

TEST REPORT



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1. Report No : DRRFCC2307-0068

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 / PM86W

FCC ID : V2X-PM86W

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

6. Date of Test : 2023.06.01 ~ 2023.07.06

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	Reviewed by
	Name : WonJu Ji (Signature)	Name : HakMin Kim (Signature)

2023 . 07 . 20 .

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
DRRFCC2307-0068	Jul. 20, 2023	Initial issue	WonJu Ji	HakMin Kim

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1. DESCRIPTION OF DEVICE

1.1 General Information

EUT type	MOBILE COMPUTER					
FCC ID	V2X-PM86W					
Equipment model name	PM86W					
Equipment add model name	N/A					
Equipment serial no.	Identical prototype					
FVIN (Firmware Version Identification Number)	86.00					
FCC & ISED MRA Designation No.	KR0034					
ISED#	5740A					
Mode(s) of Operation	2.4 G W-LAN (802.11b/g/n-HT20/n-HT40/ac-VHT20/ac-VHT40), 5 G W-LAN (802.11a/n-HT20/n-HT40/ac-VHT20/ac-VHT40/ac-VHT80), Bluetooth, NFC					
TX Frequency Range	Band	Mode	Operating Modes	Bandwidth	Frequency	
	2.4 GHz W-LAN	802.11b/g/n/ac	Voice/Data	HT20/VHT20	2 412 ~ 2 462 MHz	
		802.11n/ac	Voice/Data	HT40/VHT40	2 422 ~ 2 452 MHz	
	5.2 GHz W-LAN	802.11a/n/ac	Voice/Data	HT20/VHT20	5 180 ~ 5 240 MHz	
		802.11n/ac	Voice/Data	HT40/VHT40	5 190 ~ 5 230 MHz	
	5.3 GHz W-LAN	802.11ac	Voice/Data	VHT80	5 210 MHz	
		802.11a/n/ac	Voice/Data	HT20/VHT20	5 260 ~ 5 320 MHz	
	5.6 GHz W-LAN	802.11n/ac	Voice/Data	HT40/VHT40	5 270 ~ 5 310 MHz	
		802.11ac	Voice/Data	VHT80	5 290 MHz	
	5.8 GHz W-LAN	802.11a/n/ac	Voice/Data	HT20/VHT20	5 500 ~ 5 720 MHz	
		802.11n/ac	Voice/Data	HT40/VHT40	5 510 ~ 5 710 MHz	
		802.11ac	Voice/Data	VHT80	5 530 ~ 5 690 MHz	
		802.11a/n/ac	Voice/Data	HT20/VHT20	5 745 ~ 5 825 MHz	
		802.11n/ac	Voice/Data	HT40/VHT40	5 755 ~ 5 795 MHz	
		802.11ac	Voice/Data	VHT80	5 775 MHz	
		Bluetooth	-	Data	-	2 402 ~ 2 480 MHz
	NFC	-	Type A/B/F	-	13.56 MHz	
RX Frequency Range	2.4 GHz W-LAN	802.11b/g/n/ac	Voice/Data	HT20/VHT20	2 412 ~ 2 462 MHz	
		802.11n/ac	Voice/Data	HT40/VHT40	2 422 ~ 2 452 MHz	
	5.2 GHz W-LAN	802.11a/n/ac	Voice/Data	HT20/VHT20	5 180 ~ 5 240 MHz	
		802.11n/ac	Voice/Data	HT40/VHT40	5 190 ~ 5 230 MHz	
	5.3 GHz W-LAN	802.11ac	Voice/Data	VHT80	5 210 MHz	
		802.11a/n/ac	Voice/Data	HT20/VHT200	5 260 ~ 5 320 MHz	
	5.6 GHz W-LAN	802.11n/ac	Voice/Data	HT40/VHT40	5 270 ~ 5 310 MHz	
		802.11ac	Voice/Data	VHT80	5 290 MHz	
	5.8 GHz W-LAN	802.11a/n/ac	Voice/Data	HT20/VHT20	5 500 ~ 5 720 MHz	
		802.11n/ac	Voice/Data	HT40/VHT40	5 510 ~ 5 710 MHz	
		802.11ac	Voice/Data	VHT80	5 530 ~ 5 690 MHz	
		802.11a/n/ac	Voice/Data	HT20/VHT20	5 745 ~ 5 825 MHz	
		802.11n/ac	Voice/Data	HT40/VHT40	5 755 ~ 5 795 MHz	
		802.11ac	Voice/Data	VHT80	5 775 MHz	
		Bluetooth	-	Data	-	2 402 ~ 2 480 MHz
		NFC	-	Type A/B/F	-	13.56 MHz

SAR Summary Table

Equipment Class	Band	Reported SAR		
		1g SAR (W/kg)		10g SAR (W/kg)
		Head	Body-Worn	Extremity
DTS(SISO)	2.4 GHz W-LAN	0.44	0.29	-
DTS(MIMO)	2.4 GHz W-LAN	0.48	0.23	-
U-NII-1(SISO)	5.2 GHz W-LAN	-	-	-
U-NII-1(MIMO)	5.2 GHz W-LAN	-	-	-
U-NII-2A(SISO)	5.3 GHz W-LAN	0.63	0.39	-
U-NII-2A(MIMO)	5.3 GHz W-LAN	0.46	0.28	-
U-NII-2C(SISO)	5.6 GHz W-LAN	0.78	0.31	-
U-NII-2C(MIMO)	5.6 GHz W-LAN	0.77	0.50	-
U-NII-3(SISO)	5.8 GHz W-LAN	0.56	0.32	-
U-NII-3(MIMO)	5.8 GHz W-LAN	0.69	0.51	-
DSS	Bluetooth (Module1)	< 0.1	< 0.1	-
DTS	Bluetooth LE (Module1)	< 0.1	< 0.1	-
DTS	Bluetooth LE (Module2)	< 0.1	< 0.1	-
DXX	NFC	-	-	< 0.1
Simultaneous SAR per KDB 690783 D01v01r03		0.80	0.55	-
FCC Equipment Class	Part 15 Spread Spectrum Transmitter(DSS) Digital Transmission System(DTS) Unlicensed National Information Infrastructure (UNII) Low Power Communications Device Transmitter (DXX)			
Date(s) of Tests	2023.06.01 ~ 2023.07.06			
Antenna Type	Internal Antenna			
Functions	<ul style="list-style-type: none"> No simultaneous transmission between WLAN & NFC (13.56 MHz). VoIP is supported. 			

1.2 Power Reduction for SAR

This device uses an independent fixed level power reduction mechanism for WLAN operations during receiver. Detailed descriptions of the power reduction mechanism are included in the operational description.

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 (PM86W)_Antenna Location. Since the diagonal dimension of this device is < 160 mm and the diagonal display is < 150 mm, it is not considered a "phablet".

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 (PM86W)_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.

1.7 Guidance Applied

- IEEE 1528-2013
- IEC/IEEE 62209-1528
- 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)

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 IEEE 1528-2013:

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 IEEE1528-2013.
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.
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 IEEE 1528-2013. 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.

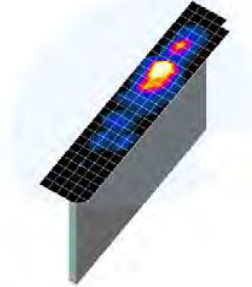


Figure 4.1
Sample SAR Area Scan

		≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		$5 \text{ mm} \pm 1 \text{ mm}$	$\frac{1}{2} \cdot \delta \cdot \ln(2) \text{ mm} \pm 0.5 \text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location		$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area}		≤ 2 GHz: $\leq 15 \text{ mm}$ 2 – 3 GHz: $\leq 12 \text{ mm}$	3 – 4 GHz: $\leq 12 \text{ mm}$ 4 – 6 GHz: $\leq 10 \text{ mm}$
		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 \leq 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: $\leq 8 \text{ mm}$ 2 – 3 GHz: $\leq 5 \text{ mm}^*$	3 – 4 GHz: $\leq 5 \text{ mm}^*$ 4 – 6 GHz: $\leq 4 \text{ mm}^*$
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	$\leq 5 \text{ mm}$	3 – 4 GHz: $\leq 4 \text{ mm}$ 4 – 5 GHz: $\leq 3 \text{ mm}$ 5 – 6 GHz: $\leq 2 \text{ mm}$
	graded grid	$\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	$\leq 4 \text{ mm}$
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1) \text{ mm}$
Minimum zoom scan volume	x, y, z	$\geq 30 \text{ mm}$	3 – 4 GHz: $\geq 28 \text{ mm}$ 4 – 5 GHz: $\geq 25 \text{ mm}$ 5 – 6 GHz: $\geq 22 \text{ mm}$
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 <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB Publication 447498 is $\leq 1.4 \text{ W/kg}$, $\leq 8 \text{ mm}$, $\leq 7 \text{ mm}$ and $\leq 5 \text{ mm}$ 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.

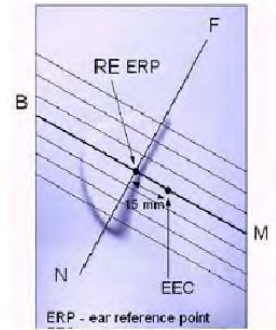


Figure 5.1
Close-up side view of ERP

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 then 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 its top and bottom edges, positioning the “ear reference point” on the outer surface of the both the left and right head phantoms on the ear reference point.



Figure 5.2 Front, back and side view SAM Twin Phantom

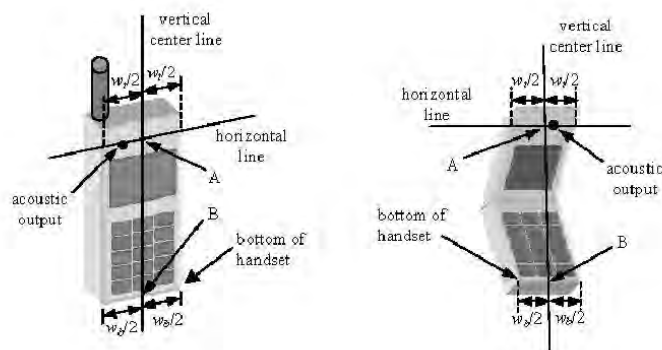


Figure 5.3 Handset Vertical Center & Horizontal Line Reference Points

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 $\epsilon = 3$ and loss tangent $\delta = 0.02$.

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 then rotated around the vertical centerline until the phone (horizontal line) was symmetrical with 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).

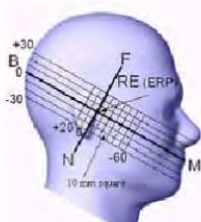


Figure 6.2 Side view w/relevant markings



Figure 6.3 Front, Side and Top View of Ear/15° 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 $> 1.2 \text{ W/kg}$, 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.

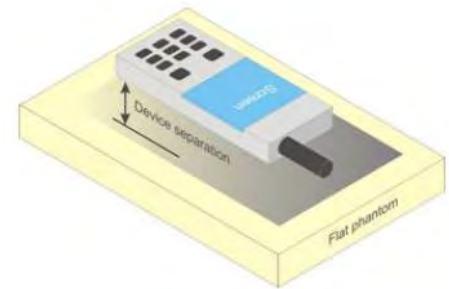


Figure 6.4 Sample Body-Worn Diagram

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.

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.

Table 8.1.SAR Human Exposure Specified in ANSI/IEEE C95.1-1992

	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).

7. FCC MEASUREMENT PROCEDURES

Power measurements were performed using a base station simulator under digital average power.

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 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.

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 802.11g then 802.11n is used for SAR measurement. When the maximum output power were 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.

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.

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.

