)

SYSTEM DIPOLE VERIFICATION TARGET & MEASURED												
SAR System #	Freq. [MHz]	SAR Dipole kits	Date(s)	Tissue Type	Ambient Temp. [°C]	Liquid Temp. [°C]	Probe S/N	Input Power (mW)	1 W Target 4 cm^2APD (W/m^2)	Measured 4 cm ^{2}APD (W/m^2)	1 W Normalized 4 cm^2APD (W/m^2)	Deviation [%]
A	6 500	D6.5GHzV2, SN:1017	Apr. 8. 2024	Head	21.4	21.3	7368	25	1330	30.6	1224	-7.97
A	6 500	D6.5GHzV2, SN:1017	Apr. 11. 2024	Head	21.3	21.2	7368	25	1330	30.7	1228	-7.67
A	6 500	D6.5GHzV2, SN:1017	Apr. 16. 2024	Head	21.1	21.0	7368	25	1330	30.6	1224	-7.97
A	7 000	D7GHzV2, SN:1015	Apr. 8. 2024	Head	21.4	21.3	7368	25	1200	28.7	1148	-4.33
A	7 000	D7GHzV2, SN:1015	Apr. 11. 2024	Head	21.3	21.2	7368	25	1200	28.6	1144	-4.67
A	7 000	D7GHzV2, SN:1015	Apr. 16. 2024	Head	21.1	21.0	7368	25	1200	29.1	1164	-3.00

Note(s):
1. System Verification was measured with input 250 mW, 100 mW, 25 mW and normalized to 1W.
2. Full system validation status and results can be found in Appendix D.

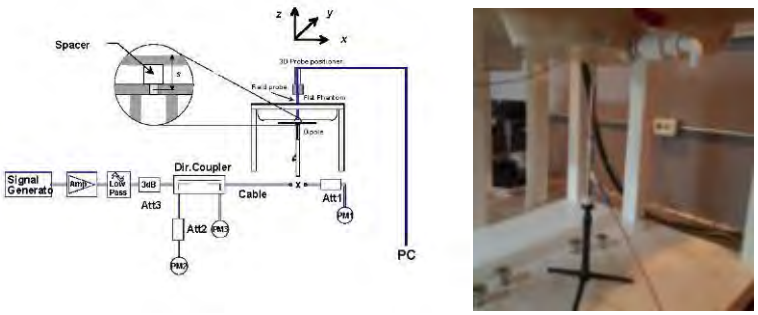

Figure 9.2.1 Dipole Verification Test Setup Diagram & Photo

Table 9.2.4 Reference Target PD Values

5G Verification Source	Serial No.	Cal. Date	Freq. (GHz)	Averaging Area	Prad (mW)	Input Power (mW)	Normal psPD Values (W/m²)	Total psPD Values (W/m²)	Note
							4 cm²	4 cm²	
10 GHz	1026	Jan. 17. 2024	10	Circular	93.3	[redacted]	55.40	55.70	Cal. report target
10 GHz	1026	Jan. 17. 2024	10	Circular	[redacted]	100	59.38	59.70	Convert target from Cal. report

Table 9.2.5 System Verification Results (IPD)

SAR System #	Freq. [GHz]	SAR Dipole kits	Date(s)	Input Power (mW)	Probe S/N	Normal psPD (W/m² over 4 cm²)		Deviation [%]	Total psPD (W/m² over 4 cm²)		Deviation [%]	Visual Inspection
						Target	Measured		Target	Measured		
E	10	Horn Antenna (10 GHz) SN:1026	May. 2. 2024	100	9400	59.38	57.50	-3.17	59.70	57.90	-3.02	confirmed
E	10	Horn Antenna (10 GHz) SN:1026	May. 3. 2024	100	9400	59.38	56.30	-5.19	59.70	56.80	-4.86	confirmed
E	10	Horn Antenna (10 GHz) SN:1026	May. 7. 2024	100	9400	59.38	58.30	-1.82	59.70	58.70	-1.68	confirmed

Note(s):
1. IPD Dielectric Property
   Media is air so Relative Permittivity (εr) and Conductivity (σ) is 1.
2. IPD System Verification Results
   Per Nov 2017, TCB Workshop
   System Validation is required before a system is deployed for measurement.
   System Verification is also required before each series of continuous measurement and, as applicable, repeated at least weekly.
   Peak and spatially averaged power density at the peak location(s) must be compared to calibrated results according to the defined test conditions.
   - The same spatial resolution and measurement region used in the waveguide calibration should be applied to system validation and system verification.
   - 4 cm² spatial averaging have been used according to FCC requirement.
   - Power density distribution should also be verified, both spatially (shape) and numerically (level) through visual inspection for noticeable differences.
   - The Horn antenna input power (forward power) was 100 mW.
   - The measured psPDn+, psPDtot+, and psPDmod+ values over 4 cm² for the desired averaging geometry are compared to the calibrated value and expected to be below ±10%.
3. A 10 mm distance spacing was used from the reference horn antenna aperture to the probe element.

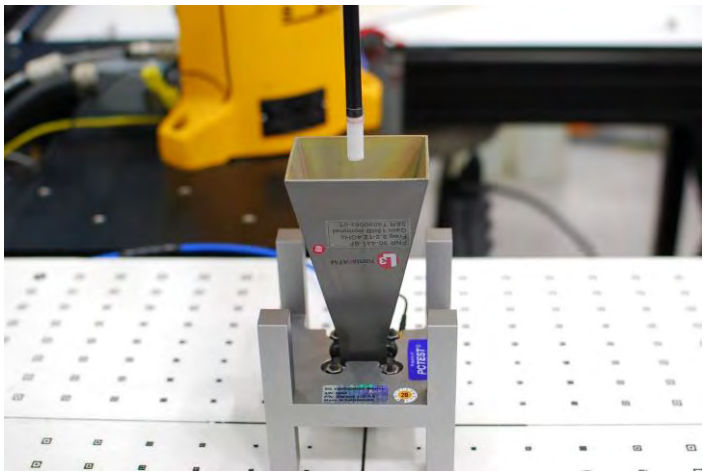

Figure 9.2.2 System Verification Test Setup Diagram & Photo