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SAR EVALUATION REPORT

Applicant Name:
Apple Inc.
One Apple Park Way
Cupertino, CA 95014 USA

Date of Testing:
07/15/2024
Test Report Issue Date:
07/18/2024
Test Site/Location:
Element, Morgan Hill, CA, USA
Document Serial No.:
1C2407010043-04.BCG (rev1)

FCC ID: **BCGA2117**

APPLICANT: **APPLE, INC.**

DUT Type: Head Mounted Device
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model: A2117
Date of Original Certification: 1/16/2024

Equipment Class	Band & Mode	Tx Frequency	SAR	
			1g Head (W/kg)	10g Extremity (W/kg)
6VL	NB UNII-5	6108 - 6420 MHz	<0.1	< 0.1
Simultaneous SAR per KDB 690783 D01v01r03:			0.15	3.85
Equipment Class	Band & Mode	Tx Frequency	APD (W/m²)	
6VL	NB UNII-5	6108 - 6420 MHz	0.07	0.25
Equipment Class	Band & Mode	Tx Frequency	Reported PD (W/m²)	
6VL	NB UNII-5	6108 - 6420 MHz	0.33	

Please see the original compliance evaluation in RF Exposure Technical Report S/N 1C2302130007-12.BCG (Rev 1) for complete evaluation of all other operating modes. The operational description includes a description of all added items.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in Section 1.7 of this report; for North American frequency bands only.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. Test results reported herein relate only to the item(s) tested.

RJ Ortanez
Executive Vice President

The SAR Tick is an initiative of the Mobile & Wireless Forum (MWF). While a product may be considered eligible, use of the SAR Tick logo requires an agreement with the MWF. Further details can be obtained by emailing: sartick@mwfai.info.

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1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
2.4 GHz WLAN	Voice/Data	2412 - 2472 MHz
U-NII-1	Voice/Data	5180 - 5240 MHz
U-NII-2A	Voice/Data	5260 - 5320 MHz
U-NII-2C	Voice/Data	5500 - 5720 MHz
U-NII-3	Voice/Data	5745 - 5825 MHz
Bluetooth	Data	2402 - 2480 MHz
NB UNII-1	Data	5157 - 5245 MHz
NB UNII-3	Data	5731 - 5844 MHz
NB UNII-5	Data	6108 - 6420 MHz

1.2 Power Reduction for SAR

Only operations relevant to this report were evaluated for compliance. No other target changes have been made. Targets for all other bands/exposure conditions can be found in the original filing.

When Bluetooth is operating simultaneously with certain combinations of NB UNII antennas, the output power is permanently reduced. SAR evaluations were performed at the maximum allowed output power for these scenarios to evaluate simultaneous transmission compliance.

1.3 Nominal and Maximum Output Power Specifications

This device operates using the following maximum and nominal output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D04v01.

Only operations relevant to this report were evaluated for compliance. No other target changes have been made. Targets for all other bands/exposure conditions can be found in the original filing.

1.3.1 NB UNII Maximum Power

Mode / Band		Modulated Average (ePA) - Single Tx Chain (dBm) - Antenna NB UNII_R
NB UNII-5 BDR/EDR/LE	Maximum	**-8.50**
	Nominal	**-10.00**
NB UNII-5 HDR4	Maximum	**-6.50**
	Nominal	**-8.00**
NB UNII-5 HDR8	Maximum	**-4.00**
	Nominal	**-5.50**

Mode / Band		Modulated Average (ePA) - Single Tx Chain (dBm) - Antenna NB UNII_L
NB UNII-5 BDR/EDR/LE	Maximum	**-8.50**
	Nominal	**-10.00**
NB UNII-5 HDR4	Maximum	**-6.50**
	Nominal	**-8.00**
NB UNII-5 HDR8	Maximum	**-4.00**
	Nominal	**-5.50**

1.4 DUT Antenna Locations

Based on the expected use conditions and FCC approved test plan, Head SAR and Extremity SAR were evaluated. A diagram showing the location of the antennas can be found in the DUT Antenna Diagram & SAR Test Setup Photographs appendix. More information about the configuration evaluated for SAR can be found in Section 4.2 and Section 4.3.

See the original filing for all other operations that were not evaluated in this report.

1.5 Simultaneous Transmission Capabilities

According to FCC KDB Publication 447498 D04v01, transmitters are considered to be operating simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 60 seconds.

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D04v01 4.3.2 procedures.

Table 1-1
Simultaneous Head Transmission Scenarios

No.	Capable Transmit Configuration	Head
1	NB UNII + 2.4 GHz Bluetooth	Yes
2	NB UNII + 2.4 GHz WiFi	Yes
3	NB UNII + 5 GHz WiFi	Yes
4	NB UNII + 2.4 GHz Bluetooth + 5GHz WiFi	Yes
5	NB UNII + 2.4 GHz Bluetooth + 2.4GHz WiFi	Yes
7	2.4 GHz Bluetooth + 2.4 GHz WI-FI	Yes
9	2.4 GHz Bluetooth + 5 GHz WI-FI	Yes
8	2.4 GHz Bluetooth(TXBF)	Yes
9	2.4 GHz Bluetooth(TXBF) + 5 GHz WI-FI	Yes

Table 1-2
Simultaneous Extremity Transmission Scenarios

No.	Capable Transmit Configuration	Extremity
1	NB UNII + 2.4 GHz Bluetooth	Yes
2	NB UNII + 2.4 GHz WiFi	Yes
3	NB UNII + 5 GHz WiFi	Yes
4	NB UNII + 2.4 GHz Bluetooth + 5GHz WiFi	Yes
5	NB UNII + 2.4 GHz Bluetooth + 2.4GHz WiFi	Yes
7	2.4 GHz Bluetooth + 2.4 GHz WI-FI	Yes
9	2.4 GHz Bluetooth + 5 GHz WI-FI	Yes
8	2.4 GHz Bluetooth(TXBF)	Yes
9	2.4 GHz Bluetooth(TXBF) + 5 GHz WI-FI	Yes
11	2.4 GHz WLAN MIMO	Yes
12	5 GHz WLAN MIMO	Yes

1. 2.4 GHz WLAN, and 2.4 GHz Bluetooth can transmit simultaneously on separate antennas. 2.4 GHz WLAN Antenna 1 can only transmit simultaneously with 2.4 GHz Bluetooth Antenna 2 **or** 2.4 GHz Bluetooth Antenna NB UNII_L.
2. This device supports VoWIFI.
3. NB UNII Antennas are on the same core and will always operate at the same time.
4. Table 1-1 supports Head testing using the Head-on policy as stated in the Technical Document.
5. Table 1-2 supports Extremity testing using both Head-on and Head-off policies as stated in the Technical Document.

1.6 Miscellaneous SAR Test Considerations

(A) NB UNII

Only operations relevant to this report were evaluated for compliance. Please see original filing for complete evaluation for all other operating modes. The operational description includes a description of all added items.

1.7 Guidance Applied

- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D04v01 (Interim General RF Exposure Guidance)
- 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)

1.8 Device Serial Numbers

Several samples with identical hardware were used to support SAR testing. 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. The serial numbers used for each test are indicated alongside the results in Section 9.

1.9 Bibliography

Report Type	Report Serial Number
RF Exposure Test Report (Original)	Original Filing

2 INTRODUCTION

The FCC and Innovation, Science, and Economic Development 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. [1]

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 [3] and Health Canada RF Exposure Guidelines Safety Code 6 [22]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (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 International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," Report No. Vol 74. 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.

2.1 SAR Definition

Specific Absorption Rate 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 Equation 2-1).

Equation 2-1
SAR Mathematical Equation

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

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 relation 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.[6]

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:

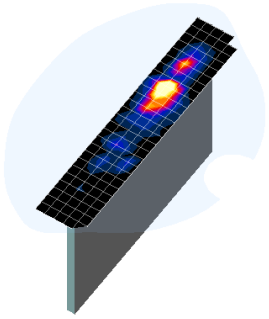


Figure 3-1
Sample SAR Area Scan

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 3-1) and IEEE 1528-2013.
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 3-1) 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 cDASY6 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 3-1. 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.