8. RF CONDUCTED POWERS

8.1 WLAN Nominal and Maximum Output Power Spec and Conducted Powers

Band (GHz)	Mode	Ch	Modulated Average[dBm]						
			Ant.1		Ant.2		MIMO(CDD/SDM)		
			Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	
2.4	802.11b	1-11	17.5	17.0	17.5	17.0	-	-	
		802.11g (6M)	1	14.5	14.0	14.5	14.0	17.5	17.0
			6	16.0	15.5	16.0	15.5	19.0	18.5
	802.11n (MCS0)	11	12.5	12.0	12.5	12.0	15.5	15.0	
		1	14.5	14.0	14.5	14.0	17.5	17.0	
		6	16.0	15.5	16.0	15.5	19.0	18.5	
	802.11ac (MCS0)	11	12.5	12.0	12.5	12.0	15.5	15.0	
		1	14.5	14.0	14.5	14.0	17.5	17.0	
		6	16.0	15.5	16.0	15.5	19.0	18.5	
	802.11ax (MCS0)	11	12.5	12.0	12.5	12.0	15.5	15.0	
		1	15.5	15.0	15.5	15.0	18.5	18.0	
		6	16.0	15.5	16.0	15.5	19.0	18.5	
			11	15.0	14.5	15.0	14.5	18.0	17.5

Table 8.1.1 Nominal and Maximum Output Power Spec

Mode	Freq. (MHz)	Channel	IEEE 802.11 (2.4 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11b	2 412	1	17.30	17.49	-	-
	2 437	6	17.49	17.47	-	-
	2 462	11	17.45	17.45	-	-
802.11g (6M)	2 412	1	14.46	14.47	17.48	-
	2 437	6	15.79	15.80	18.81	-
	2 462	11	12.01	12.49	15.27	-
802.11n (HT-20) (MCS0)	2 412	1	13.99	13.97	16.99	16.99
	2 437	6	14.93	15.02	17.99	17.99
	2 462	11	11.16	12.37	14.82	14.77
802.11ac (VHT-20) (MCS0)	2 412	1	13.99	13.97	16.99	16.99
	2 437	6	14.87	15.09	17.99	17.98
	2 462	11	11.17	12.31	14.79	14.76
802.11ax (HE-20) (MCS0)	2 412	1	15.29	15.49	18.40	18.35
	2 437	6	14.82	15.95	18.43	18.25
	2 462	11	13.28	14.99	17.23	17.17

Table 8.1.2 IEEE 802.11 Average RF Power

Band (GHz)	Mode	Ch	Modulated Average[dBm]						
			Ant.1		Ant.2		MIMO(CDD/SDM)		
			Maximum	Nominal	Maximum	Nominal	Maximum	Nominal	
2.4	802.11b	1-11	N/A	N/A	14.5	14.0	-	-	
		802.11g (6M)	1	N/A	N/A	14.5	14.0	17.5	17.0
			6	N/A	N/A	14.5	14.0	17.5	17.0
	802.11n (MCS0)	11	N/A	N/A	13.5	13.0	15.5	15.0	
		1	N/A	N/A	14.5	14.0	17.5	17.0	
		6	N/A	N/A	14.5	14.0	17.5	17.0	
	802.11ac (MCS0)	11	N/A	N/A	13.5	13.0	15.5	15.0	
		1	N/A	N/A	14.5	14.0	17.5	17.0	
		6	N/A	N/A	14.5	14.0	17.5	17.0	
	802.11ax (MCS0)	11	N/A	N/A	13.5	13.0	16.5	16.0	
		1	N/A	N/A	14.5	14.0	17.5	17.0	
		6	N/A	N/A	14.5	14.0	17.5	17.0	
			11	N/A	N/A	13.5	13.0	16.5	16.0

Table 8.1.3 Nominal and Maximum Output Power Spec (Reduced Output Power during Receiver on)

Mode	Freq. (MHz)	Channel	IEEE 802.11 (2.4 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11b	2 412	1	N/A	14.49	-	-
	2 437	6	N/A	14.47	-	-
	2 462	11	N/A	14.48	-	-
802.11g (6M)	2 412	1	N/A	14.42	17.44	-
	2 437	6	N/A	14.48	17.49	-
	2 462	11	N/A	12.48	15.25	-
802.11n (HT-20) (MCS0)	2 412	1	N/A	13.96	16.98	16.96
	2 437	6	N/A	14.48	17.49	16.73
	2 462	11	N/A	12.36	14.81	14.75
802.11ac (VHT-20) (MCS0)	2 412	1	N/A	13.96	16.97	16.95
	2 437	6	N/A	14.48	17.49	16.61
	2 462	11	N/A	12.30	14.77	14.74
802.11ax (HE-20) (MCS0)	2 412	1	N/A	14.48	17.43	17.46
	2 437	6	N/A	14.38	17.04	17.41
	2 462	11	N/A	13.33	16.00	16.00

Table 8.1.4 IEEE 802.11 Average RF Power (Reduced Output Power during Receiver on)

Band (GHz)	Mode	Ch	Modulated Average[dBm]					
			Ant.1		Ant.2		MIMO(CDD/SDM)	
			Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
5 (UNII)	802.11a (6M)	36-48	12.0	11.5	12.0	11.5	15.0	14.5
		52-144	15.5	15.0	15.5	15.0	18.5	18.0
		149-165	16.0	15.5	16.0	15.5	19.0	18.5
	802.11n (20MHz) (MCS0)	36-48	12.0	11.5	12.0	11.5	15.0	14.5
		52-144	15.5	15.0	15.5	15.0	18.5	18.0
		149-165	16.0	15.5	16.0	15.5	19.0	18.5
	802.11ac (20MHz) (MCS0)	36-48	12.0	11.5	12.0	11.5	15.0	14.5
		52-144	15.5	15.0	15.5	15.0	18.5	18.0
		149-165	16.0	15.5	16.0	15.5	19.0	18.5
	802.11n/ac (40MHz) (MCS0)	38-159	15.0	14.5	15.0	14.5	18.0	17.5
	802.11ac (80MHz) (MCS0)	42-155	14.0	13.5	14.0	13.5	17.0	16.5
	802.11ax (20MHz) (MCS0)	36-48	12.5	12.0	12.5	12.0	15.5	15.0
		52-144	15.5	15.0	15.5	15.0	18.5	18.0
		149-165	16.0	15.5	16.0	15.5	19.0	18.5
	802.11ax (40MHz) (MCS0)	38-46	14.5	14.0	14.5	14.0	17.5	17.0
54-159		15.0	14.5	15.0	14.5	18.0	17.5	
802.11ax (80MHz) (MCS0)	42-106	13.5	13.0	13.5	13.0	16.5	16.0	
	138-155	14.0	13.5	14.0	13.5	17.0	16.5	

Table 8.1.5 Nominal and Maximum Output Power Spec

Mode	Freq. (MHz)	Channel	IEEE 802.11a (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11a (6M)	5 180	36	11.67	11.55	14.62	-
	5 200	40	11.66	11.56	14.62	-
	5 220	44	11.66	11.63	14.66	-
	5 240	48	11.69	11.69	14.70	-
	5 260	52	15.47	15.49	18.49	-
	5 280	56	15.44	15.47	18.47	-
	5 300	60	15.43	15.45	18.45	-
	5 320	64	15.45	15.47	18.47	-
	5 500	100	15.40	15.49	18.46	-
	5 580	116	15.08	15.48	18.29	-
	5 660	132	15.10	15.44	18.28	-
	5 720	144	15.09	15.47	18.29	-
	5 745	149	15.78	15.99	18.90	-
	5 785	157	15.61	15.97	18.80	-
	5 825	165	15.77	15.96	18.88	-

Table 8.1.6 IEEE 802.11a Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11n HT20 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11n (HT-20) (MCS0)	5 180	36	11.20	10.84	14.03	13.80
	5 200	40	11.22	10.89	14.07	13.85
	5 220	44	11.18	10.96	14.08	13.94
	5 240	48	11.09	11.11	14.11	14.09
	5 260	52	14.90	15.32	18.13	17.58
	5 280	56	14.78	15.25	18.03	17.58
	5 300	60	14.85	15.36	18.12	17.50
	5 320	64	14.79	15.18	18.00	17.67
	5 500	100	14.96	15.45	18.22	17.70
	5 580	116	14.87	15.46	18.19	17.55
	5 660	132	14.39	15.15	17.80	17.31
	5 720	144	14.54	15.05	17.81	17.32
	5 745	149	14.95	15.63	18.31	17.60
	5 785	157	15.18	15.51	18.36	17.61
	5 825	165	15.29	15.41	18.36	17.54

Table 8.1.7 IEEE 802.11n HT20 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT20 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11ac (VHT-20) (MCS0)	5 180	36	11.18	10.89	14.05	13.87
	5 200	40	11.22	10.92	14.08	13.89
	5 220	44	11.16	11.05	14.12	14.02
	5 240	48	10.99	11.16	14.09	14.14
	5 260	52	14.73	15.21	17.99	17.33
	5 280	56	14.91	15.21	18.07	17.41
	5 300	60	14.81	15.33	18.09	17.37
	5 320	64	14.87	15.25	18.07	17.38
	5 500	100	14.95	15.44	18.21	17.75
	5 580	116	14.65	15.47	18.09	17.71
	5 660	132	14.38	15.14	17.79	17.50
	5 720	144	14.54	15.08	17.83	17.55
	5 745	149	14.96	15.58	18.29	17.41
	5 785	157	15.23	15.42	18.34	17.65
	5 825	165	15.13	15.30	18.23	17.52

Table 8.1.8 IEEE 802.11ac VHT20 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11n HT40 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11n (HT-40) (MCS0)	5 190	38	14.40	14.48	17.45	17.25
	5 230	46	14.17	14.58	17.39	17.17
	5 270	54	14.24	14.60	17.43	17.17
	5 310	62	13.98	14.61	17.32	17.14
	5 510	102	14.16	14.86	17.53	17.16
	5 590	118	14.11	14.94	17.56	17.11
	5 670	134	13.86	14.67	17.29	17.10
	5 710	142	14.03	14.55	17.31	17.11
	5 755	151	13.48	13.99	16.75	17.11
	5 795	159	13.41	14.01	16.73	17.14

Table 8.1.9 IEEE 802.11n HT40 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT40 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11ac (VHT-40) (MCS0)	5 190	38	14.24	14.30	17.28	17.14
	5 230	46	14.17	14.53	17.36	17.17
	5 270	54	14.12	14.65	17.40	17.15
	5 310	62	14.25	14.68	17.48	17.17
	5 510	102	14.20	14.83	17.54	17.10
	5 590	118	14.08	14.87	17.50	17.12
	5 670	134	13.82	14.63	17.25	17.17
	5 710	142	13.94	14.45	17.21	17.11
	5 755	151	13.52	14.15	16.86	17.09
	5 795	159	13.37	14.07	16.74	17.17

Table 8.1.10 IEEE 802.11ac VHT40 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT80 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11ac (VHT-80) (MCS0)	5 210	42	13.02	13.08	16.06	16.25
	5 290	58	12.77	13.21	16.01	16.22
	5 530	106	13.31	13.57	16.45	16.21
	5 690	138	12.58	13.19	15.91	16.17
	5 775	155	13.21	13.73	16.49	16.23

Table 8.1.11 IEEE 802.11ac VHT80 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT20 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11ax (HE-20) (MCS0)	5 180	36	12.20	11.87	15.05	14.97
	5 200	40	12.14	12.16	15.16	15.09
	5 220	44	12.26	12.19	15.24	15.15
	5 240	48	11.98	12.17	15.09	15.02
	5 260	52	15.12	15.29	18.22	18.15
	5 280	56	15.10	15.25	18.19	18.12
	5 300	60	15.07	15.47	18.28	18.21
	5 320	64	15.17	15.32	18.26	18.18
	5 500	100	15.21	15.45	18.34	18.33
	5 580	116	14.97	15.46	18.23	18.14
	5 660	132	14.66	15.22	17.96	17.89
	5 720	144	14.85	15.23	18.05	17.97
	5 745	149	15.83	15.97	18.91	18.83
	5 785	157	15.95	15.96	18.97	18.89
	5 825	165	15.71	15.90	18.82	18.76

Table 8.1.12 IEEE 802.11ac VHT20 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT40 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11ax (HE-40) (MCS0)	5 190	38	13.60	13.74	16.68	16.60
	5 230	46	13.61	13.93	16.78	16.65
	5 270	54	13.82	14.18	17.01	16.86
	5 310	62	13.68	14.18	16.95	16.84
	5 510	102	13.95	14.76	17.38	17.24
	5 590	118	14.11	14.67	17.41	17.29
	5 670	134	13.40	14.56	17.03	16.92
	5 710	142	13.35	14.26	16.84	16.69
	5 755	151	14.44	14.97	17.72	17.62
	5 795	159	14.39	14.99	17.71	17.59

Table 8.1.13 IEEE 802.11ac VHT40 Average RF Power

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT80 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11ax (HE-80) (MCS0)	5 210	42	12.39	12.53	15.47	15.32
	5 290	58	12.59	12.68	15.65	15.58
	5 530	106	13.26	13.44	16.36	15.61
	5 690	138	13.60	13.97	16.80	16.65
	5 775	155	13.42	13.96	16.71	16.54

Table 8.1.14 IEEE 802.11ac VHT80 Average RF Power

Band (GHz)	Mode	Ch	Modulated Average[dBm]					
			Ant.1		Ant.2		MIMO(CDD/SDM)	
			Maximum	Nominal	Maximum	Nominal	Maximum	Nominal
5 (UNII)	802.11a/n/ac/ax (20MHz)	36-48	N/A	N/A	12.0	11.5	15.0	14.5
		52-165	N/A	N/A	12.5	12.0	15.5	15.0
	802.11n/ac/ax (40MHz)	38-159	N/A	N/A	12.0	11.5	15.0	14.5
	802.11ac/ax (80MHz)	42-155	N/A	N/A	11.9	11.4	14.9	14.4

Table 8.1.15 Nominal and Maximum Output Power Spec (Reduced Output Power during Receiver on)

Mode	Freq. (MHz)	Channel	IEEE 802.11a (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11a (6M)	5 180	36	N/A	11.47	14.51	-
	5 200	40	N/A	11.44	14.54	-
	5 220	44	N/A	11.61	14.61	-
	5 240	48	N/A	11.54	14.60	-
	5 260	52	N/A	12.48	15.49	-
	5 280	56	N/A	12.45	15.46	-
	5 300	60	N/A	12.40	15.45	-
	5 320	64	N/A	12.46	15.45	-
	5 500	100	N/A	12.49	15.49	-
	5 580	116	N/A	12.48	15.47	-
	5 660	132	N/A	12.47	15.48	-
	5 720	144	N/A	12.46	15.47	-
	5 745	149	N/A	12.49	15.49	-
	5 785	157	N/A	12.48	15.44	-
	5 825	165	N/A	12.48	15.46	-

Table 8.1.16 IEEE 802.11a Average RF Power (Reduced Output Power during Receiver on)

Mode	Freq. (MHz)	Channel	IEEE 802.11n HT20 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11n (HT-20) (MCS0)	5 180	36	N/A	10.70	13.93	13.67
	5 200	40	N/A	10.69	13.89	13.79
	5 220	44	N/A	10.91	13.97	13.81
	5 240	48	N/A	11.07	14.02	13.97
	5 260	52	N/A	12.05	15.03	15.04
	5 280	56	N/A	12.25	15.32	15.37
	5 300	60	N/A	12.25	15.35	15.37
	5 320	64	N/A	11.43	14.47	14.48
	5 500	100	N/A	11.81	14.89	14.95
	5 580	116	N/A	11.98	15.01	15.09
	5 660	132	N/A	11.95	14.98	15.06
	5 720	144	N/A	12.39	15.40	15.26
	5 745	149	N/A	12.30	15.29	15.41
	5 785	157	N/A	11.59	14.60	14.46
	5 825	165	N/A	11.82	14.87	14.83

Table 8.1.17 IEEE 802.11n HT20 Average RF Power (Reduced Output Power during Receiver on)

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT20 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11ac (VHT-20) (MCS0)	5 180	36	N/A	10.76	13.96	13.73
	5 200	40	N/A	10.81	13.96	13.75
	5 220	44	N/A	10.96	14.04	13.85
	5 240	48	N/A	11.10	13.99	13.97
	5 260	52	N/A	11.98	15.07	15.10
	5 280	56	N/A	12.00	15.20	15.13
	5 300	60	N/A	12.22	15.32	15.23
	5 320	64	N/A	12.30	14.94	14.81
	5 500	100	N/A	12.06	14.94	15.07
	5 580	116	N/A	11.96	14.99	15.08
	5 660	132	N/A	11.98	15.03	15.01
	5 720	144	N/A	12.23	15.32	15.20
	5 745	149	N/A	12.17	15.22	15.35
	5 785	157	N/A	12.20	14.83	14.79
	5 825	165	N/A	11.86	14.85	14.85

Table 8.1.18 IEEE 802.11ac VHT20 Average RF Power (Reduced Output Power during Receiver on)

Mode	Freq. (MHz)	Channel	IEEE 802.11n HT40 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11n (HT-40) (MCS0)	5 190	38	N/A	11.95	14.98	14.97
	5 230	46	N/A	11.99	14.96	14.97
	5 270	54	N/A	11.83	14.82	14.94
	5 310	62	N/A	11.80	14.82	14.93
	5 510	102	N/A	11.99	14.98	14.93
	5 590	118	N/A	11.82	14.83	14.97
	5 670	134	N/A	11.79	14.78	14.94
	5 710	142	N/A	11.98	14.88	14.97
	5 755	151	N/A	11.71	14.78	14.92
	5 795	159	N/A	11.81	14.84	14.99

Table 8.1.19 IEEE 802.11n HT40 Average RF Power (Reduced Output Power during Receiver on)

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT40 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11ac (VHT-40) (MCS0)	5 190	38	N/A	11.61	14.57	14.71
	5 230	46	N/A	11.71	14.68	14.77
	5 270	54	N/A	11.76	14.68	14.80
	5 310	62	N/A	11.99	14.80	14.71
	5 510	102	N/A	11.75	14.61	14.71
	5 590	118	N/A	11.74	14.64	14.77
	5 670	134	N/A	11.94	14.78	14.80
	5 710	142	N/A	11.99	14.86	14.81
	5 755	151	N/A	11.64	14.57	14.69
	5 795	159	N/A	11.64	14.56	14.67

Table 8.1.20 IEEE 802.11ac VHT40 Average RF Power (Reduced Output Power during Receiver on)

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT80 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11ac (VHT-80) (MCS0)	5 210	42	N/A	11.31	14.23	14.23
	5 290	58	N/A	11.11	14.25	14.29
	5 530	106	N/A	11.32	13.99	13.92
	5 690	138	N/A	11.38	13.82	13.84
	5 775	155	N/A	11.26	14.23	14.25

Table 8.1.21 IEEE 802.11ac VHT80 Average RF Power (Reduced Output Power during Receiver on)

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT20 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11ac (HE-20) (MCS0)	5 180	36	N/A	11.69	14.91	14.87
	5 200	40	N/A	11.66	14.90	14.85
	5 220	44	N/A	11.63	14.92	14.85
	5 240	48	N/A	11.97	14.89	14.85
	5 260	52	N/A	12.29	15.36	15.50
	5 280	56	N/A	12.24	15.30	15.00
	5 300	60	N/A	12.12	15.22	15.16
	5 320	64	N/A	12.48	15.35	15.03
	5 500	100	N/A	12.22	15.36	15.33
	5 580	116	N/A	12.15	15.28	15.20
	5 660	132	N/A	12.17	15.10	15.30
	5 720	144	N/A	12.45	15.18	15.49
	5 745	149	N/A	11.99	15.12	15.33
	5 785	157	N/A	12.27	15.39	14.98
	5 825	165	N/A	12.42	15.39	15.02

Table 8.1.22 IEEE 802.11ac VHT20 Average RF Power (Reduced Output Power during Receiver on)

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT40 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11ax (HE-40) (MCS0)	5 190	38	N/A	11.75	14.88	14.60
	5 230	46	N/A	11.95	14.86	14.92
	5 270	54	N/A	11.93	14.96	14.94
	5 310	62	N/A	11.68	14.66	14.61
	5 510	102	N/A	11.85	14.84	14.74
	5 590	118	N/A	11.92	14.96	14.81
	5 670	134	N/A	11.61	14.57	14.58
	5 710	142	N/A	11.94	14.96	14.94
	5 755	151	N/A	11.69	14.62	14.74
	5 795	159	N/A	11.63	14.63	14.80

Table 8.1.23 IEEE 802.11ac VHT40 Average RF Power (Reduced Output Power during Receiver on)

Mode	Freq. (MHz)	Channel	IEEE 802.11ac VHT80 (5 GHz) Conducted Power[dBm]			
			Ant.1	Ant.2	MIMO(CDD)	MIMO(SDM)
802.11ax (HE-80) (MCS0)	5 210	42	N/A	11.86	14.87	14.89
	5 290	58	N/A	11.87	14.87	14.89
	5 530	106	N/A	11.88	14.89	14.86
	5 690	138	N/A	11.81	14.85	14.86
	5 775	155	N/A	11.89	14.87	14.87

Table 8.1.24 IEEE 802.11ac VHT80 Average RF Power (Reduced Output Power during Receiver on)

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, due 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.

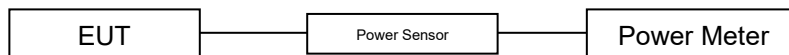


Figure 8.1 Power Measurement Setup

8.2 Bluetooth Conducted Powers

Channel	Frequency	Frame AVG Output Power (1Mbps)	Frame AVG Output Power (2Mbps)	Frame AVG Output Power (3Mbps)
	(MHz)	(dBm)	(dBm)	(dBm)
Low	2 402	1.85	0.85	0.85
Mid	2 441	2.95	2.85	2.85
High	2 480	2.95	2.85	2.85

Table 8.2.1 Nominal and Maximum Output Power Spec (Frame) (Module1)

Channel	Frequency	Frame AVG Output Power (1Mbps)	Frame AVG Output Power (2Mbps)	Frame AVG Output Power (3Mbps)
	(MHz)	(dBm)	(dBm)	(dBm)
Low	2 402	1.16	0.72	0.73
Mid	2 441	1.52	2.49	2.48
High	2 480	2.44	2.79	2.79

Table 8.2.2 Bluetooth Burst and Frame Average RF Power (Module1) - Power Class 1

Channel	Frequency	Frame AVG Output Power (1Mbps)	Frame AVG Output Power (2Mbps)	Frame AVG Output Power (3Mbps)
	(MHz)	(dBm)	(dBm)	(dBm)
Low	2 402	-1.69	-1.88	-1.87
Mid	2 441	-1.66	-1.48	-1.47
High	2 480	-0.64	-1.38	-1.39

Table 8.2.3 Bluetooth Burst and Frame Average RF Power (Module1) - Power Class 2

Channel	Frequency	Frame AVG Output Power(LE / 1Mbps)	Frame AVG Output Power(LE / 2Mbps)
	(MHz)	(dBm)	(dBm)
Low	2 402	1.29	-0.48
Mid	2 440	3.19	1.32
High	2 480	3.99	2.12

Table 8.2.4 Nominal and Maximum Output Power Spec (Frame) (Module1)

Channel	Frequency	Frame AVG Output Power(LE / 1Mbps)	Frame AVG Output Power(LE / 2Mbps)
	(MHz)	(dBm)	(dBm)
Low	2 402	0.89	-0.89
Mid	2 440	3.07	1.30
High	2 480	3.74	1.97

Table 8.2.5 Bluetooth LE Burst and Frame Average RF Power (Module1) - Power Class 1

Channel	Frequency	Frame AVG Output Power(LE / 1Mbps)	Frame AVG Output Power(LE / 2Mbps)
	(MHz)	(dBm)	(dBm)
Low	2 402	-2.80	-5.88
Mid	2 440	-2.58	-5.69
High	2 480	-1.89	-4.97

Table 8.2.6 Bluetooth LE Burst and Frame Average RF Power (Module1) - Power Class 2

Channel	Frequency	Frame AVG Output Power(LE / 1Mbps)	Frame AVG Output Power(LE / 2Mbps)
	(MHz)	(dBm)	(dBm)
Low	2 402	0.32	-1.40
Mid	2 440	0.32	-1.40
High	2 480	0.32	-1.40

Table 8.2.7 Nominal and Maximum Output Power Spec (Frame) (Module2)

Channel	Frequency	Frame AVG Output Power(LE / 1Mbps)	Frame AVG Output Power(LE / 2Mbps)
	(MHz)	(dBm)	(dBm)
Low	2 402	0.07	-1.65
Mid	2 440	0.00	-1.72
High	2 480	-0.14	-1.86

Table 8.2.8 Bluetooth LE Burst and Frame Average RF Power (Module2)

- Bluetooth Conducted Powers procedures

- Bluetooth (BDR, EDR)

- Enter DUT mode in EUT and operate it.

When it operating, The EUT is transmitting at maximum power level and duty cycle fixed.

- Instruments and EUT were connected like Figure 9.5.1.

- The maximum output powers of BDR(1 Mbps), EDR(2, 3 Mbps) and each frequency were set by a Bluetooth Tester.

- Power levels were measured by a Power Meter.



Figure 9.5.1 Average Power Measurement Setup

Bluetooth Transmission Plot (Module1)

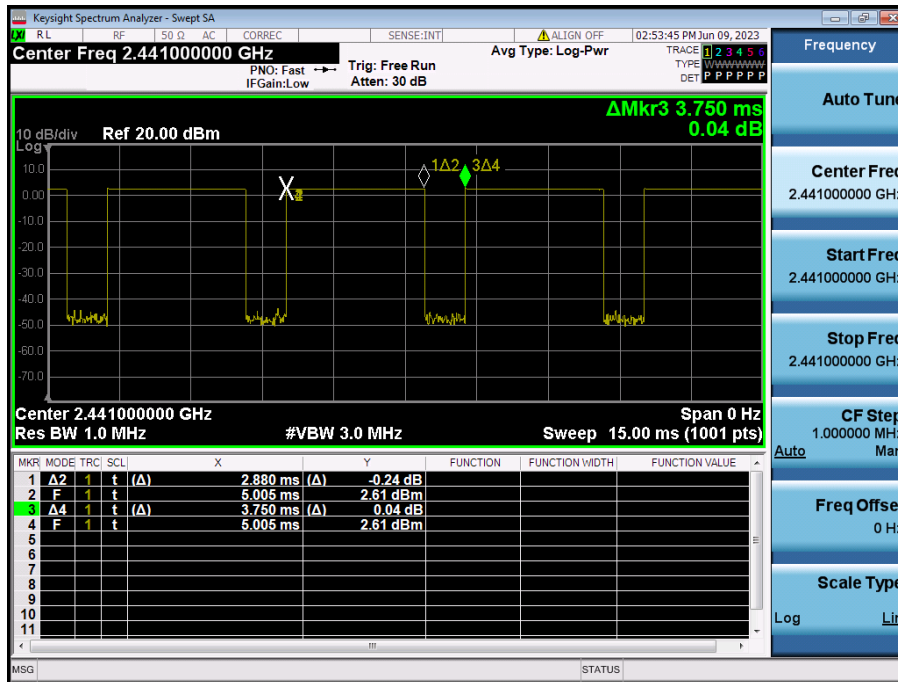


Figure 8.2.2 Bluetooth Transmission Plot

Bluetooth Duty Cycle Calculation

$$\text{Duty Cycle} = \text{Pulse/Period} * 100\% = (2.880/3.750) * 100 = 76.8\%$$