Table 3-1
Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04*

Frequency	Maximum Area Scan Resolution (mm) (Δx_{area}, Δy_{area})	Maximum Zoom Scan Resolution (mm) (Δx_{zoom}, Δy_{zoom})	Maximum Zoom Scan Spatial Resolution (mm)			Minimum Zoom Scan Volume (mm) (x,y,z)
			Uniform Grid	Graded Grid		
			$\Delta z_{zoom}(n)$	$\Delta z_{zoom}(1)$*	$\Delta z_{zoom}(n>1)$*	
≤ 2 GHz	≤ 15	≤ 8	≤ 5	≤ 4	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≤ 4	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≤ 3	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≤ 2.5	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≤ 2	≤ 1.5*$\Delta z_{zoom}(n-1)$	≥ 22

*Also compliant to IEEE 1528-2013 Table 6

4 TEST CONFIGURATION POSITIONS

4.1 Device Holder

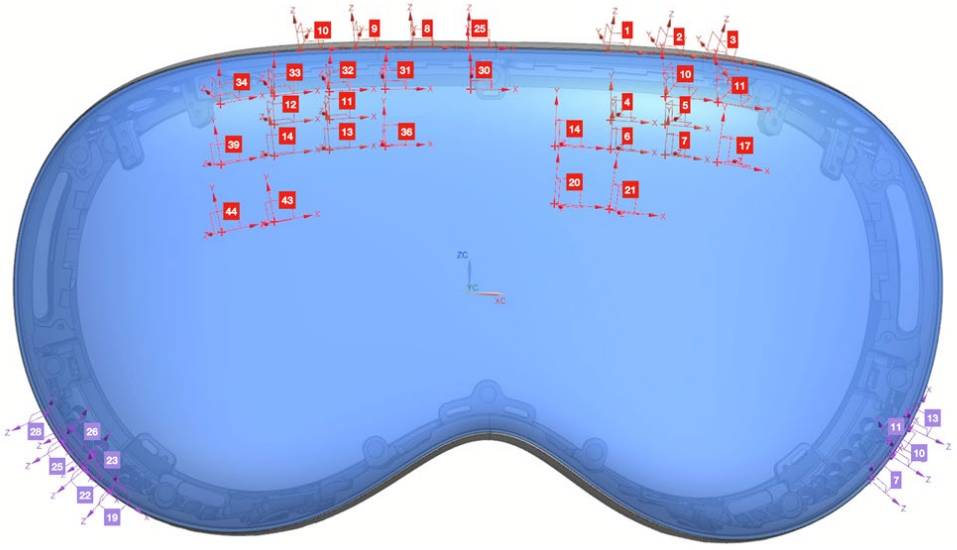
The device holder is made out of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02.

4.2 Positioning for Head

Head mounted devices are designed to be used on the face and, in particular, the eye regions. Since the device is worn in front of the face, SAR testing was performed in a face-down phantom to evaluate all head use case conditions. SAR was evaluated with a separation distance of 0 mm between the device and the eye region of the facedown phantom to mimic expected use conditions. Additionally, the worst-case SAR configuration per band (e.g. 2400-2483.5 MHz, 5150-5250 MHz etc.) was spot-checked with the light seal which is a foam gasket covered in fabric connected to the head mounted device to ensure a good fit and seal out the ambient light. The smallest and largest light seal available were used for the spot-check. The phantom is filled with head tissue equivalent medium.

4.3 Extremity Exposure Conditions

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions: i.e., hands, wrists, feet, and ankles, may require an extremity SAR evaluation. Per FCC approved test plan, Extremity SAR was evaluated. Based on the simulation data, a few candidates for the maximum averaged E-field location/area on the surface of the device were identified. A tangential plane on the maximum E-field locations were identified and a URE5 Robot was used to position the device in these locations underneath the flat phantom so SAR can be evaluated to confirm the highest SAR value. The separation distance between the device and the flat phantom was 0 mm. A diagram of the locations identified (point scheme schematic) per antenna is shown below. Additionally, the worst-case SAR configuration per band (e.g. 2400-2483.5 MHz, 5150-5250 MHz etc.) was spot-checked with the light seal, which is a foam gasket covered in fabric connected to the head mounted device to ensure a good fit and seal out ambient light. The smallest (“mini”) and largest (“main”) available light seals were used for the spot-check. The phantom is filled with head tissue-equivalent medium.



5 RF EXPOSURE LIMITS

5.1 Uncontrolled Environment

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

5.2 Controlled Environment

CONTROLLED ENVIRONMENTS are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e., as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. 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 5-1
SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT *General Population* (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT *Occupational* (W/kg) or (mW/g)
Peak Spatial Average SAR Head	1.6	8.0
Whole Body SAR	0.08	0.4
Peak Spatial Average SAR Hands, Feet, Ankle, Wrists, etc.	4.0	20

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.

6 FCC MEASUREMENT PROCEDURES

6.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D04v01, 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.

6.1.1 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.

7 RF CONDUCTED POWERS

7.1 NB UNII Conducted Powers

Table 7-1
NB UNII5 Average RF Power – Ant NB UNII_R, Variant 1

Band	Frequency	Average
UNII5	6108	-4.51
	6186	-4.43
	6264	-4.59
	6342	-4.45
	6420	-4.54

Table 7-2
NB UNII5 Average RF Power – Ant NB UNII_R, Variant 2

Band	Frequency	Average
UNII5	6108	-4.38
	6186	-4.45
	6264	-4.43
	6342	-4.45
	6420	-4.44

Table 7-3
NB UNII5 Average RF Power – Ant NB UNII_L, Variant 1

Band	Frequency	Average
UNII5	6108	-4.32
	6186	-4.28
	6264	-4.55
	6342	-4.46
	6420	-4.64

Table 7-4
NB UNII5 Average RF Power – Ant NB UNII_L, Variant 2

Band	Frequency	Average
UNII5	6108	-4.38
	6186	-4.59
	6264	-4.41
	6342	-4.37
	6420	-4.41