Bluetooth LE Transmission Plot (Module1)



Figure 8.2.3 Bluetooth Transmission Plot

Bluetooth LE Duty Cycle Calculation

$$\text{Duty Cycle} = \text{Pulse/Period} * 100\% = (2.130/2.510) * 100 = 84.9\%$$

- Bluetooth LE Transmission Plot (Module2)



Figure 8.2.4 Bluetooth Transmission Plot

- Bluetooth LE Duty Cycle Calculation

$$\text{Duty Cycle} = \text{Pulse/Period} * 100\% = (2.140/2.500) * 100 = 85.6\%$$

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, ϵ_r	Target Conductivity, σ (S/m)	Measured Dielectric Constant, ϵ_r	Measured Conductivity, σ (S/m)	Er Deviation [%]	σ Deviation [%]
Jun. 26. 2023	13 Head	21.4	21.3	12.0	55.000	0.750	54.277	0.730	-1.31	-2.67
				13.0	55.000	0.750	54.388	0.730	-1.11	-2.67
				13.6	55.000	0.750	54.441	0.730	-1.02	-2.67
				14.0	55.000	0.750	54.469	0.730	-0.97	-2.67
Jun. 01. 2023	2 450 Head	21.3	21.2	2 412.0	39.265	1.766	38.610	1.753	-1.67	-0.74
				2 437.0	39.222	1.788	38.501	1.784	-1.84	-0.22
				2 450.0	39.200	1.800	38.464	1.800	-1.88	0.00
				2 462.0	39.184	1.813	38.431	1.813	-1.92	0.00
Jun. 20. 2023	2 450 Head	21.5	21.4	2 402.0	39.282	1.757	39.334	1.802	0.13	2.56
				2 440.0	39.217	1.791	39.177	1.845	-0.10	3.02
				2 441.0	39.215	1.792	39.173	1.846	-0.11	3.01
				2 450.0	39.200	1.800	39.143	1.856	-0.15	3.11
Jul. 4. 2023	5 300 Head	20.8	20.7	2 480.0	39.160	1.832	39.021	1.891	-0.35	3.22
				5 260.0	35.940	4.720	35.318	4.870	-1.73	3.18
				5 280.0	35.920	4.740	35.277	4.895	-1.79	3.27
				5 300.0	35.900	4.760	35.233	4.920	-1.86	3.36
Jul. 5. 2023	5 600 Head	20.7	20.6	5 320.0	35.880	4.780	35.186	4.946	-1.93	3.47
				5 500.0	35.650	4.965	36.216	5.080	-1.22	2.32
				5 580.0	35.530	5.049	36.057	5.186	-1.48	2.71
				5 600.0	35.500	5.070	36.019	5.212	-1.46	2.80
Jul. 6. 2023	5 800 Head	21.0	20.9	5 660.0	35.440	5.130	35.889	5.289	-1.27	3.10
				5 720.0	35.380	5.190	35.756	5.367	-1.06	3.41
				5 800.0	35.300	5.270	35.590	5.471	-0.82	3.81
				5 825.0	35.275	5.296	35.591	5.505	-0.90	3.95

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):

$$Y = \frac{j2\omega\epsilon_r\epsilon_0}{[\ln(b/a)]^2} \int_a^b \int_a^b \int_0^\pi \cos\phi' \frac{\exp[-j\omega r(\mu_0\epsilon_r'\epsilon_0)^{1/2}]}{r} d\phi'd\rho'd\rho$$

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 $\pm 10\%$ of the specifications at using the SAR Dipole kit(s). (Graphic Plots Attached)

Table 9.2.1 System Verification Results (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 [%]
D	2 450	D2450V2, SN: 920	Jun. 1. 2023	Head	21.3	21.2	3327	100	52.9	5.33	53.30	0.76
D	2 450	D2450V2, SN: 920	Jun. 20. 2023	Head	21.5	21.4	3327	100	52.9	5.55	55.50	4.91
C	5 300	D5GHZV2, SN:1103	Jul. 4. 2023	Head	20.8	20.7	3930	100	83.8	8.37	81.40	-2.86
C	5 500	D5GHZV2, SN:1103	Jul. 5. 2023	Head	20.7	20.6	3930	100	86.8	8.69	84.10	-3.11
C	5 600	D5GHZV2, SN:1103	Jul. 5. 2023	Head	20.7	20.6	3930	100	84.8	8.15	88.30	4.13
C	5 800	D5GHZV2, SN:1103	Jul. 5. 2023	Head	20.7	20.6	3930	100	81.6	8.58	84.50	3.55
C	5 800	D5GHZV2, SN:1103	Jul. 6. 2023	Head	21.0	20.9	3930	100	81.6	8.49	84.80	3.92

Table 9.2.2 System Verification Results (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 [%]
E	13	CLA13, SN:1030	Jun. 26. 2023	Head	21.4	21.3	3916	250	0.337	0.079	0.316	-6.23

Note(s):

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

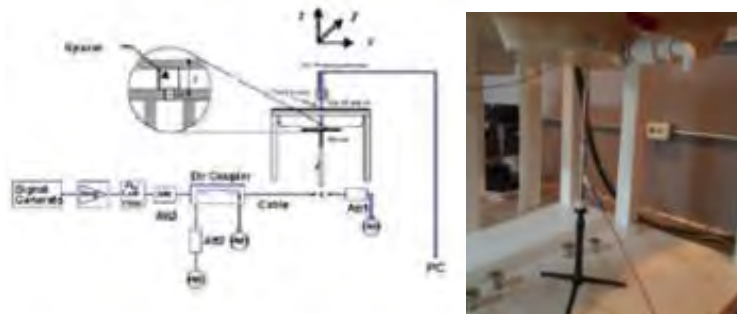


Figure 9.2 Dipole Verification Test Setup Diagram & Photo

10. SAR TEST RESULTS

10.1 Head SAR Results

Table 10.1.1 DTS Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode (Antenna)	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plots #
MHz	Ch														
2437.0	6	802.11b (Ant.1)	17.50	17.49	0.020	Left Touch	FCC #2	0.096	1	99.2	0.094	1.002	1.008	0.095	A1
2437.0	6	802.11b (Ant.1)	17.50	17.49	0.100	Right Touch	FCC #2	0.195	1	99.2	0.194	1.002	1.008	0.196	
2437.0	6	802.11b (Ant.1)	17.50	17.49	0.060	Left Tilt	FCC #2	0.089	1	99.2	0.087	1.002	1.008	0.088	
2437.0	6	802.11b (Ant.1)	17.50	17.49	-0.070	Right Tilt	FCC #2	0.051	1	99.2	0.052	1.002	1.008	0.053	
2437.0	6	802.11b (Ant.1)	17.50	17.49	0.140	Right Touch	FCC #2	0.179	1	99.2	0.184	1.002	1.008	0.186	
2412.0	1	802.11b (Ant.2)	14.50	14.49	0.190	Left Touch	FCC #2	0.470	1	99.2	0.434	1.002	1.008	0.438	
2412.0	1	802.11b (Ant.2)	14.50	14.49	0.030	Right Touch	FCC #2	0.183	1	99.2	0.199	1.002	1.008	0.201	
2412.0	1	802.11b (Ant.2)	14.50	14.49	0.100	Left Tilt	FCC #2	0.269	1	99.2	0.258	1.002	1.008	0.261	
2412.0	1	802.11b (Ant.2)	14.50	14.49	0.050	Right Tilt	FCC #2	0.120	1	99.2	0.128	1.002	1.008	0.129	
2412.0	1	802.11b (Ant.2)	14.50	14.49	0.040	Left Touch	FCC #2	0.430	1	99.2	0.431	1.002	1.008	0.435	
2437.0	6	802.11g (MIMO)	17.50	17.49	-0.090	Left Touch	FCC #2	0.429	1	95.2	0.451	1.002	1.050	0.475	A3
2437.0	6	802.11g (MIMO)	17.50	17.49	0.030	Right Touch	FCC #2	0.293	1	95.2	0.304	1.002	1.050	0.320	
2437.0	6	802.11g (MIMO)	17.50	17.49	0.140	Left Tilt	FCC #2	0.273	1	95.2	0.262	1.002	1.050	0.276	
2437.0	6	802.11g (MIMO)	17.50	17.49	-0.170	Right Tilt	FCC #2	0.226	1	95.2	0.241	1.002	1.050	0.254	
2437.0	6	802.11g (MIMO)	17.50	17.49	0.070	Left Touch	FCC #2	0.449	1	95.2	0.427	1.002	1.050	0.449	
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure											Head 1.6 W/kg (mW/g) averaged over 1 gram				

Note: Blue entries represent Extended Battery measurements.

Adjusted SAR results for OFDM SAR												
FREQUENCY		Mode/ Antenna	Service	Maximum Allowed Power [dBm]	1g Scaled SAR (W/kg)	FREQUENCY [MHz]	Mode	Service	Maximum Allowed Power [dBm]	Ratio of OFDM to DSSS	1g Adjusted SAR (W/kg)	Determine OFDM SAR
MHz	Ch											
2 437.0	6	802.11b (Ant.1)	DSSS	17.5	0.196	2 437.0	802.11g	OFDM	16.0	0.708	0.139	X
2 437.0	6	802.11b (Ant.1)	DSSS	17.5	0.196	2 437.0	802.11n	OFDM	16.0	0.708	0.139	X
2 437.0	6	802.11b (Ant.1)	DSSS	17.5	0.196	2 437.0	802.11ac	OFDM	16.0	0.708	0.139	X
2 437.0	6	802.11b (Ant.1)	DSSS	17.5	0.197	2 437.0	802.11ax	OFDM	16.0	0.708	0.139	X
2 412.0	1	802.11b (Ant.2)	DSSS	14.5	0.438	2 412.0	802.11g	OFDM	14.5	1.000	0.438	X
2 412.0	1	802.11b (Ant.2)	DSSS	14.5	0.438	2 412.0	802.11n	OFDM	14.5	1.000	0.438	X
2 412.0	1	802.11b (Ant.2)	DSSS	14.5	0.438	2 412.0	802.11ac	OFDM	14.5	1.000	0.438	X
2 412.0	1	802.11b (Ant.2)	DSSS	14.5	0.492	2 412.0	802.11ax	OFDM	14.5	1.000	0.492	X
2 437.0	6	802.11g (MIMO)	OFDM	17.5	0.475	2 437.0	802.11n	OFDM	17.5	1.000	0.475	X
2 437.0	6	802.11g (MIMO)	OFDM	17.5	0.475	2 437.0	802.11ac	OFDM	17.5	1.000	0.475	X
2 437.0	6	802.11g (MIMO)	OFDM	17.5	0.475	2 437.0	802.11ax	OFDM	17.5	1.000	0.475	X
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure										Head 1.6 W/kg (mW/g) averaged over 1 gram		

Note: SAR is not required for the following 2.4 GHz OFDM conditions. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

Table 10.1.2 UNII Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode (Antenna)	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plots #
MHz	Ch														
5260.0	52	802.11a (Ant.1)	15.50	15.47	0.000	Left Touch	FCC #2	0.016	6	95.8	0.010	1.007	1.044	0.011	A4
5260.0	52	802.11a (Ant.1)	15.50	15.47	0.000	Right Touch	FCC #2	0.068	6	95.8	0.076	1.007	1.044	0.080	
5260.0	52	802.11a (Ant.1)	15.50	15.47	0.000	Left Tilt	FCC #2	0.013	6	95.8	0.009	1.007	1.044	0.009	
5260.0	52	802.11a (Ant.1)	15.50	15.47	0.000	Right Tilt	FCC #2	0.008	6	95.8	0.007	1.007	1.044	0.007	
5260.0	52	802.11a (Ant.1)	15.50	15.47	0.000	Right Touch	FCC #2	0.065	6	95.8	0.075	1.007	1.044	0.079	
5260.0	52	802.11a (Ant.2)	12.50	12.48	0.070	Left Touch	FCC #2	0.271	6	95.8	0.318	1.005	1.044	0.334	
5260.0	52	802.11a (Ant.2)	12.50	12.48	0.110	Right Touch	FCC #2	0.317	6	95.8	0.359	1.005	1.044	0.377	
5260.0	52	802.11a (Ant.2)	12.50	12.48	-0.120	Left Tilt	FCC #2	0.360	6	95.8	0.448	1.005	1.044	0.470	
5260.0	52	802.11a (Ant.2)	12.50	12.48	0.090	Right Tilt	FCC #2	0.507	6	95.8	0.597	1.005	1.044	0.626	
5260.0	52	802.11a (Ant.2)	12.50	12.48	0.080	Right Tilt	FCC #2	0.431	6	95.8	0.489	1.005	1.044	0.513	
5260.0	52	802.11a (MIMO)	15.50	15.49	0.030	Left Touch	FCC #2	0.290	6	95.8	0.317	1.007	1.044	0.333	A6
5260.0	52	802.11a (MIMO)	15.50	15.49	0.180	Right Touch	FCC #2	0.300	6	95.8	0.304	1.007	1.044	0.320	
5260.0	52	802.11a (MIMO)	15.50	15.49	0.010	Left Tilt	FCC #2	0.344	6	95.8	0.370	1.007	1.044	0.389	
5260.0	52	802.11a (MIMO)	15.50	15.49	0.120	Right Tilt	FCC #2	0.420	6	95.8	0.436	1.007	1.044	0.458	
5260.0	52	802.11a (MIMO)	15.50	15.49	0.060	Right Touch	FCC #2	0.351	6	95.8	0.360	1.007	1.044	0.378	
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure											Head 1.6 W/kg (mW/g) averaged over 1 gram				

Note: Blue entries represent Extended Battery measurements.