7.2 NB UNII Duty Cycle

7.2.1 Maximum NB UNII Transmission

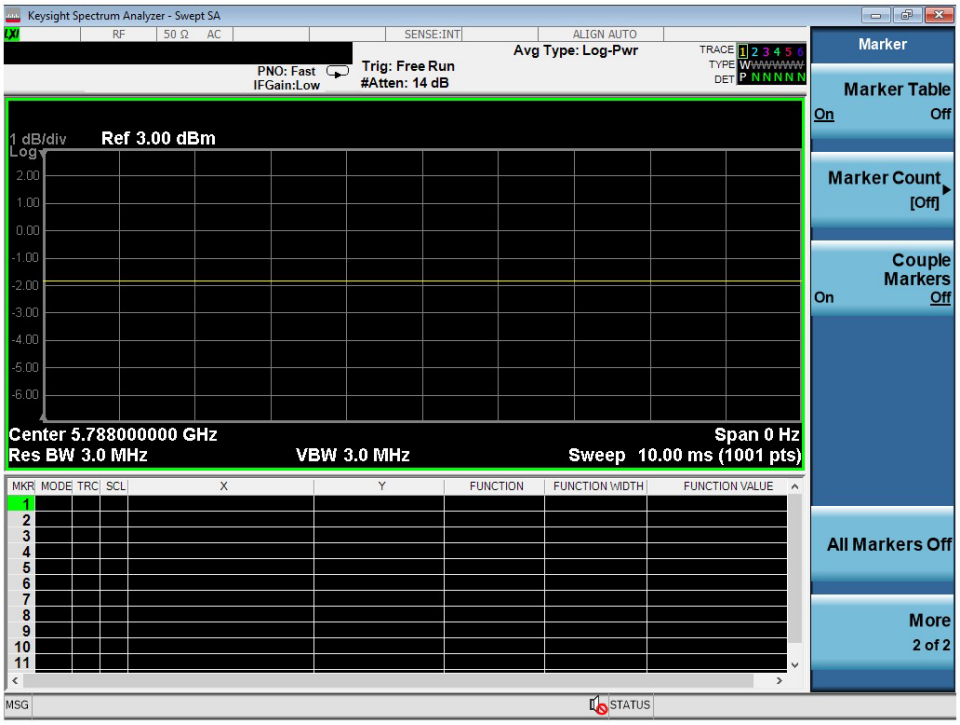


Figure 7-1
NB UNII Transmission Plot – Antenna NB UNII_R, Variant 1

Equation 7-1
NB UNII Duty Cycle Calculation – Antenna NB UNII_R, Variant 1

$$Duty\ Cycle = 100\%$$

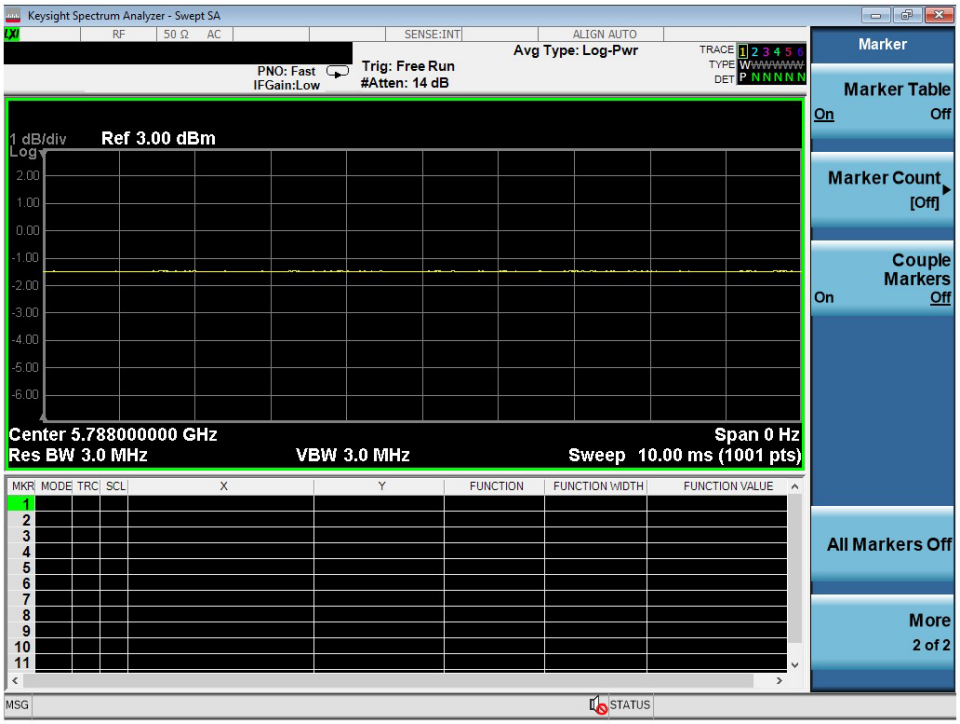


Figure 7-2
NB UNII Transmission Plot – Antenna NB UNII_R, Variant 2

Equation 7-2
NB UNII Duty Cycle Calculation – Antenna NB UNII_R, Variant 2

$$Duty\ Cycle = 100\%$$

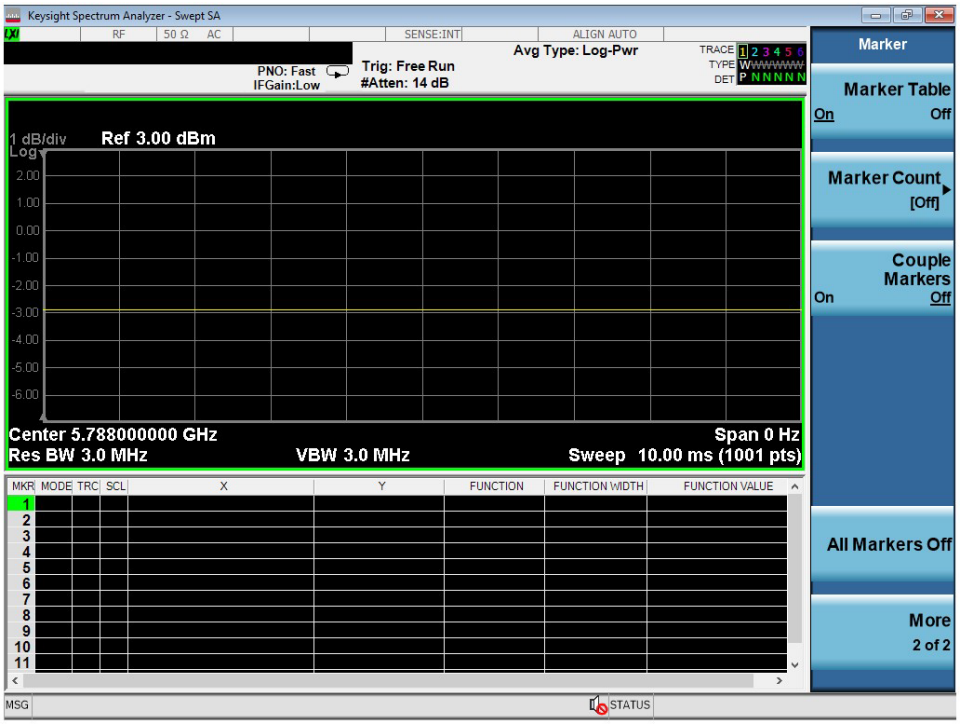


Figure 7-3
NB UNII Transmission Plot – Antenna NB UNII_L, Variant 1

Equation 7-3
NB UNII Duty Cycle Calculation – Antenna NB UNII_L, Variant 1

$$Duty\ Cycle = 100\%$$

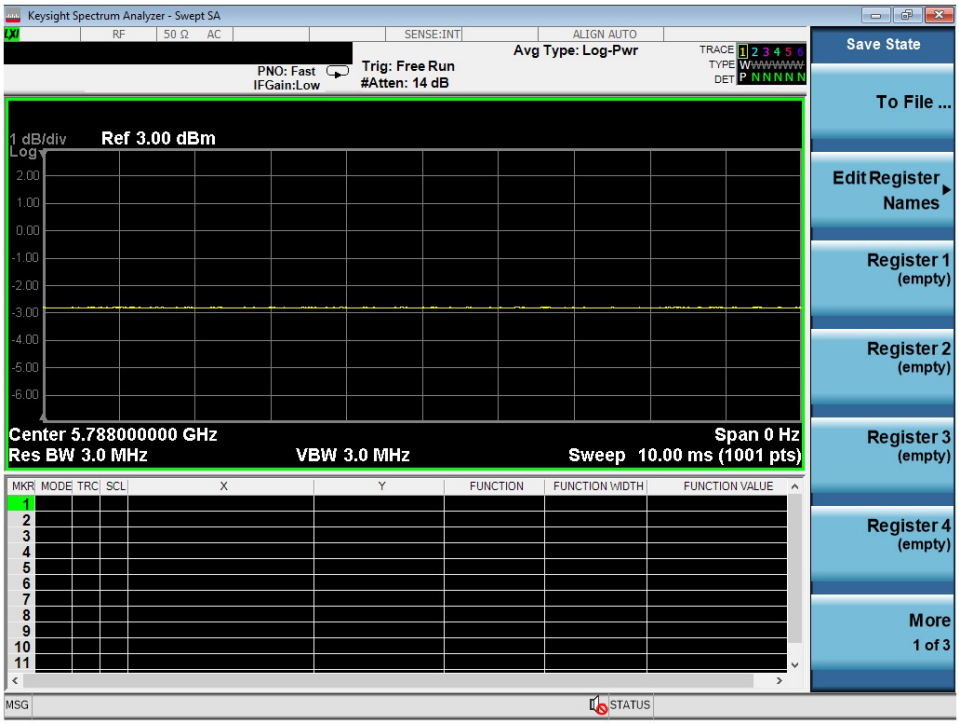


Figure 7-4
NB UNII Transmission Plot – Antenna NB UNII_L, Variant 2

Equation 7-4
NB UNII Duty Cycle Calculation – Antenna NB UNII_L, Variant 2

$$Duty\ Cycle = 100\%$$

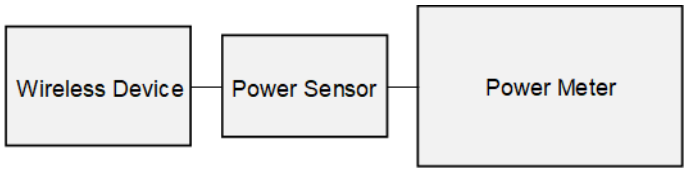


Figure 7-5
Power Measurement Setup

8 SYSTEM VERIFICATION

8.1 Tissue Verification

Table 8-1
Measured Head Tissue Properties Cont.