Adjusted SAR results for UNII-1 and UNII-2A SAR												
FREQUENCY		Mode/ Antenna	Service	Maximum Allowed Power [dBm]	1g Scaled SAR (W/kg)	FREQUENCY [MHz]	Mode	Service	Maximum Allowed Power [dBm]	Adjusted Factor	1g Adjusted SAR (W/kg)	SAR for the band with lower maximum output power
MHz	Ch											
5 260.0	52	802.11a (Ant.1)	OFDM	15.50	0.080	5 240.0	802.11a	OFDM	12.00	0.447	0.036	X
5 260.0	52	802.11a (Ant.2)	OFDM	12.50	0.626	5 220.0	802.11a	OFDM	12.00	0.891	0.558	X
5 260.0	52	802.11a (MIMO)	OFDM	15.50	0.458	5 220.0	802.11a	OFDM	15.00	0.891	0.408	X
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure										Head 1.6 W/kg (mW/g) averaged over 1 gram		

Note: U-NII-1 and U-NII-2A Bands: 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.

Table 10.1.3 UNII Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode (Antenna)	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plots #
MHz	Ch														
5500.0	100	802.11a (Ant.1)	15.50	15.40	0.000	Left Touch	FCC #2	0.023	6	95.8	0.033	1.023	1.044	0.035	A7
5500.0	100	802.11a (Ant.1)	15.50	15.40	0.000	Right Touch	FCC #2	0.102	6	95.8	0.067	1.023	1.044	0.072	
5500.0	100	802.11a (Ant.1)	15.50	15.40	0.090	Left Tilt	FCC #2	0.017	6	95.8	0.023	1.023	1.044	0.025	A8
5500.0	100	802.11a (Ant.1)	15.50	15.40	0.000	Right Tilt	FCC #2	0.048	6	95.8	0.059	1.023	1.044	0.063	
5500.0	100	802.11a (Ant.1)	15.50	15.40	0.000	Right Touch	FCC #2	0.044	6	95.8	0.065	1.023	1.044	0.069	A9
5500.0	100	802.11a (Ant.2)	12.50	12.49	0.010	Left Touch	FCC #2	0.488	6	95.8	0.498	1.002	1.044	0.521	
5500.0	100	802.11a (Ant.2)	12.50	12.49	0.030	Right Touch	FCC #2	0.439	6	95.8	0.426	1.002	1.044	0.446	
5500.0	100	802.11a (Ant.2)	12.50	12.49	0.130	Left Tilt	FCC #2	0.709	6	95.8	0.745	1.002	1.044	0.779	
5500.0	100	802.11a (Ant.2)	12.50	12.49	0.030	Right Tilt	FCC #2	0.550	6	95.8	0.532	1.002	1.044	0.556	
5500.0	100	802.11a (Ant.2)	12.50	12.49	0.030	Left Tilt	FCC #2	0.682	6	95.8	0.715	1.002	1.044	0.748	
5500.0	100	802.11a (MIMO)	15.50	15.49	0.120	Left Touch	FCC #2	0.511	6	95.8	0.544	1.023	1.044	0.581	
5500.0	100	802.11a (MIMO)	15.50	15.49	0.110	Right Touch	FCC #2	0.432	6	95.8	0.471	1.023	1.044	0.503	
5500.0	100	802.11a (MIMO)	15.50	15.49	0.190	Left Tilt	FCC #2	0.697	6	95.8	0.721	1.023	1.044	0.770	
5500.0	100	802.11a (MIMO)	15.50	15.49	0.130	Right Tilt	FCC #2	0.528	6	95.8	0.550	1.023	1.044	0.587	
5500.0	100	802.11a (MIMO)	15.50	15.49	0.020	Left Tilt	FCC #2	0.693	6	95.8	0.715	1.023	1.044	0.764	
5745.0	149	802.11a (Ant.1)	16.00	15.78	0.000	Left Touch	FCC #2	0.026	6	95.8	0.033	1.052	1.044	0.036	A10
5745.0	149	802.11a (Ant.1)	16.00	15.78	0.000	Right Touch	FCC #2	0.073	6	95.8	0.100	1.052	1.044	0.110	
5745.0	149	802.11a (Ant.1)	16.00	15.78	0.000	Left Tilt	FCC #2	0.018	6	95.8	0.012	1.052	1.044	0.013	A11
5745.0	149	802.11a (Ant.1)	16.00	15.78	0.000	Right Tilt	FCC #2	0.022	6	95.8	0.022	1.052	1.044	0.024	
5745.0	149	802.11a (Ant.1)	16.00	15.78	0.000	Right Touch	FCC #2	0.062	6	95.8	0.093	1.052	1.044	0.102	
5745.0	149	802.11a (Ant.2)	12.50	12.49	-0.110	Left Touch	FCC #2	0.430	6	95.8	0.531	1.002	1.044	0.555	
5745.0	149	802.11a (Ant.2)	12.50	12.49	0.190	Right Touch	FCC #2	0.308	6	95.8	0.383	1.002	1.044	0.401	
5745.0	149	802.11a (Ant.2)	12.50	12.49	0.050	Left Tilt	FCC #2	0.414	6	95.8	0.457	1.002	1.044	0.478	
5745.0	149	802.11a (Ant.2)	12.50	12.49	0.130	Right Tilt	FCC #2	0.384	6	95.8	0.425	1.002	1.044	0.445	
5745.0	149	802.11a (Ant.2)	12.50	12.49	-0.020	Left Touch	FCC #2	0.390	6	95.8	0.457	1.002	1.044	0.478	
5745.0	149	802.11a (MIMO)	15.50	15.49	0.110	Left Touch	FCC #2	0.450	6	95.8	0.500	1.052	1.044	0.549	
5745.0	149	802.11a (MIMO)	15.50	15.49	0.130	Right Touch	FCC #2	0.424	6	95.8	0.520	1.052	1.044	0.571	
5745.0	149	802.11a (MIMO)	15.50	15.49	0.060	Left Tilt	FCC #2	0.632	6	95.8	0.628	1.052	1.044	0.690	
5745.0	149	802.11a (MIMO)	15.50	15.49	0.020	Right Tilt	FCC #2	0.488	6	95.8	0.417	1.052	1.044	0.458	
5745.0	149	802.11a (MIMO)	15.50	15.49	0.030	Left Tilt	FCC #2	0.630	6	95.8	0.625	1.052	1.044	0.686	
ANSI / IEEE C95.1-1992- SAFETY LIMIT											Head				
Spatial Peak											1.6 W/kg (mW/g)				
Uncontrolled Exposure/General Population Exposure											averaged over 1 gram				

Note: Blue entries represent Extended Battery measurements.

Table 10.1.4 Bluetooth/Bluetooth LE Head SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode (Module)	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plots #	
MHz	Ch														
2441.0	39	Bluetooth (Module1)	2.95	1.52	0.000	Left Touch	FCC #2	1	76.8	0.002	1.390	1.302	0.004	A13	
2441.0	39	Bluetooth (Module1)	2.95	1.52	0.000	Right Touch	FCC #2	1	76.8	0.003	1.390	1.302	0.005		
2441.0	39	Bluetooth (Module1)	2.95	1.52	0.000	Left Tilt	FCC #2	1	76.8	0.001	1.390	1.302	0.002	A14	
2441.0	39	Bluetooth (Module1)	2.95	1.52	0.000	Right Tilt	FCC #2	1	76.8	< 0.001	1.390	1.302	0.001		
2441.0	39	Bluetooth (Module1)	2.95	1.52	0.000	Right Touch	FCC #2	1	76.8	0.002	1.390	1.302	0.004		
2440.0	19	Bluetooth LE (Module1)	3.19	3.07	0.000	Left Touch	FCC #2	1	84.9	0.010	1.028	1.178	0.012	A15	
2440.0	19	Bluetooth LE (Module1)	3.19	3.07	0.000	Right Touch	FCC #2	1	84.9	0.026	1.028	1.178	0.031		
2440.0	19	Bluetooth LE (Module1)	3.19	3.07	0.000	Left Tilt	FCC #2	1	84.9	0.013	1.028	1.178	0.016		
2440.0	19	Bluetooth LE (Module1)	3.19	3.07	0.000	Right Tilt	FCC #2	1	84.9	0.009	1.028	1.178	0.011		
2440.0	19	Bluetooth LE (Module1)	3.19	3.07	0.000	Right Touch	FCC #2	1	84.9	0.024	1.028	1.178	0.029		
2440.0	19	Bluetooth LE (Module2)	0.32	0.00	0.000	Left Touch	FCC #2	1	85.6	0.001	1.076	1.168	0.001	A15	
2440.0	19	Bluetooth LE (Module2)	0.32	0.00	0.000	Right Touch	FCC #2	1	85.6	0.003	1.076	1.168	0.004		
2440.0	19	Bluetooth LE (Module2)	0.32	0.00	0.000	Left Tilt	FCC #2	1	85.6	0.002	1.076	1.168	0.003		
2440.0	19	Bluetooth LE (Module2)	0.32	0.00	0.000	Right Tilt	FCC #2	1	85.6	0.002	1.076	1.168	0.003		
2440.0	19	Bluetooth LE (Module2)	0.32	0.00	0.000	Right Touch	FCC #2	1	85.6	0.002	1.076	1.168	0.003		
ANSI / IEEE C95.1-1992- SAFETY LIMIT											Head				
Spatial Peak											1.6 W/kg (mW/g)				
Uncontrolled Exposure/General Population Exposure											averaged over 1 gram				

Note: Blue entries represent Extended Battery measurements.

10.2 Standalone Body-Worn SAR Results

Table 10.2.1 DTS Body-Worn SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	SAR (W/kg)	Plots #
MHz	Ch														
2437.0	6	802.11b (Ant.1)	17.50	17.49	0.150	10 mm [Front]	FCC #2	0.237	1	99.2	0.231	1.002	1.008	0.233	
2437.0	6	802.11b (Ant.1)	17.50	17.49	0.110	10 mm [Rear]	FCC #2	0.295	1	99.2	0.284	1.002	1.008	0.287	A16
2437.0	6	802.11b (Ant.1)	17.50	17.49	0.110	10 mm [Rear]	FCC #2	0.292	1	99.2	0.282	1.002	1.008	0.285	
2412.0	1	802.11b (Ant.2)	17.50	17.49	0.050	10 mm [Front]	FCC #2	0.227	1	99.2	0.226	1.002	1.008	0.228	A17
2412.0	1	802.11b (Ant.2)	17.50	17.49	0.050	10 mm [Rear]	FCC #2	0.119	1	99.2	0.124	1.002	1.008	0.125	
2412.0	1	802.11b (Ant.2)	17.50	17.49	-0.060	10 mm [Front]	FCC #2	0.229	1	99.2	0.224	1.002	1.008	0.226	
2437.0	6	802.11g (MIMO)	19.00	18.81	-0.160	10 mm [Front]	FCC #2	0.209	1	95.2	0.211	1.045	1.050	0.232	A18
2437.0	6	802.11g (MIMO)	19.00	18.81	-0.190	10 mm [Rear]	FCC #2	0.164	1	95.2	0.162	1.045	1.050	0.178	
2437.0	6	802.11g (MIMO)	19.00	18.81	-0.110	10 mm [Front]	FCC #2	0.203	1	95.2	0.209	1.045	1.050	0.229	
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure											Body 1.6 W/kg (mW/g) averaged over 1 gram				

Note(s):
1. Blue entries represent Extended Battery measurements.