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (˚C)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
7/15/2024	6000 Head	20	5935	5.436	34.576	5.411	35.143	*0.46%*	*-1.61%*
			5970	5.474	34.523	5.448	35.12	*0.48%*	*-1.70%*
			5985	5.491	34.502	5.464	35.11	*0.49%*	*-1.73%*
			6000	5.51	34.478	5.48	35.1	*0.55%*	*-1.77%*
			6025	5.54	34.436	5.51	35.07	*0.54%*	*-1.81%*
			6065	5.59	34.364	5.557	35.022	*0.59%*	*-1.88%*
			6075	5.602	34.346	5.569	35.01	*0.59%*	*-1.90%*
			6085	5.615	34.329	5.58	34.998	*0.63%*	*-1.91%*
			6185	5.735	34.166	5.698	34.878	*0.65%*	*-2.04%*
			6275	5.839	34.016	5.805	34.77	*0.59%*	*-2.17%*
			6285	5.851	33.999	5.816	34.758	*0.60%*	*-2.18%*
			6305	5.875	33.965	5.84	34.734	*0.60%*	*-2.21%*
			6345	5.919	33.898	5.887	34.686	*0.54%*	*-2.27%*
			6475	6.063	33.696	6.041	34.53	*0.36%*	*-2.42%*
			6485	6.074	33.681	6.052	34.518	*0.36%*	*-2.42%*
			6500	6.091	33.658	6.07	34.5	*0.35%*	*-2.44%*
			6505	6.097	33.65	6.076	34.494	*0.35%*	*-2.45%*
			6545	6.145	33.579	6.122	34.446	*0.38%*	*-2.52%*
			6665	6.292	33.378	6.265	34.302	*0.43%*	*-2.69%*
			6675	6.303	33.362	6.273	34.29	*0.48%*	*-2.71%*
			6685	6.314	33.345	6.285	34.278	*0.46%*	*-2.72%*
			6715	6.351	33.295	6.319	34.242	*0.51%*	*-2.77%*
			6785	6.433	33.188	6.4	34.158	*0.52%*	*-2.84%*
			6825	6.476	33.13	6.447	34.11	*0.45%*	*-2.87%*
			6985	6.643	32.893	6.633	33.918	*0.15%*	*-3.02%*
			6995	6.655	32.877	6.644	33.906	*0.17%*	*-3.03%*
			7000	6.66	32.868	6.65	33.9	*0.15%*	*-3.04%*
			7005	6.666	32.858	6.656	33.894	*0.15%*	*-3.06%*
			7025	6.691	32.821	6.68	33.87	*0.16%*	*-3.10%*
			7500	7.254	32.053	7.24	33.3	*0.19%*	*-3.74%*
			7980	7.822	31.307	7.816	32.724	*0.08%*	*-4.33%*
			8000	7.847	31.27	7.84	32.7	*0.09%*	*-4.37%*

Note: Per April 2019 TCB Workshop Notes, single head-tissue simulating liquid specified in IEC 62209-1 is permitted to use for all SAR tests. The above measured tissue parameters were used in the cDASY6 software. The cDASY6 software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies (per KDB Publication 865664 D01v01r04 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.

8.1.1 Test System Verification

Prior to SAR assessment, the system is verified to ±10% of the SAR measurement on the reference dipole at the time of calibration by the calibration facility. Full system validation status and result summary can be found in SAR System Validation Appendix.

Table 8-2
System Verification Results – 1g

System Verification TARGET & MEASURED																	
SAR System	Tissue Frequency (MHz)	Tissue Type	Date	Amb. Temp. (C)	Liquid Temp. (C)	Input Power (W)	Source SN	Probe SN	DAE	Measured SAR 1g (W/kg)	1W Target SAR 1g (W/kg)	1W Normalized SAR 1g (W/kg)	Deviation 1g (%)	Measured 4cm2 (W/m2)	1W Target 4cm2 APD	1W Normalized 4cm2 APD	Deviation 4cm2 APD (%)
AM11	6500	HEAD	07/15/2024	20.3	20.0	0.03	1019	7532	501	7.79	293.00	311.60	6.35%	35.00	1320.00	1400.00	6.06%

Table 8-3
System Verification Results – 10g

System Verification TARGET & MEASURED																	
SAR System	Tissue Frequency (MHz)	Tissue Type	Date	Amb. Temp. (C)	Liquid Temp. (C)	Input Power (W)	Source SN	Probe SN	DAE	Measured SAR 10g (W/kg)	1W Target SAR 10g (W/kg)	1W Normalized SAR 10g (W/kg)	Deviation 10g (%)	Measured 4cm2 (W/m2)	1W Target 4cm2 APD	1W Normalized 4cm2 APD	Deviation 4cm2 APD (%)
AM11	6500	HEAD	07/15/2024	20.3	20.0	0.03	1019	7532	501	1.43	54.10	1.35	5.69%	35.00	1320.00	1400.00	6.06%

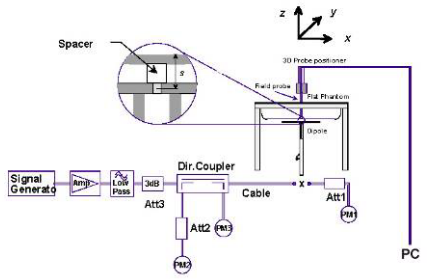


Figure 8-1
System Verification Setup Diagram

Figure 8-2
System Verification Setup Photo

8.2 Power Density Test System Verification

The system was verified to be within ±0.66 dB of the power density targets on the calibration certificate according to the test system specification in the user's manual and calibration facility recommendation. The 0.66 dB deviation threshold represents the expanded uncertainty for system performance checks using SPEAG's mmWave verification sources. The same spatial resolution and measurement region used in the source calibration was applied during the system check.

The measured power density distribution of verification source was also confirmed through visual inspection to have no noticeable differences, both spatially (shape) and numerically (level) from the distribution provided by the manufacturer, per November 2017 TCBC Workshop Notes.

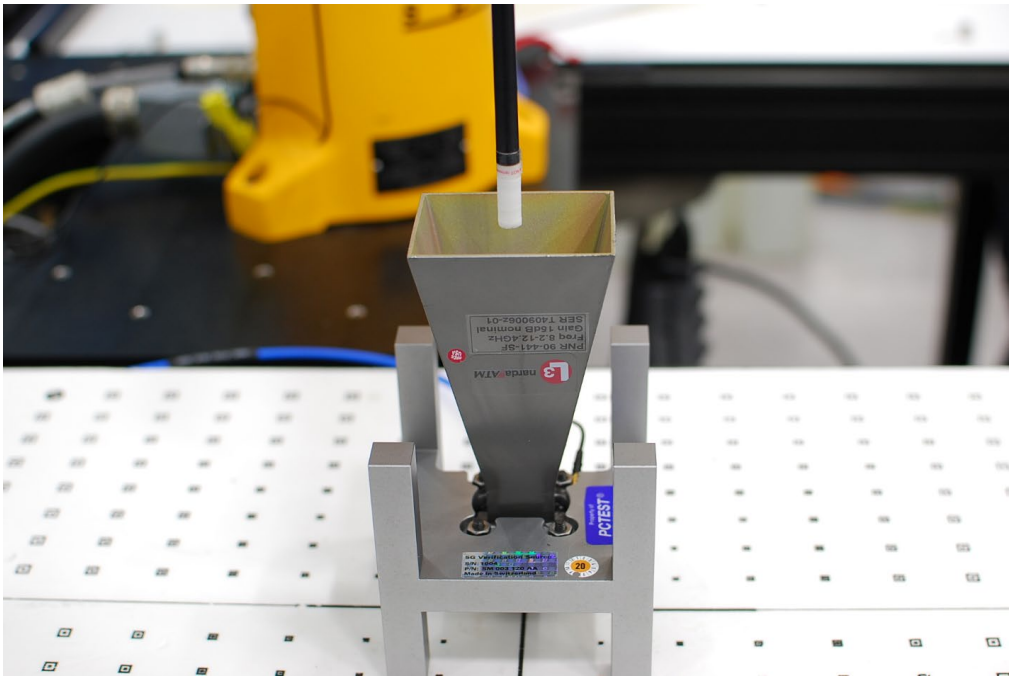


Figure 8-3
System Verification Setup Photo

Table 8-3

10 GHz Verification Results											
SAR System	Tissue Frequency (GHz)	Date	Source SN	Probe SN	Prad (mW)	Normal psPD (W/m^2 over 4cm^2)		Deviation (dB)	Total psPD (W/m^2 over 4cm^2)		Deviaiton (dB)
						Measured	Target		Measured	Target	
AM5	10	07/15/2024	1006	9487	93.3	57.5	58.5	-0.07	57.70	58.90	-0.09

Note: A **10 mm distance spacing** was used from the reference horn antenna aperture to the probe element.