Adjusted SAR results for OFDM SAR												
FREQUENCY		Mode/ Antenna	Service	Maximum Allowed Power [dBm]	1g Scaled SAR (W/kg)	FREQUENCY [MHz]	Mode	Service	Maximum Allowed Power [dBm]	Ratio of OFDM to DSSS	1g Adjusted SAR (W/kg)	Determine OFDM SAR
MHz	Ch											
2 437.0	6	802.11b (Ant.1)	DSSS	17.5	0.287	2 437.0	802.11g	OFDM	16.0	0.708	0.203	X
2 437.0	6	802.11b (Ant.1)	DSSS	17.5	0.287	2 437.0	802.11n	OFDM	16.0	0.708	0.203	X
2 437.0	6	802.11b (Ant.1)	DSSS	17.5	0.287	2 437.0	802.11ac	OFDM	16.0	0.708	0.203	X
2 437.0	6	802.11b (Ant.1)	DSSS	17.5	0.287	2 437.0	802.11ax	OFDM	16.0	0.708	0.203	X
2 412.0	1	802.11b (Ant.2)	DSSS	17.5	0.228	2 412.0	802.11g	OFDM	16.0	0.708	0.161	X
2 412.0	1	802.11b (Ant.2)	DSSS	17.5	0.228	2 412.0	802.11n	OFDM	16.0	0.708	0.161	X
2 412.0	1	802.11b (Ant.2)	DSSS	17.5	0.228	2 412.0	802.11ac	OFDM	16.0	0.708	0.161	X
2 412.0	1	802.11b (Ant.2)	DSSS	17.5	0.228	2 412.0	802.11ax	OFDM	16.0	0.708	0.161	X
2 437.0	6	802.11g (MIMO)	OFDM	19.0	0.232	2 437.0	802.11n	OFDM	19.0	1.000	0.232	X
2 437.0	6	802.11g (MIMO)	OFDM	19.0	0.232	2 437.0	802.11ac	OFDM	19.0	1.000	0.232	X
2 437.0	6	802.11g (MIMO)	OFDM	19.0	0.232	2 437.0	802.11ax	OFDM	19.0	1.000	0.232	X
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure									Head 1.6 W/kg (mW/g) averaged over 1 gram			

Note: SAR is not required for the following 2.4 GHz OFDM conditions. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

Table 10.2.2 UNII Body-Worn SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plots #
MHz	Ch														
5260.0	52	802.11a (Ant.1)	15.50	15.47	0.020	10 mm [Front]	FCC #2	0.354	6	95.8	0.374	1.007	1.044	0.393	A19
5260.0	52	802.11a (Ant.1)	15.50	15.47	0.180	10 mm [Rear]	FCC #2	0.248	6	95.8	0.253	1.007	1.044	0.266	
5260.0	52	802.11a (Ant.1)	15.50	15.47	0.110	10 mm [Front]	FCC #2	0.299	6	95.8	0.330	1.007	1.044	0.347	
5260.0	52	802.11a (Ant.2)	15.50	15.49	0.030	10 mm [Front]	FCC #2	0.310	6	95.8	0.335	1.002	1.044	0.350	A20
5260.0	52	802.11a (Ant.2)	15.50	15.49	0.190	10 mm [Rear]	FCC #2	0.131	6	95.8	0.141	1.002	1.044	0.147	
5260.0	52	802.11a (Ant.2)	15.50	15.49	0.090	10 mm [Front]	FCC #2	0.220	6	95.8	0.239	1.002	1.044	0.250	
5260.0	52	802.11a (MIMO)	18.50	18.49	0.090	10 mm [Front]	FCC #2	0.227	6	95.8	0.262	1.007	1.044	0.275	A21
5260.0	52	802.11a (MIMO)	18.50	18.49	0.150	10 mm [Rear]	FCC #2	0.206	6	95.8	0.195	1.007	1.044	0.205	
5260.0	52	802.11a (MIMO)	18.50	18.49	0.170	10 mm [Rear]	FCC #2	0.205	6	95.8	0.214	1.007	1.044	0.225	
ANSI / IEEE C95.1-2005- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure											Body 1.6 W/kg (mW/g) averaged over 1 gram				

Note: Blue entries represent Extended Battery measurements.

Adjusted SAR results for UNII-1 and UNII-2A SAR												
FREQUENCY		Mode/ Antenna	Service	Maximum Allowed Power [dBm]	1g Scaled SAR (W/kg)	FREQUENCY [MHz]	Mode	Service	Maximum Allowed Power [dBm]	Adjusted Factor	1g Adjusted SAR (W/kg)	SAR for the band with lower maximum output power
MHz	Ch											
5 260.0	52	802.11a (Ant.1)	OFDM	15.50	0.393	5 240.0	802.11a	OFDM	12.00	0.447	0.176	X
5 260.0	52	802.11a (Ant.2)	OFDM	15.50	0.350	5 240.0	802.11a	OFDM	12.00	0.447	0.156	X
5 260.0	52	802.11a (MIMO)	OFDM	18.50	0.275	5 240.0	802.11a	OFDM	15.00	0.447	0.123	X
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure											Body 1.6 W/kg (mW/g) averaged over 1 gram	

 Note: U-NII-1 and U-NII-2A Bands: 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.

Table 10.2.3 UNII Body-Worn SAR

MEASUREMENT RESULTS															
FREQUENCY		Mode	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Peak SAR of Area Scan	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plots #
MHz	Ch														
5500.0	100	802.11a (Ant.1)	15.50	15.40	0.030	10 mm [Front]	FCC #2	0.195	6	95.8	0.222	1.023	1.044	0.237	A22
5500.0	100	802.11a (Ant.1)	15.50	15.40	-0.020	10 mm [Rear]	FCC #2	0.144	6	95.8	0.160	1.023	1.044	0.171	
5500.0	100	802.11a (Ant.1)	15.50	15.40	-0.130	10 mm [Front]	FCC #2	0.195	6	95.8	0.217	1.023	1.044	0.232	
5500.0	100	802.11a (Ant.2)	15.50	15.49	-0.090	10 mm [Front]	FCC #2	0.254	6	95.8	0.275	1.002	1.044	0.288	
5500.0	100	802.11a (Ant.2)	15.50	15.49	0.020	10 mm [Rear]	FCC #2	0.273	6	95.8	0.294	1.002	1.044	0.308	A23
5500.0	100	802.11a (Ant.2)	15.50	15.49	0.020	10 mm [Rear]	FCC #2	0.190	6	95.8	0.210	1.002	1.044	0.220	
5500.0	100	802.11a (MIMO)	18.50	18.46	-0.040	10 mm [Front]	FCC #2	0.441	6	95.8	0.464	1.023	1.044	0.495	A24
5500.0	100	802.11a (MIMO)	18.50	18.46	0.030	10 mm [Rear]	FCC #2	0.405	6	95.8	0.419	1.023	1.044	0.447	
5500.0	100	802.11a (MIMO)	18.50	18.46	0.110	10 mm [Rear]	FCC #2	0.430	6	95.8	0.440	1.023	1.044	0.470	
5745.0	149	802.11a (Ant.1)	16.00	15.78	0.000	10 mm [Front]	FCC #2	0.153	6	95.8	0.183	1.052	1.044	0.201	A25
5745.0	149	802.11a (Ant.1)	16.00	15.78	0.030	10 mm [Rear]	FCC #2	0.140	6	95.8	0.155	1.052	1.044	0.170	
5745.0	149	802.11a (Ant.1)	16.00	15.78	0.060	10 mm [Front]	FCC #2	0.143	6	95.8	0.152	1.052	1.044	0.167	
5745.0	149	802.11a (Ant.2)	16.00	15.99	-0.150	10 mm [Front]	FCC #2	0.285	6	95.8	0.308	1.002	1.044	0.322	A26
5745.0	149	802.11a (Ant.2)	16.00	15.99	0.080	10 mm [Rear]	FCC #2	0.256	6	95.8	0.283	1.002	1.044	0.296	
5745.0	149	802.11a (Ant.2)	16.00	15.99	0.190	10 mm [Front]	FCC #2	0.264	6	95.8	0.298	1.002	1.044	0.312	
5745.0	149	802.11a (MIMO)	19.00	18.90	0.010	10 mm [Front]	FCC #2	0.284	6	95.8	0.320	1.052	1.044	0.351	
5745.0	149	802.11a (MIMO)	19.00	18.90	0.150	10 mm [Rear]	FCC #2	0.391	6	95.8	0.463	1.052	1.044	0.508	A27
5745.0	149	802.11a (MIMO)	19.00	18.90	0.180	10 mm [Rear]	FCC #2	0.227	6	95.8	0.270	1.052	1.044	0.296	
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure											Body 1.6 W/kg (mW/g) averaged over 1 gram				

Note: Blue entries represent Extended Battery measurements.

Table 10.2.4 Bluetooth/Bluetooth LE Body-Worn SAR

MEASUREMENT RESULTS														
FREQUENCY		Mode (Module)	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Drift Power [dB]	Phantom Position	Device Serial Number	Data Rate [Mbps]	Duty Cycle	1g SAR (W/kg)	Scaling Factor	Scaling Factor (Duty Cycle)	1g Scaled SAR (W/kg)	Plots #
MHz	Ch													
2441.0	39	Bluetooth (Module1)	2.95	1.52	-0.020	10 mm [Front]	FCC #2	1	76.8	0.003	1.390	1.302	0.005	
2441.0	39	Bluetooth (Module1)	2.95	1.52	0.050	10 mm [Rear]	FCC #2	1	76.8	0.004	1.390	1.302	0.007	A28
2441.0	39	Bluetooth (Module1)	2.95	1.52	0.180	10 mm [Rear]	FCC #2	1	76.8	0.002	1.390	1.302	0.004	
2440.0	19	Bluetooth LE (Module1)	3.19	3.07	0.180	10 mm [Front]	FCC #2	1	84.9	0.025	1.028	1.178	0.030	
2440.0	19	Bluetooth LE (Module1)	3.19	3.07	0.020	10 mm [Rear]	FCC #2	1	84.9	0.027	1.028	1.178	0.033	A29
2440.0	19	Bluetooth LE (Module1)	3.19	3.07	-0.120	10 mm [Rear]	FCC #2	1	84.9	0.014	1.028	1.178	0.017	
2440.0	19	Bluetooth LE (Module2)	0.32	0.00	0.000	10 mm [Front]	FCC #2	1	85.6	0.001	1.076	1.168	0.001	
2440.0	19	Bluetooth LE (Module2)	0.32	0.00	0.000	10 mm [Rear]	FCC #2	1	85.6	0.009	1.076	1.168	0.011	A30
2440.0	19	Bluetooth LE (Module2)	0.32	0.00	0.190	10 mm [Rear]	FCC #2	1	85.6	0.004	1.076	1.168	0.005	
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure											Body 1.6 W/kg (mW/g) averaged over 1 gram			

Note: Blue entries represent Extended Battery measurements.

10.3 Standalone Extremity SAR Results

Table 10.3.1 NFC Extremity SAR

MEASUREMENT RESULTS										
FREQUENCY		Mode	Drift Power [dB]	Phantom Position	Device Serial Number	Duty Cycle (%)	10 g SAR (W/kg)	Plots #		
MHz	Ch									
13.6	13600	NFC	0.030	0 mm [Top]	FCC #1	100	0.002			
13.6	13600	NFC	0.000	0 mm [Bottom]	FCC #1	100	< 0.001			
13.6	13600	NFC	0.000	0 mm [Front]	FCC #1	100	0.001			
13.6	13600	NFC	0.020	0 mm [Rear]	FCC #1	100	0.025	A31		
13.6	13600	NFC	0.000	0 mm [Right]	FCC #1	100	0.001			
13.6	13600	NFC	0.020	0 mm [Left]	FCC #1	100	0.001			
13.6	13600	NFC	0.010	0 mm [Rear]	FCC #1	100	0.013			
ANSI / IEEE C95.1-1992- SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population Exposure							Phantom 4.0 W/kg (mW/g) averaged over 10 gram			

Note: Blue entries represent Extended Battery measurements.

10.4 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, and FCC KDB Publication 447498 D01v06.
2. Batteries are fully charged at the beginning of the SAR measurements. A standard battery was used for all SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.
7. Per FCC KDB Publication 648474 D04v01r03, body-worn SAR was evaluated without a headset connected to the device. Since the standalone reported body-worn SAR was not > 1.2 W/kg, no additional body-worn SAR evaluations using a headset cable were performed.
8. During SAR Testing for the Wireless Router conditions per FCC KDB Publication 941225 D06v02r01, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated.
9. SAR measurements were performed using the DASY5 automated system. The procedure for spatial peak SAR evaluation has been implemented according to the IEEE 1528 standard. During a maximum search, global and local maxima searches are automatically performed in 2-D after each area scan measurement. The algorithm will find the global maximum and all local maxima within 2 dB of the global maxima for all SAR distributions. All local maxima within 2 dB of the global maximum were searched and passed for the Zoom Scan measurement.

WLAN Notes:

1. The initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be 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 was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4 GHz WIFI single transmission chain operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output and the adjusted SAR is ≤ 1.2 W/kg.
3. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 5 GHz WIFI single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum output powers is less than 1.2 W/kg.
4. When the maximum reported 1g averaged SAR ≤ 0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg or all test channels were measured.
5. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor to determine compliance.
6. Per KDB Publication 248227 D01v02r02, SAR for MIMO was evaluated by following the simultaneous SAR provisions from KDB Publication 447498 D01v06 by making a SAR measurement with both antennas transmitting simultaneously.

Bluetooth Notes:

1. Bluetooth SAR was measured with the device connected to a call with hopping disabled with DH5 operation. Per October 2016 TCB Workshop Notes, the reported SAR was scaled to the 100% transmission duty factor to determine compliance. Refer to section 8.2 for the time-domain plot and calculation for the duty factor of the device.

11. FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

11.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D01v06 are applicable to handsets with built-in unlicensed transmitters such as 802.11b/g/n and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

11.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v06 4.3.2 and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the sum 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤ 1.6 W/kg. The different test position in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1-g or 10-g SAR.

11.3 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D01v06, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds.

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v06.

Table 11.1 Simultaneous SAR Cases

No.	Capable Transmit Configuration	Head SAR	Body-Worn SAR	Note
1	Wi-Fi 2.4 GHz Ant.2 + Bluetooth 2.4 GHz Ant.1 (Module 1)	Yes ^a	Yes	^a Bluetooth Tethering is considered.
2	Wi-Fi 2.4 GHz Ant.2 + Bluetooth 2.4 GHz Ant.1 (Module 1) + BLE 2.4 GHz (Module 2)	Yes ^a	Yes	^a Bluetooth Tethering is considered.
3	Wi-Fi 2.4 GHz MIMO + BLE 2.4 GHz (Module 2)	Yes ^a	Yes	^a Bluetooth Tethering is considered.
4	Wi-Fi 5 GHz Ant.1 + Bluetooth 2.4 GHz Ant.1 (Module 1)	Yes ^a	Yes	^a Bluetooth Tethering is considered.
5	Wi-Fi 5 GHz Ant.2 + Bluetooth 2.4 GHz Ant.1 (Module 1)	Yes ^a	Yes	^a Bluetooth Tethering is considered.
6	Wi-Fi 5 GHz Ant.1 + Bluetooth 2.4 GHz Ant.1 (Module 1) + BLE 2.4 GHz (Module 2)	Yes ^a	Yes	^a Bluetooth Tethering is considered.
7	Wi-Fi 5 GHz Ant.2 + Bluetooth 2.4 GHz Ant.1 (Module 1) + BLE 2.4 GHz (Module 2)	Yes ^a	Yes	^a Bluetooth Tethering is considered.
8	Wi-Fi 5 GHz MIMO + Bluetooth 2.4 GHz Ant.1 (Module 1)	Yes ^a	Yes	^a Bluetooth Tethering is considered.
9	Wi-Fi 5 GHz MIMO + BLE 2.4 GHz (Module 2)	Yes ^a	Yes	^a Bluetooth Tethering is considered.
10	Wi-Fi 5 GHz MIMO + Bluetooth 2.4 GHz Ant.1 (Module 1) + BLE 2.4 GHz (Module 2)	Yes ^a	Yes	^a Bluetooth Tethering is considered.
11	Bluetooth 2.4 GHz Ant.1 (Module 1) + BLE 2.4 GHz (Module 2)	Yes ^a	Yes	^a Bluetooth Tethering is considered.

Notes:

- Bluetooth 2.4 GHz (Module 1): BCM43752
- BLE 2.4 GHz (Module 2): NRF52820
- Ant.1 is Chain0 (Wi-Fi), Ant.2 is Chain1 (Wi-Fi)
- Wi-Fi Power reduction is applied in Receiver On Mode of Ant.2 and MIMO.
- NFC cannot be operated simultaneous transmission.

11.4 Head SAR Simultaneous Transmission Analysis

Table 11.2 Simultaneous Transmission Scenario: 2.4 GHz W-LAN + 5 GHz W-LAN + BT + BT LE (Held to Ear)

Exp. Con.	Configuration	2.4G W-LAN Ant.1 SAR (W/kg)	2.4G W-LAN Ant.2 SAR (W/kg)	2.4G W-LAN MIMO SAR (W/kg)	5G W-LAN Ant.1 SAR (W/kg)	5G W-LAN Ant.2 SAR (W/kg)	5G W-LAN MIMO SAR (W/kg)	BT SAR (W/kg)	BT LE SAR (W/kg)	ΣSAR (W/kg)										
		1	2	3	4	5	6	7	8	2+7	2+7+8	3+8	4+7	5+7	4+7+8	5+7+8	6+7	6+8	6+7+8	7+8
Head SAR	Left Touch	0.095	0.438	0.475	0.036	0.555	0.581	0.012	0.001	0.450	0.452	0.476	0.048	0.567	0.050	0.569	0.593	0.582	0.594	0.013
	Right Touch	0.196	0.201	0.320	0.110	0.446	0.571	0.031	0.004	0.232	0.236	0.324	0.141	0.477	0.145	0.481	0.603	0.575	0.606	0.035
	Left Tilt	0.088	0.261	0.276	0.025	0.779	0.770	0.016	0.003	0.276	0.279	0.278	0.040	0.795	0.043	0.797	0.786	0.772	0.788	0.018
	Right Tilt	0.053	0.129	0.254	0.063	0.626	0.587	0.011	0.003	0.140	0.143	0.256	0.074	0.637	0.076	0.640	0.598	0.590	0.601	0.013

11.5 Body-Worn Simultaneous Transmission Analysis

Table 11.3 Simultaneous Transmission Scenario: 2G/3G/4G + 2.4 GHz W-LAN + 5 GHz W-LAN + BT + BT LE (Body-Worn at 10 mm)

Exp. Con.	Configuration	2.4G W-LAN Ant.1 SAR (W/kg)	2.4G W-LAN Ant.2 SAR (W/kg)	2.4G W-LAN MIMO SAR (W/kg)	5G W-LAN Ant.1 SAR (W/kg)	5G W-LAN Ant.2 SAR (W/kg)	5G W-LAN MIMO SAR (W/kg)	BT SAR (W/kg)	BT LE SAR (W/kg)	ΣSAR (W/kg)										
		1	2	3	4	5	6	7	8	2+7	2+7+8	3+8	4+7	5+7	4+7+8	5+7+8	6+7	6+8	6+7+8	7+8
BodyWorn SAR	Front	0.233	0.228	0.232	0.393	0.359	0.495	0.030	0.001	0.259	0.260	0.233	0.423	0.381	0.425	0.382	0.526	0.497	0.527	0.032
	Rear	0.287	0.125	0.178	0.266	0.308	0.598	0.033	0.011	0.158	0.169	0.189	0.299	0.340	0.310	0.352	0.541	0.520	0.552	0.044

11.6 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and IEEE 1528-2013 Section 6.3.4.1.2.

12. SAR MEASUREMENT VARIABILITY

12.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01r04, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:

1. When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2. A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~10% from the 1-g SAR limit).
3. A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .
4. Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg
5. The same procedures should be adapted for measurements according to extremity exposure limits by applying a factor of 2.5 for extremity exposure to the corresponding SAR thresholds.

12.2 Measurement Uncertainty

The measured SAR was < 1.5 W/kg for 1g and < 3.75 W/kg for 10g for all frequency bands. Therefore, per KDB Publication 865664 D01v01r04, the extended measurement uncertainty analysis per IEEE 1528-2013 was not required.

13. EQUIPMENT LIST

Table 13.1 Test Equipment Calibration

Type	Manufacturer	Model	Cal.Date	Next.Cal.Date	S/N
<input checked="" type="checkbox"/> SEMITEC Engineering	SEMITEC	N/A	N/A	N/A	Shield Room
<input checked="" type="checkbox"/> SEMITEC Engineering	SEMITEC	N/A	N/A	N/A	Shield Room
<input checked="" type="checkbox"/> SEMITEC Engineering	SEMITEC	N/A	N/A	N/A	Shield Room
<input checked="" type="checkbox"/> Robot	SPEAG	TX90XL	N/A	N/A	F13/5P9GA1/A/01
<input checked="" type="checkbox"/> Robot	SPEAG	TX90XL	N/A	N/A	F13/5RR2A1/A/01
<input checked="" type="checkbox"/> Robot	SPEAG	TX60L	N/A	N/A	F15/50NHA1/A/01
<input checked="" type="checkbox"/> Robot Controller	SPEAG	CS8C	N/A	N/A	F13/5P9GA1/C/01
<input checked="" type="checkbox"/> Robot Controller	SPEAG	CS8C	N/A	N/A	F13/5RR2A1/C/01
<input checked="" type="checkbox"/> Robot Controller	SPEAG	CS8C	N/A	N/A	F15/50NHA1/C/01
<input checked="" type="checkbox"/> Joystick	SPEAG	N/A	N/A	N/A	S-12450905
<input checked="" type="checkbox"/> Joystick	SPEAG	N/A	N/A	N/A	S-13200990
<input checked="" type="checkbox"/> Joystick	SPEAG	N/A	N/A	N/A	D21142605A
<input checked="" type="checkbox"/> Intel Core i7-3 770 3.40 GHz Windows 7 Professional	N/A	N/A	N/A	N/A	N/A
<input checked="" type="checkbox"/> Intel Core i7-3 770 3.40 GHz Windows 7 Professional	N/A	N/A	N/A	N/A	N/A
<input checked="" type="checkbox"/> Intel Core i7-8 700K 3.70 GHz Windows 10 Pro	N/A	N/A	N/A	N/A	N/A
<input checked="" type="checkbox"/> Probe Alignment Unit LB	N/A	N/A	N/A	N/A	SE UKS 030 AA
<input checked="" type="checkbox"/> Probe Alignment Unit LB	N/A	N/A	N/A	N/A	SE UKS 030 AA
<input checked="" type="checkbox"/> Probe Alignment Unit LB	N/A	N/A	N/A	N/A	SE UKS 030 AA
<input checked="" type="checkbox"/> Device Holder	SPEAG	SD000H01KA	N/A	N/A	N/A
<input checked="" type="checkbox"/> Device Holder	SPEAG	SD000H01KA	N/A	N/A	N/A
<input checked="" type="checkbox"/> Device Holder	SPEAG	SD000H01KA	N/A	N/A	N/A
<input checked="" type="checkbox"/> Twin SAM Phantom	SPEAG	QD000P40CD	N/A	N/A	1786
<input checked="" type="checkbox"/> Twin SAM Phantom	SPEAG	QD000P40CD	N/A	N/A	1785
<input checked="" type="checkbox"/> 2mm Oval Phantom ELI6	SPEAG	QDOVA003AA	N/A	N/A	2039
<input checked="" type="checkbox"/> Data Acquisition Electronics	SPEAG	DAE4V1	2023-02-22	2024-02-22	1391
<input checked="" type="checkbox"/> Data Acquisition Electronics	SPEAG	DAE3V1	2022-11-16	2023-11-16	520
<input checked="" type="checkbox"/> Data Acquisition Electronics	SPEAG	DAE4V1	2022-09-21	2023-09-21	1453
<input checked="" type="checkbox"/> Dosimetric E-Field Probe	SPEAG	EX3DV4	2022-07-25	2023-07-25	3930
<input checked="" type="checkbox"/> Dosimetric E-Field Probe	SPEAG	ES3DV3	2023-01-22	2024-01-22	3327
<input checked="" type="checkbox"/> Dosimetric E-Field Probe	SPEAG	EX3DV4	2023-03-22	2024-03-22	3916
<input checked="" type="checkbox"/> Confined Loop Antenna (13 MHz)	SPEAG	CLA13	2022-11-07	2023-11-07	1030
<input checked="" type="checkbox"/> 2.450MHz SAR Dipole	SPEAG	D2450V2	2022-08-18	2024-08-18	920
<input checked="" type="checkbox"/> 2.600MHz SAR Dipole	SPEAG	D2600V2	2023-01-20	2025-01-20	1016
<input checked="" type="checkbox"/> 5GHz SAR Dipole	SPEAG	D5GHzV2	2023-01-25	2025-01-25	1103
<input checked="" type="checkbox"/> Signal Generator	Agilent	E4438C	2023-06-24	2024-06-24	US41461520
<input checked="" type="checkbox"/> Amplifier	EMPOWER	BBS3Q7ELU	2023-06-24	2024-06-24	1020
<input checked="" type="checkbox"/> High Power RF Amplifier	EMPOWER	BBS3Q8CCJ	2023-06-24	2024-06-24	1005
<input checked="" type="checkbox"/> Power Meter	HP	EPM-442A	2022-12-16	2023-12-16	GB37170267
<input checked="" type="checkbox"/> Power Meter	Anritsu	ML2488B	2022-12-16	2023-12-16	0846003
<input checked="" type="checkbox"/> Power Sensor	Anritsu	MA2472D	2022-12-16	2023-12-16	0845419
<input checked="" type="checkbox"/> Power Sensor	HP	8481A	2022-12-16	2023-12-16	2702A65976
<input checked="" type="checkbox"/> Power Sensor	HP	8481A	2022-12-16	2023-12-16	2702A61707
<input checked="" type="checkbox"/> Dual Directional Coupler	Agilent	778D-012	2022-12-16	2023-12-16	50399
<input checked="" type="checkbox"/> Directional Coupler	HP	772D	2022-12-16	2023-12-16	2839A00902
<input checked="" type="checkbox"/> Low Pass Filter 3.0 GHz	MICROLAB	LA-30N	2023-06-24	2024-06-24	2
<input checked="" type="checkbox"/> Low Pass Filter 6.0 GHz	MICROLAB	LA-60N	2022-12-16	2023-12-16	03942
<input checked="" type="checkbox"/> Attenuators(10 dB)	WEINSCHEL	23-10-34	2022-12-16	2023-12-16	BP4387
<input checked="" type="checkbox"/> Attenuators	Saluki	3.5TS2-3dB-26.5G	2022-06-24	2023-06-24	21090703
<input checked="" type="checkbox"/> Dielectric Probe kit	SPEAG	DAKS-12	2022-11-08	2023-11-08	1040
<input checked="" type="checkbox"/> Dielectric Probe kit	SPEAG	R60	2022-11-28	2023-11-28	22323001
<input checked="" type="checkbox"/> Dielectric Probe kit	SPEAG	DAK-3.5	2022-07-25	2023-07-25	1046
<input checked="" type="checkbox"/> Dielectric Probe kit	SPEAG	R140	2022-07-26	2023-07-26	0101213

NOTE(S):

1. The E-field probe was calibrated by SPEAG, by temperature measurement procedure. Dipole Verification measurement is performed by Dt&C before each test. The brain and muscle simulating material are calibrated by Dt&C using the dielectric probe system and network analyzer to determine the conductivity and permittivity (dielectric constant) of the brain and muscle-equivalent material. Each equipment item was used solely within its respective calibration period.