9 SAR DATA SUMMARY

9.1 Standalone Head SAR Data

Table 9-1
NB UNII Antenna NB UNII_R Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Variant	Device Serial Number	Data Rate (Mbps)	Cover	Side	Duty Cycle (%)	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.														(W/kg)			(W/kg)	
6108	Low	NB UNII 5	FHSS	-4.00	-4.51	-0.20	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.003	1.125	1.000	0.003	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.43	-0.20	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.015	1.104	1.000	0.017	A1
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.45	-0.20	0 mm	Ant NB UNII_R (6 GHz)	V2	YV4PVHN41T	8	N/A	Face-Down	100	0.007	1.109	1.000	0.008	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.59	-0.20	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.004	1.146	1.000	0.005	
6342	Mid-High	NB UNII 5	FHSS	-4.00	-4.45	-0.20	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.003	1.109	1.000	0.003	
6420	High	NB UNII 5	FHSS	-4.00	-4.54	0.20	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.002	1.132	1.000	0.002	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.43	-0.20	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	Main Light-Seal	Face-Down	100	0.002	1.104	1.000	0.002	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.43	-0.03	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	Mini Light-Seal	Face-Down	100	0.004	1.104	1.000	0.005	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram											

Table 9-2
NB UNII Antenna NB UNII_R Head APD

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Variant	Device Serial Number	Data Rate (Mbps)	Cover	Side	Duty Cycle (%)	Measured APD [W/m² (4cm²)]	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported APD [W/m² (4cm²)]	Plot #
MHz	Ch.																		
6108	Low	NB UNII 5	FHSS	-4.00	-4.51	-0.20	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.052	1.125	1.000	0.059	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.43	-0.20	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.064	1.104	1.000	0.071	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.45	-0.20	0 mm	Ant NB UNII_R (6 GHz)	V2	YV4PVHN41T	8	N/A	Face-Down	100	0.051	1.109	1.000	0.057	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.59	-0.20	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.020	1.146	1.000	0.023	
6342	Mid-High	NB UNII 5	FHSS	-4.00	-4.45	-0.20	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.028	1.109	1.000	0.031	
6420	High	NB UNII 5	FHSS	-4.00	-4.54	0.20	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.036	1.132	1.000	0.041	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.43	-0.20	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	Main Light-Seal	Face-Down	100	0.013	1.104	1.000	0.014	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.43	-0.03	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	Mini Light-Seal	Face-Down	100	0.034	1.104	1.000	0.038	

Table 9-3
NB UNII Antenna NB UNII_L Head SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Variant	Device Serial Number	Data Rate (Mbps)	Cover	Side	Duty Cycle (%)	SAR (1g)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported SAR (1g)	Plot #
MHz	Ch.														(W/kg)			(W/kg)	
6108	Low	NB UNII 5	FHSS	-4.00	-4.32	0.00	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.003	1.076	1.000	0.003	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.28	0.00	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.004	1.067	1.000	0.004	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.59	0.09	0 mm	Ant NB UNII_L (6 GHz)	V2	YV4PVHN41T	8	N/A	Face-Down	100	0.002	1.146	1.000	0.002	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.55	-0.21	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.002	1.135	1.000	0.002	
6342	Mid-High	NB UNII 5	FHSS	-4.00	-4.46	-0.21	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.002	1.112	1.000	0.002	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	-0.21	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.002	1.159	1.000	0.002	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Head 1.6 W/kg (mW/g) averaged over 1 gram											

Table 9-4
NB UNII Antenna NB UNII_L Head SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Variant	Device Serial Number	Data Rate (Mbps)	Cover	Side	Duty Cycle (%)	Measured APD [W/m² (4cm²)]	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Reported APD [W/m² (4cm²)]	Plot #
MHz	Ch.																		
6108	Low	NB UNII 5	FHSS	-4.00	-4.32	0.00	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.013	1.076	1.000	0.014	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.28	0.00	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.038	1.067	1.000	0.041	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.59	0.09	0 mm	Ant NB UNII_L (6 GHz)	V2	YV4PVHN41T	8	N/A	Face-Down	100	0.008	1.146	1.000	0.009	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.55	-0.21	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.010	1.135	1.000	0.011	
6342	Mid-High	NB UNII 5	FHSS	-4.00	-4.46	-0.21	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.011	1.112	1.000	0.012	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	-0.21	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	Face-Down	100	0.013	1.159	1.000	0.015	

9.2 Standalone Extremity SAR Data

Table 9-5
NB UNII Antenna NB UNII_R Extremity SAR

MEASUREMENT RESULTS																				
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Variant	Device Serial Number	Data Rate (Mbps)	Cover	Point Scheme	Duty Cycle (%)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	SAR (10g)	Reported SAR (10g)	Plot #
MHz	Ch.																(W/kg)	(W/kg)	
6108	Low	NB UNII 5	FHSS	-4.00	-4.51	-0.05	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	22	100	1.125	1.000	0.004	0.005	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.43	-0.10	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	22	100	1.104	1.000	0.001	0.001	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.59	0.00	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	19	100	1.146	1.000	0.005	0.006	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.59	-0.21	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	22	100	1.146	1.000	0.006	0.007	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.43	0.19	0 mm	Ant NB UNII_R (6 GHz)	V2	YV4PVHN41T	8	N/A	22	100	1.104	1.000	0.005	0.006	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.59	-0.21	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	23	100	1.146	1.000	0.004	0.005	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.59	0.05	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	25	100	1.146	1.000	0.005	0.006	
6342	Mid-High	NB UNII 5	FHSS	-4.00	-4.45	-0.07	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	22	100	1.109	1.000	0.003	0.003	
6420	High	NB UNII 5	FHSS	-4.00	-4.54	-0.10	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	22	100	1.132	1.000	0.003	0.003	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population													Extremity 4.0 W/Kg (mW/g) averaged over 10 grams						

Table 9-6
NB UNII Antenna NB UNII_R Extremity APD

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Variant	Device Serial Number	Data Rate (Mbps)	Cover	Point Scheme	Duty Cycle (%)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Measured APD [W/m² (4cm²)]	Reported APD [W/m² (4cm²)]	Plot #
MHz	Ch.																		
6108	Low	NB UNII 5	FHSS	-4.00	-4.51	-0.05	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	22	100	1.125	1.000	0.094	0.106	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.43	-0.10	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	22	100	1.104	1.000	0.025	0.028	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.59	0.00	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	19	100	1.146	1.000	0.110	0.126	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.59	-0.21	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	22	100	1.146	1.000	0.153	0.175	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.43	0.19	0 mm	Ant NB UNII_R (6 GHz)	V2	YV4PVHN41T	8	N/A	22	100	1.104	1.000	0.109	0.120	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.59	-0.21	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	23	100	1.146	1.000	0.103	0.118	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.59	0.05	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	25	100	1.146	1.000	0.128	0.147	
6342	Mid-High	NB UNII 5	FHSS	-4.00	-4.45	-0.07	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	22	100	1.109	1.000	0.077	0.085	
6420	High	NB UNII 5	FHSS	-4.00	-4.54	-0.10	0 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	N/A	22	100	1.132	1.000	0.081	0.092	

Table 9-7
NB UNII Antenna NB UNII_L Extremity SAR

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Variant	Device Serial Number	Data Rate (Mbps)	Cover	Point Scheme	Duty Cycle (%)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	SAR (10g)	Reported SAR (10g)	Plot #
MHz	Ch.																(W/kg)	(W/kg)	
6108	Low	NB UNII 5	FHSS	-4.00	-4.32	-0.04	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	10	100	1.076	1.000	0.006	0.006	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.28	-0.02	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	10	100	1.067	1.000	0.005	0.005	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.55	0.04	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	10	100	1.135	1.000	0.007	0.008	
6342	Mid-High	NB UNII 5	FHSS	-4.00	-4.46	0.12	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	10	100	1.112	1.000	0.007	0.008	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	-0.13	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	7	100	1.159	1.000	0.007	0.008	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	0.04	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	10	100	1.159	1.000	0.009	0.010	A2
6420	High	NB UNII 5	FHSS	-4.00	-4.41	0.20	0 mm	Ant NB UNII_L (6 GHz)	V2	YV4PVHN41T	8	N/A	10	100	1.099	1.000	0.008	0.009	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	0.20	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	11	100	1.159	1.000	0.007	0.008	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	0.20	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	13	100	1.159	1.000	0.007	0.008	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	-0.21	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	Light Seal Main	10	100	1.159	1.000	0.005	0.006	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	0.20	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	Light Seal Mini	10	100	1.159	1.000	0.006	0.007	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population								Extremity 4.0 W/Kg (mW/g) averaged over 10 grams											

Table 9-8
NB UNII Antenna NB UNII_L Extremity APD

MEASUREMENT RESULTS																			
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Variant	Device Serial Number	Data Rate (Mbps)	Cover	Point Scheme	Duty Cycle (%)	Scaling Factor (Cond Power)	Scaling Factor (Duty Cycle)	Measured APD [W/m² (4cm²)]	Reported APD [W/m² (4cm²)]	Plot #
MHz	Ch.																		
6108	Low	NB UNII 5	FHSS	-4.00	-4.32	-0.04	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	10	100	1.076	1.000	0.143	0.154	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.28	-0.02	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	10	100	1.067	1.000	0.126	0.134	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.55	0.04	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	10	100	1.135	1.000	0.179	0.203	
6342	Mid-High	NB UNII 5	FHSS	-4.00	-4.46	0.12	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	10	100	1.112	1.000	0.152	0.169	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	-0.13	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	7	100	1.159	1.000	0.167	0.194	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	0.04	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	10	100	1.159	1.000	0.212	0.246	
6420	High	NB UNII 5	FHSS	-4.00	-4.41	0.20	0 mm	Ant NB UNII_L (6 GHz)	V2	YV4PVHN41T	8	N/A	10	100	1.099	1.000	0.198	0.218	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	0.20	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	11	100	1.159	1.000	0.156	0.181	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	0.20	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	N/A	13	100	1.159	1.000	0.171	0.198	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	-0.21	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	Light Seal Main	10	100	1.159	1.000	0.129	0.150	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	0.20	0 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	Light Seal Mini	10	100	1.159	1.000	0.141	0.163	

9.3 SAR Test Notes

General Notes:

1. Batteries are fully charged at the beginning of the SAR measurements.
2. Liquid tissue depth was at least 15.0 cm for all frequencies.
3. 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.
4. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D04v01.
5. Per FCC KDB 865664 D01v01r04, variability SAR tests were performed when the measured SAR results for a frequency band were greater than or equal to 0.8 W/kg for 1g or 2.0 W/kg for 10g. Repeated SAR measurements are highlighted in the tables above for clarity. Please see Section 11 for variability analysis.
6. The orange highlights throughout the report represents the highest scaled SAR per Equipment Class.
7. The phantom is filled with head tissue-equivalent medium.
8. For Head SAR evaluation, SAR testing was performed in a face-down phantom to evaluate all head use case conditions. SAR was evaluated with a separation distance of 0 mm between the device and the eye region of the facedown phantom to mimic expected use conditions.
9. For Extremity SAR evaluation, SAR testing was performed with a separation distance of 0 mm between the device and the flat phantom in several identified locations in the device for each antenna corresponding to the maximum averaged E-field spots based on simulation data.
10. The worst-case SAR configuration per band (e.g. 6108-6420 MHz etc.) was spot checked with the light seal which is a foam gasket covered in fabric connected to the head mounted device to ensure a good fit and seal out the ambient light. The smallest ("mini") and largest ("main") light seal available were used for the spot-check.
11. See the original filing for all other operations that were not evaluated in this report.

9.4 Power Density Data

MEASUREMENT RESULTS																							
FREQUENCY		Mode	Service	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Antenna Config.	Variant	DUT Serial Number	Data Rate (Mbps)	Duty Cycle (%)	Grid Step (λ)	iPD (W/m²)	Scaling Factor for Measurement Uncertainty per IEC 62479	Scaling Factor (Power)	Scaling Factor (Duty Cycle)	Normal psPD (W/m²)	Scaled Normal psPD (W/m²)	Total psPD (W/m²)	Scaled Total psPD (W/m²)	Plot #
MHz	Ch.																					
6108	Low	NB UNII 5	FHSS	-4.00	-4.51	0.05	2 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	100	0.125	-	1.554	1.125	1.000	0.049	0.086	0.061	0.107	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.43	0.05	2 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	100	0.125	-	1.554	1.104	1.000	0.055	0.094	0.058	0.100	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.59	-0.05	2 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	100	0.125	-	1.554	1.146	1.000	0.112	0.199	0.115	0.205	
6342	Mid-High	NB UNII 5	FHSS	-4.00	-4.45	-0.02	2 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	100	0.125	0.185	1.554	1.109	1.000	0.178	0.307	0.190	0.327	A3
6342	Mid-High	NB UNII 5	FHSS	-4.00	-4.45	-0.02	9.45 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	100	0.125	0.015	1.554	1.109	1.000	0.016	0.028	0.018	0.031	
6420	High	NB UNII 5	FHSS	-4.00	-4.54	-0.05	2 mm	Ant NB UNII_R (6 GHz)	V1	M99429MXDC	8	100	0.125	-	1.554	1.132	1.000	0.063	0.111	0.065	0.114	
6108	Low	NB UNII 5	FHSS	-4.00	-4.32	0.00	2 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	100	0.125	-	1.554	1.076	1.000	0.037	0.062	0.054	0.090	
6186	Low-Mid	NB UNII 5	FHSS	-4.00	-4.28	0.21	2 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	100	0.125	-	1.554	1.067	1.000	0.050	0.083	0.053	0.088	
6264	Mid	NB UNII 5	FHSS	-4.00	-4.55	0.00	2 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	100	0.125	-	1.554	1.135	1.000	0.067	0.118	0.090	0.159	
6342	Mid-High	NB UNII 5	FHSS	-4.00	-4.46	0.03	2 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	100	0.125	-	1.554	1.112	1.000	0.057	0.098	0.064	0.111	
6420	High	NB UNII 5	FHSS	-4.00	-4.64	0.00	2 mm	Ant NB UNII_L (6 GHz)	V1	M99429MXDC	8	100	0.125	-	1.554	1.159	1.000	0.026	0.047	0.046	0.083	
47 CFR §1.1310 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Power Density 10 W/m² averaged over 4 cm²												

9.5 Power Density Notes

1. The manufacturer has confirmed that the devices tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
2. Batteries are fully charged at the beginning of the measurements. The DUT was connected to a portable charger for all measurements as required for operation. The DUT and portable charger were not connected to a wall charger to mimic consumer usage.
3. Power density was calculated by repeated E-field measurements on two measurement planes separated by λ/4.
4. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools.
5. Per FCC guidance and equipment manufacturer guidance, power density results were scaled according to IEC 62479:2010 for the portion of the measurement uncertainty > 30%. Total expanded uncertainty of 2.68 dB (85.4%) was used to determine the psPD measurement scaling factor.
6. Per equipment manufacturer guidance, power density was measured at d=2mm and d=λ/5mm using the same grid size and grid step size for some frequencies and surfaces. The integrated Power Density (iPD) was calculated based on these measurements. Since iPD ratio between the two distances is ≥ -1dB, the grid step was sufficient for determining compliance at d=2mm.
7. PD results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D04v01.
8. PTP-PR algorithm was used during psPD measurement and calculations.

10 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

10.1 Introduction

The following procedures adopted from FCC KDB Publication 447498 D04v01 are applicable to devices with built-in unlicensed transmitters such as 802.11 and Bluetooth devices which may simultaneously transmit together.