2. CBT(Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. signal generator) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.

14. MEASUREMENT UNCERTAINTIES

750 ~ 2 600 MHz Head (SN: 3327)

Error Description	Uncertainty value %	Probability Distribution	Divisor	(Ci) 1 g	(Ci) 10 g	Standard 1 g (%)	Standard 10 g (%)	Ci x U _i 1 g	Ci x U _i 10 g	vi 2 or Veff
Measurement System										
Probe calibration	6.0	Normal	1	1	1	6.0	6.0	6.0	6.0	∞
Axial isotropy	4.7	Rectangular	√3	1	1	2.7	2.7	2.7	2.7	∞
Hemispherical isotropy	9.6	Rectangular	√3	1	1	5.5	5.5	5.5	5.5	∞
Boundary Effects	0.8	Rectangular	√3	1	1	0.46	0.46	0.46	0.46	∞
Probe Linearity	4.7	Rectangular	√3	1	1	2.7	2.7	2.7	2.7	∞
Probe modulation response	2.4	Rectangular	√3	1	1	1.4	1.4	1.4	1.4	∞
Detection limits	0.25	Rectangular	√3	1	1	0.14	0.14	0.14	0.14	∞
Readout Electronics	1.0	Normal	1	1	1	1.0	1.0	1.0	1.0	∞
Response time	0.8	Rectangular	√3	1	1	0.46	0.46	0.46	0.46	∞
Integration time	2.6	Rectangular	√3	1	1	1.5	1.5	1.5	1.5	∞
RF Ambient Conditions – Noise	3.0	Rectangular	√3	1	1	1.8	1.8	1.8	1.8	∞
RF Ambient Conditions – Reflections	3.0	Rectangular	√3	1	1	1.8	1.8	1.8	1.8	∞
Probe Positioner	0.4	Rectangular	√3	1	1	0.23	0.23	0.23	0.23	∞
Probe Positioning	2.9	Rectangular	√3	1	1	1.7	1.7	1.7	1.7	∞
Spatial x-y-Resolution	3.0	Rectangular	√3	1	1	5.8	5.8	5.8	5.8	∞
Fast SAR z-Approximation	3.0	Rectangular	√3	1	1	4.0	4.0	4.0	4.0	∞
Test Sample Related										
Device Positioning	2.9	Normal	1	1	1	2.9	2.9	2.9	2.9	145
Device Holder	3.6	Normal	1	1	1	3.6	3.6	3.6	3.6	5
Power Drift	5.0	Rectangular	√3	1	1	2.9	2.9	2.9	2.9	∞
SAR Scaling	2.0	Rectangular	√3	1	1	1.2	1.2	1.2	1.2	∞
Physical Parameters										
Phantom Shell	7.6	Rectangular	√3	1	1	4.4	4.4	4.4	4.4	∞
Liquid conductivity (Target)	5.0	Rectangular	√3	0.64	0.43	1.8	1.2	1.2	0.5	∞
Liquid conductivity (Meas.)	3.8	Normal	1	0.78	0.71	3.0	2.7	2.3	1.9	10
Liquid permittivity (Target)	5.0	Rectangular	√3	0.60	0.49	1.7	1.4	1.0	0.7	∞
Liquid permittivity (Meas.)	3.7	Normal	1	0.23	0.26	0.85	1.0	0.20	0.25	10
Temp. unc. - Conductivity	1.8	Rectangular	√3	0.78	0.71	0.81	0.74	0.63	0.52	∞
Temp. unc. - Permittivity	1.9	Rectangular	√3	0.23	0.26	0.25	0.29	0.06	0.07	∞
Combined Standard Uncertainty						13	13			330
Expanded Uncertainty (k=2)						26	26			

$$U(1\text{ g}) = k \cdot u_c$$

$$= 2 \cdot 13\%$$

= 26 % (The confidence level is about 95 % $k = 2$)

$$U(10\text{ g}) = k \cdot u_c$$

$$= 2 \cdot 13\%$$

= 26 % (The confidence level is about 95 % $k = 2$)

3 500 ~ 5 800 MHz Head (SN: 3930)

Error Description	Uncertainty value %	Probability Distribution	Divisor	(Ci) 1 g	(Ci) 10 g	Standard 1 g (%)	Standard 10 g (%)	Ci x U _i 1 g	Ci x U _i 10 g	vi 2 or Veff
Measurement System										
Probe calibration	6.6	Normal	1	1	1	6.6	6.6	6.6	6.6	∞
Axial isotropy	4.7	Rectangular	√3	1	1	2.7	2.7	2.7	2.7	∞
Hemispherical isotropy	9.6	Rectangular	√3	1	1	5.5	5.5	5.5	5.5	∞
Boundary Effects	0.8	Rectangular	√3	1	1	0.46	0.46	0.46	0.46	∞
Probe Linearity	4.7	Rectangular	√3	1	1	2.7	2.7	2.7	2.7	∞
Probe modulation response	2.4	Rectangular	√3	1	1	1.4	1.4	1.4	1.4	∞
Detection limits	0.25	Rectangular	√3	1	1	0.14	0.14	0.14	0.14	∞
Readout Electronics	1.0	Normal	1	1	1	1.0	1.0	1.0	1.0	∞
Response time	0.8	Rectangular	√3	1	1	0.46	0.46	0.46	0.46	∞
Integration time	2.6	Rectangular	√3	1	1	1.5	1.5	1.5	1.5	∞
RF Ambient Conditions – Noise	3.0	Rectangular	√3	1	1	1.8	1.8	1.8	1.8	∞
RF Ambient Conditions – Reflections	3.0	Rectangular	√3	1	1	1.8	1.8	1.8	1.8	∞
Probe Positioner	0.4	Rectangular	√3	1	1	0.23	0.23	0.23	0.23	∞
Probe Positioning	2.9	Rectangular	√3	1	1	1.7	1.7	1.7	1.7	∞
Spatial x-y-Resolution	3.0	Rectangular	√3	1	1	5.8	5.8	5.8	5.8	∞
Fast SAR z-Approximation	3.0	Rectangular	√3	1	1	4.0	4.0	4.0	4.0	∞
Test Sample Related										
Device Positioning	2.9	Normal	1	1	1	2.9	2.9	2.9	2.9	145
Device Holder	3.6	Normal	1	1	1	3.6	3.6	3.6	3.6	5
Power Drift	5.0	Rectangular	√3	1	1	2.9	2.9	2.9	2.9	∞
SAR Scaling	2.0	Rectangular	√3	1	1	1.2	1.2	1.2	1.2	∞
Physical Parameters										
Phantom Shell	7.6	Rectangular	√3	1	1	4.4	4.4	4.4	4.4	∞
Liquid conductivity (Target)	5.0	Rectangular	√3	0.64	0.43	1.8	1.2	1.2	0.5	∞
Liquid conductivity (Meas.)	4.2	Normal	1	0.78	0.71	3.1	2.8	2.4	2.0	10
Liquid permittivity (Target)	5.0	Rectangular	√3	0.60	0.49	1.7	1.4	1.0	0.7	∞
Liquid permittivity (Meas.)	4.0	Normal	1	0.23	0.26	0.94	1.1	0.22	0.28	10
Temp. unc. - Conductivity	2.1	Rectangular	√3	0.78	0.71	0.95	0.86	0.74	0.61	∞
Temp. unc. - Permittivity	2.1	Rectangular	√3	0.23	0.26	0.28	0.32	0.07	0.08	∞
Combined Standard Uncertainty						14	13			330
Expanded Uncertainty (k=2)						28	26			

$$U(1\text{ g}) = k \cdot u_c$$

$$= 2 \cdot 14\%$$

$$= 28\% \text{ (The confidence level is about 95\% } k=2)$$

$$U(10\text{ g}) = k \cdot u_c$$

$$= 2 \cdot 13\%$$

$$= 26\% \text{ (The confidence level is about 95\% } k=2)$$

13 MHz Head (SN: 3916)

Error Description	Uncertainty value %	Probability Distribution	Divisor	(Ci) 1 g	(Ci) 10 g	Standard 1 g (%)	Standard 10 g (%)	Ci x U _i 1 g	Ci x U _i 10 g	vi 2 or Veff
Measurement System										
Probe calibration	6.7	Normal	1	1	1	6.7	6.7	6.7	6.7	∞
Axial isotropy	4.7	Rectangular	√3	1	1	2.7	2.7	2.7	2.7	∞
Hemispherical isotropy	9.6	Rectangular	√3	1	1	5.5	5.5	5.5	5.5	∞
Boundary Effects	0.8	Rectangular	√3	1	1	0.46	0.46	0.46	0.46	∞
Probe Linearity	4.7	Rectangular	√3	1	1	2.7	2.7	2.7	2.7	∞
Probe modulation response	2.4	Rectangular	√3	1	1	1.4	1.4	1.4	1.4	∞
Detection limits	0.3	Rectangular	√3	1	1	0.14	0.14	0.14	0.14	∞
Readout Electronics	1.0	Normal	1	1	1	1.0	1.0	1.0	1.0	∞
Response time	0.8	Rectangular	√3	1	1	0.46	0.46	0.46	0.46	∞
Integration time	2.6	Rectangular	√3	1	1	1.5	1.5	1.5	1.5	∞
RF Ambient Conditions – Noise	3.0	Rectangular	√3	1	1	1.8	1.8	1.8	1.8	∞
RF Ambient Conditions – Reflections	3.0	Rectangular	√3	1	1	1.8	1.8	1.8	1.8	∞
Probe Positioner	0.4	Rectangular	√3	1	1	0.23	0.23	0.23	0.23	∞
Probe Positioning	2.9	Rectangular	√3	1	1	1.7	1.7	1.7	1.7	∞
Spatial x-y-Resolution	10.0	Rectangular	√3	1	1	5.8	5.8	5.8	5.8	∞
Fast SAR z-Approximation	7.0	Rectangular	√3	1	1	4.0	4.0	4.0	4.0	∞
Test Sample Related										
Device Positioning	2.9	Normal	1	1	1	2.9	2.9	2.9	2.9	145
Device Holder	3.6	Normal	1	1	1	3.6	3.6	3.6	3.6	5
Power Drift	5.0	Rectangular	√3	1	1	2.9	2.9	2.9	2.9	∞
SAR Scaling	2.0	Rectangular	√3	1	1	1.2	1.2	1.2	1.2	∞
Physical Parameters										
Phantom Shell	7.6	Rectangular	√3	1	1	4.4	4.4	4.4	4.4	∞
Liquid conductivity (Target)	5.0	Rectangular	√3	0.64	0.43	1.8	1.2	1.2	0.5	∞
Liquid conductivity (Meas.)	3.5	Normal	1	0.78	0.71	2.7	2.5	2.1	1.8	10
Liquid permittivity (Target)	5.0	Rectangular	√3	0.60	0.49	1.7	1.4	1.0	0.7	∞
Liquid permittivity (Meas.)	3.8	Normal	1	0.23	0.26	0.87	1.0	0.20	0.26	10
Temp. unc. - Conductivity	1.9	Rectangular	√3	0.78	0.71	0.86	0.78	0.67	0.55	∞
Temp. unc. - Permittivity	2.0	Rectangular	√3	0.23	0.26	0.27	0.30	0.06	0.08	∞
Combined Standard Uncertainty						14	13			330
Expanded Uncertainty (k=2)						28	26			

$$U(1\text{ g}) = k \cdot u_c$$

$$= 2 \cdot 14\%$$

$$= 28\% \text{ (The confidence level is about 95\% } k = 2)$$

$$U(10\text{ g}) = k \cdot u_c$$

$$= 2 \cdot 13\%$$

$$= 26\% \text{ (The confidence level is about 95\% } k = 2)$$

15. CONCLUSION

Measurement Conclusion

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the FCC. These measurements are taken to simulate the RF effects exposure under the worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The tested device complies with the requirements in respect to all parameters subject to the test. The test results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are every complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role impossible biological effect are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease).

Because innumerable factors may interact to determine the specific biological outcome of an exposure to electromagnetic fields, any protection guide shall consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.

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