10.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore, simultaneous transmission analysis is required. Per FCC KDB Publication 447498 D04v01 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 1g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤1.6 W/kg. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1g or 10g SAR.

Note:
SAR Summations for some scenarios when the output power levels are reduced, SAR values at the maximum output power level were used as the most conservative evaluation for simultaneous transmission analysis.

Please see the original compliance evaluation in RF Exposure Technical Report S/N 1C2302130007-12.BCG (Rev 1) for the standalone reported SAR for modes and bands that were not evaluated for this report.

*Per FCC approved test plan when two antennas operate in simultaneous mode, simultaneous transmission were treated independently for this configuration since their SAR peaks do not occur on the same plane and only one side of the device will become the main contributor to the overall SAR. See section 10.3 and 10.4 for more information about the Simultaneous Transmission Analysis.

10.3 Head SAR Simultaneous Transmission Analysis

Table 10-1
NB UNII Simultaneous Transmission Scenario with 2.4 GHz Bluetooth

Simult Tx	Configuration	NB UNII Ant NB UNII_R (5GHz) SAR (W/kg)	NB UNII Ant NB UNII_L (5GHz) SAR (W/kg)	Bluetooth Ant 1 SAR (W/kg)	Bluetooth Ant NB UNII_L (2.4GHz) SAR (W/kg)	Σ SAR (W/kg)	
		1	2	3	4	1+2+3	1+2+4
Head SAR	Head	0.033	0.036	0.047	0.005	0.047*	0.041*

Table 10-2
NB UNII Simultaneous Transmission Scenario with 2.4 GHz WLAN

Simult Tx	Configuration	NB UNII Ant NB UNII_R (5GHz) SAR (W/kg)	NB UNII Ant NB UNII_L (5GHz) SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	
		1	2	3	4	1+2+3	1+2+4
Head SAR	Head	0.033	0.036	0.053	0.089	0.053*	0.089*

Table 10-3
NB UNII Simultaneous Transmission Scenario with 5 GHz WLAN

Simult Tx	Configuration	NB UNII Ant NB UNII_R (5GHz) SAR (W/kg)	NB UNII Ant NB UNII_L (5GHz) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	
		1	2	3	4	1+2+3	1+2+4
Head SAR	Head	0.033	0.036	0.099	0.059	0.099*	0.059*

Table 10-4
NB UNII Simultaneous Transmission Scenario with 2.4 GHz Bluetooth and 5 GHz WLAN

Simult Tx	Configuration	NB UNII Ant NB UNII_R (5GHz) SAR (W/kg)	NB UNII Ant NB UNII_L (5GHz) SAR (W/kg)	Bluetooth Ant 1 SAR (W/kg)	Bluetooth Ant NB UNII_L (2.4GHz) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)			
		1	2	3	4	5	6	1+2+3+5	1+2+3+6	1+2+4+5	1+2+4+6
Head SAR	Head	0.033	0.036	0.047	0.005	0.099	0.059	0.146*	0.059*	0.099*	0.059*

Table 10-5
NB UNII Simultaneous Transmission Scenario with 2.4 GHz WLAN and 2.4 GHz Bluetooth

Simult Tx	Configuration	NB UNII Ant NB UNII_R (5GHz) SAR (W/kg)	NB UNII Ant NB UNII_L (5GHz) SAR (W/kg)	Bluetooth Ant NB UNII_L (2.4GHz) SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Head SAR	Head	0.033	0.036	0.005	0.053	0.053*

10.4 Extremity SAR Simultaneous Transmission Analysis

Table 10-6
NB UNII Simultaneous Transmission Scenario with 2.4 GHz Bluetooth

Simult Tx	Configuration	NB UNII Ant NB UNII_R (5GHz) SAR (W/kg)	NB UNII Ant NB UNII_L (5GHz) SAR (W/kg)	Bluetooth Ant 1 SAR (W/kg)	Bluetooth Ant NB UNII_L (2.4GHz) SAR (W/kg)	Σ SAR (W/kg)	
		1	2	3	4	1+2+3	1+2+4
Extremity SAR	Extremity	0.083	0.062	2.181	0.124	2.181*	0.186*

Table 10-7
NB UNII Simultaneous Transmission Scenario with 2.4 GHz WLAN

Simult Tx	Configuration	NB UNII Ant NB UNII_R (5GHz) SAR (W/kg)	NB UNII Ant NB UNII_L (5GHz) SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	2.4 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	
		1	2	3	4	1+2+3	1+2+4
Extremity SAR	Extremity	0.083	0.062	2.855	2.658	2.855*	2.658*

Table 10-8
NB UNII TxBF Simultaneous Transmission Scenario with 5 GHz WLAN

Simult Tx	Configuration	NB UNII Ant NB UNII_R (5GHz) SAR (W/kg)	NB UNII Ant NB UNII_L (5GHz) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)	
		1	2	3	4	1+2+3	1+2+4
Extremity SAR	Extremity	0.083	0.062	2.935	2.964	2.935*	2.964*

Table 10-9
NB UNII Simultaneous Transmission Scenario with 2.4 GHz Bluetooth, and 5 GHz WLAN

Simult Tx	Configuration	NB UNII Ant NB UNII_R (5GHz) SAR (W/kg)	NB UNII Ant NB UNII_L (5GHz) SAR (W/kg)	Bluetooth Ant 1 at 18 dBm SAR (W/kg)	Bluetooth Ant NB UNII_L (2.4GHz) SAR (W/kg)	5 GHz WLAN Ant 1 SAR (W/kg)	5 GHz WLAN Ant 2 SAR (W/kg)	Σ SAR (W/kg)			
		1	2	3	4	5	6	1+2+3+5	1+2+3+6	1+2+4+5	1+2+4+6
Extremity SAR	Extremity	0.083	0.062	0.911	0.124	2.935	2.964	3.846*	2.964*	2.935*	2.964*

Table 10-10
NB UNII Simultaneous Transmission Scenario with 2.4 GHz WLAN and 2.4 GHz Bluetooth

Simult Tx	Configuration	NB UNII Ant NB UNII_R (5GHz) SAR (W/kg)	NB UNII Ant NB UNII_L (5GHz) SAR (W/kg)	Bluetooth Ant NB UNII_L (2.4GHz) SAR (W/kg)	2.4 GHz WLAN Ant 1 SAR (W/kg)	Σ SAR (W/kg)
		1	2	3	4	1+2+3+4
Extremity SAR	Extremity	0.083	0.062	0.124	2.855	2.855*

11 SAR MEASUREMENT VARIABILITY

11.1 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 1g 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. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

Note:
Please see the original filing for frequencies that were not evaluated for this report.

11.2 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.

12 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E4404B	Spectrum Analyzer	N/A	N/A	N/A	MY45113242
Agilent	E4438C	ESG Vector Signal Generator	11/15/2023	Annual	11/15/2024	MY45092078
Agilent	N5182A	MXG Vector Signal Generator	11/14/2023	Annual	11/14/2024	US46240505
Agilent	8753ES	S-Parameter Vector Network Analyzer	1/10/2024	Annual	1/10/2025	MY40001472
Agilent	E5515C	Wireless Communications Test Set	1/10/2024	Annual	1/10/2025	MY50262130
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB46170464
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343972
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	343971
Anritsu	MN8110B	I/O Adaptor	CBT	N/A	CBT	6261747881
Anritsu	ML2496A	Power Meter	9/1/2023	Annual	9/1/2024	105096
Anritsu	MA2411B	Pulse Power Sensor	11/8/2023	Annual	11/8/2024	1027293
Anritsu	MA24106A	USB Power Sensor	3/14/2024	Annual	3/14/2025	1344555
Control Company	4353	Long Stem Thermometer	10/24/2023	Annual	10/24/2024	200645916
Control Company	4040	Therm./ Clock/ Humidity Monitor	1/15/2024	Annual	1/15/2025	160574418
Mitutoyo	500-196-30	CD-6"ASX 6Inch Digital Caliper	2/16/2022	Triennial	2/16/2025	A20238413
Keysight Technologies	N9020A	MXA Signal Analyzer	10/17/2023	Annual	10/17/2024	MY51240479
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Mini-Circuits	ZUDC10-83-S+	Directional Coupler	CBT	N/A	CBT	2050
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Seekonk	TSF-100	Torque Wrench	10/17/2023	Biannual	10/17/2025	22847
SPEAG	DAK-3.5	Dielectric Assessment Kit	5/14/2024	Annual	5/14/2025	1070
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1237
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1585
SPEAG	D5GHzV2	6.5 GHz SAR Dipole	10/11/2023	Annual	10/11/2024	1019
SPEAG	5G Verificaiton Source 10GHz	10GHz System Verification Antenna	10/13/2023	Annual	10/13/2024	1006
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/9/2024	Annual	4/9/2025	501
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/17/2024	Annual	4/17/2025	793
SPEAG	EUmmWV4	SAR Probe	4/16/2024	Annual	4/16/2025	7532
SPEAG	EX3DV4	SAR Probe	4/8/2024	Annual	4/8/2025	9487

Note: 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., a 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.

13 MEASUREMENT UNCERTAINTIES

Table 13-1
Face Down Phantom Uncertainty Table

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component (Specific Phantom)	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c_i 1gm	c_i 10 gms	1gm u_i (± %)	10gms u_i (± %)	v_i
Measurement System									
Probe Calibration	E.2.1	7	N	1	1	1	7.0	7.0	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	0.7	0.7	0.9	0.9	∞
Boundary Effect	E.2.3	2	R	1.73	1	1	1.2	1.2	∞
Linearity	E.2.4	0.3	N	1	1	1	0.3	0.3	∞
System Detection Limits	E.2.4	0.25	R	1.73	1	1	0.1	0.1	∞
Modulation Response	E.2.5	4.8	R	1.73	1	1	2.8	2.8	∞
Readout Electronics	E.2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1	1	1.5	1.5	∞
RF Ambient Conditions - Noise	E.6.1	3	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	3	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.8	R	1.73	1	1	0.5	0.5	∞
Probe Positioning w/ respect to Phantom	E.6.3	6.7	R	1.73	1	1	3.9	3.9	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	4	R	1.73	1	1	2.3	2.3	∞
Test Sample Related									
Test Sample Positioning	E.4.2	3.12	N	1	1	1	3.1	3.1	35
Device Holder Uncertainty	E.4.1	1.67	N	1	1	1	1.7	1.7	5
Output Power Variation - SAR drift measurement	E.2.9	5	R	1.73	1	1	2.9	2.9	∞
SAR Scaling	E.6.5	0	R	1.73	1	1	0.0	0.0	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	14.0	R	1.73	1.0	1.0	8.1	8.1	∞
Liquid Conductivity - measurement uncertainty	E.3.3	4.3	N	1	0.78	0.71	3.3	3.0	76
Liquid Permittivity - measurement uncertainty	E.3.3	4.2	N	1	0.23	0.26	1.0	1.1	75
Liquid Conductivity - Temperature Uncertainty	E.3.4	3.4	R	1.73	0.78	0.71	1.5	1.4	∞
Liquid Permittivity - Temperature Unceritainty	E.3.4	0.6	R	1.73	0.23	0.26	0.1	0.1	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Combined Standard Uncertainty (k=1)			RSS				14.0	13.8	191
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				27.9	27.6	

The above measurement uncertainties are according to IEEE Std. 1528-2013

Applicable for SAR measurements > 6 GHz

Table 13-2
Twin Sam Phantom Uncertainty Table

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c_i 1gm	c_i 10 gms	1gm u_i (± %)	10gms u_i (± %)	v_i
Measurement System									
Probe Calibration	E.2.1	9.3	N	1	1	1	9.3	9.3	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	0.7	0.7	0.9	0.9	∞
Boundary Effect	E.2.3	2	R	1.732	1	1	1.2	1.2	∞
Linearity	E.2.4	0.3	N	1	1	1	0.3	0.3	∞
System Detection Limits	E.2.4	0.25	R	1.732	1	1	0.1	0.1	∞
Modulation Response	E.2.5	4.8	R	1.732	1	1	2.8	2.8	∞
Readout Electronics	E.2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	R	1.732	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.732	1	1	1.5	1.5	∞
RF Ambient Conditions - Noise	E.6.1	3	R	1.732	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	3	R	1.732	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.8	R	1.732	1	1	0.5	0.5	∞
Probe Positioning w/ respect to Phantom	E.6.3	6.7	R	1.732	1	1	3.9	3.9	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	4	R	1.732	1	1	2.3	2.3	∞
Test Sample Related									
Test Sample Positioning	E.4.2	3.12	N	1	1	1	3.1	3.1	35
Device Holder Uncertainty	E.4.1	1.67	N	1	1	1	1.7	1.7	5
Output Power Variation - SAR drift measurement	E.2.9	5	R	1.732	1	1	2.9	2.9	∞
SAR Scaling	E.6.5	0	R	1.732	1	1	0.0	0.0	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	7.6	R	1.73	1.0	1.0	4.4	4.4	∞
Liquid Conductivity - measurement uncertainty	E.3.3	4.3	N	1	0.78	0.71	3.3	3.0	76
Liquid Permittivity - measurement uncertainty	E.3.3	4.2	N	1	0.23	0.26	1.0	1.1	75
Liquid Conductivity - Temperature Uncertainty	E.3.4	3.4	R	1.732	0.78	0.71	1.5	1.4	∞
Liquid Permittivity - Temperature Unceritainty	E.3.4	0.6	R	1.732	0.23	0.26	0.1	0.1	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Combined Standard Uncertainty (k=1)			RSS				13.8	13.6	191
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				27.6	27.1	

The above measurement uncertainties are according to IEEE Std. 1528-2013

Applicable for Power Density measurements

Table 13-3
Twin Sam Phantom Uncertainty Table

a	b	c	d	e	f = c x f/e	g
Uncertainty Component	Unc. (± dB)	Prob. Dist.	Div.	c_i	u_i (± dB)	v_i
Measurement System						
Calibration	0.49	N	1	1	0.49	∞
Probe Correction	0.00	R	1.73	1	0.00	∞
Frequency Response	0.20	R	1.73	1	0.12	∞
Sensor Cross Coupling	0.00	R	1.73	1	0.00	∞
Isotropy	0.50	R	1.73	1	0.29	∞
Linearity	0.20	R	1.73	1	0.12	∞
Probe Scattering	0.00	R	1.73	1	0.00	∞
Probe Positioning offset	0.30	R	1.73	1	0.17	∞
Probe Positioning Repeatability	0.04	R	1.73	1	0.02	∞
Sensor MechanicalOffset	0.00	R	1.73	1	0.00	∞
Probe Spatial Resolution	0.00	R	1.73	1	0.00	∞
Field Impedence Dependance	0.00	R	1.73	1	0.00	∞
Amplitude and Phase Drift	0.00	R	1.73	1	0.00	∞
Amplitude and Phase Noise	0.04	R	1.73	1	0.02	∞
Measurement Area Truncation	0.00	R	1.73	1	0.00	∞
Data Acquisition	0.03	N	1	1	0.03	∞
Sampling	0.00	R	1.73	1	0.00	∞
Field Reconstruction	2.00	R	1.73	1	1.15	∞
Forward Transformation	0.00	R	1.73	1	0.00	∞
Power Density Scaling	0.00	R	1.73	1	0.00	∞
Spatial Averaging	0.10	R	1.73	1	0.06	∞
System Detection Limit	0.04	R	1.73	1	0.02	∞
Test Sample Related						
Probe Coupling with DUT	0.00	R	1.73	1	0.00	∞
Modulation Response	0.40	R	1.73	1	0.23	∞
Integration Time	0.00	R	1.73	1	0.00	∞
Response Time	0.00	R	1.73	1	0.00	∞
Device Holder Influence	0.10	R	1.73	1	0.06	∞
DUT alignment	0.00	R	1.73	1	0.00	∞
RF Ambient Conditions	0.04	R	1.73	1	0.02	∞
Ambient Reflections	0.04	R	1.73	1	0.02	∞
Immunity/Secondary Reception	0.00	R	1.73	1	0.00	∞
Drift of DUT	0.21	R	1.73	1	0.12	∞
Combined Standard Uncertainty (k=1)		RSS			1.34	∞
Expanded Uncertainty (95% CONFIDENCE LEVEL)		k=2			2.68	

14 CONCLUSION

14.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Innovation, Science, and Economic Development Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very 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 in possible biological effects 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 various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

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