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SAR EVALUATION REPORT

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

Date of Testing:
07/29/2024 – 08/17/2024
Test Report Issue Date:
08/21/2024
Test Site/Location:
Element, Morgan Hill, CA, USA
Document Serial No.:
1C2405230023-01.BCG-R1

FCC ID: **BCG-A3050**

APPLICANT: **APPLE, INC.**

DUT Type:	Wireless Earbud
Application Type:	Certification
FCC Rule Part(s):	CFR §2.1093
Model:	A3050

Equipment Class	Band & Mode	Tx Frequency	SAR	
			1g Head (W/kg)	1g Body-Worn (W/kg)
DSS/DTS	2.4 GHz Bluetooth	2402 - 2480 MHz	0.11	0.56
NII	NB U-NII 1	5157 - 5245 MHz	<0.1	0.84
NII	NB U-NII 3	5731 - 5844 MHz	<0.1	1.17
6VL	NB U-NII 5	6108 - 6420 MHz	<0.1	0.33
Equipment Class	Band & Mode	Tx Frequency	APD (W/m²)	APD (W/m²)
6VL	NB U-NII 5	6108 - 6420 MHz	0.13	1.02
Equipment Class	Band & Mode	Tx Frequency	Reported PD (W/m²)	Reported PD (W/m²)
6VL	NB U-NII 5	6108 - 6420 MHz	0.39	1.29

Note: This revised Test Report supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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 1.6 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 Bluetooth	Data	2402 - 2480 MHz
NB U-NII 1	Data	5157 - 5245 MHz
NB U-NII 3	Data	5731 - 5844 MHz
NB U-NII 5	Data	6108 - 6420 MHz

1.2 Power Reduction for SAR

There is no power reduction used for any band/mode implemented in this device for SAR purposes.

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.

1.3.1 Maximum Output Power

Mode / Band	Duty Cycle	Modulated Average (dBm)	
2.4 GHz Bluetooth BDR	34%	Maximum	**12.50**
		Nominal	**11.50**
2.4 GHz Bluetooth EDR	77%	Maximum	**9.50**
		Nominal	**8.50**
2.4 GHz Bluetooth HDR4/8	77%	Maximum	**9.50**
		Nominal	**8.50**
2.4 GHz Bluetooth HDRp4/8	100%	Maximum	**9.50**
		Nominal	**8.50**
2.4 Bluetooth LE1M	100%	Maximum	**10.50**
		Nominal	**9.50**
2.4 Bluetooth LE2M	15%	Maximum	**10.50**
		Nominal	**9.50**

Mode / Band	Duty Cycle	Modulated Average (dBm)	
NB UNII-1 BDR	34%	Maximum	**9.00**
		Nominal	**8.00**
NB UNII-1 HDR4/8 1-Slot	34%	Maximum	**9.00**
		Nominal	**8.00**
NB UNII-1 HDR4/8 3/5-Slot	77%	Maximum	**6.00**
		Nominal	**5.00**
NB UNII-1 HDRp4/8	100%	Maximum	**6.00**
		Nominal	**5.00**
NB UNII-1 LE2M	15%	Maximum	**10.00**
		Nominal	**9.00**

Mode / Band	Duty Cycle	Modulated Average (dBm)	
NB UNII-3 BDR	34%	Maximum	**10.00**
		Nominal	**9.00**
NB UNII-3 HDR4/8 1-Slot	34%	Maximum	**9.50**
		Nominal	**8.50**
NB UNII-3 HDR4/8 3/5-Slot	77%	Maximum	**6.50**
		Nominal	**5.50**
NB UNII-3 HDRp4/8	100%	Maximum	**6.50**
		Nominal	**5.50**
NB UNII-3 LE2M	15%	Maximum	**11.00**
		Nominal	**10.00**

Mode / Band	Duty Cycle	Modulated Average (dBm)	
NB UNII-5 BDR	34%	Maximum	**-3.00**
		Nominal	**-4.00**
NB UNII-5 HDR4 1-Slot	34%	Maximum	**-0.50**
		Nominal	**-1.50**
NB UNII-5 HDR8 1-Slot	34%	Maximum	**2.00**
		Nominal	**1.00**
NB UNII-5 HDR4 3/5-Slot	77%	Maximum	**-0.50**
		Nominal	**-1.50**
NB UNII-5 HDR8 3/5-Slot	77%	Maximum	**2.00**
		Nominal	**1.00**
NB UNII-5 HDRp4	100%	Maximum	**-0.50**
		Nominal	**-1.50**
NB UNII-5 HDRp8	100%	Maximum	**2.00**
		Nominal	**1.00**
NB UNII-5 LE2M	15%	Maximum	**-3.00**
		Nominal	**-4.00**

1.4 DUT Antenna Locations

Based on the expected use conditions, Head SAR was evaluated. Per manufacturer request, Body-Worn SAR was evaluated as an additional conservative SAR test condition. The antenna is located inside BCG-A3050 – which is a wireless Bluetooth earbud for the Right ear. A diagram showing the location of the device antenna can be found in the DUT Antenna Diagram & SAR Test Setup Photographs Appendix. More information about the configurations evaluated for SAR can be found in Section 4.2 and Section 4.3.

1.5 Simultaneous Transmission Capabilities

This Device does not support any Simultaneous transmission Scenarios.

1.6 Guidance Applied

- FCC KDB Publication 447498 D04v01 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)

1.7 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.

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:

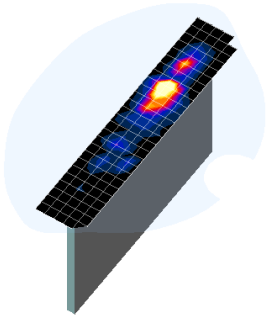


Figure 3-1
Sample SAR Area Scan

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 3-3-1) 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 3-3-1) 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 3-3-1. 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 3-3-1
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*Δz_{zoom}(n-1)	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≤ 4	≤ 1.5*Δz_{zoom}(n-1)	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≤ 3	≤ 1.5*Δz_{zoom}(n-1)	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≤ 2.5	≤ 1.5*Δz_{zoom}(n-1)	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≤ 2	≤ 1.5*Δz_{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

This device is a wireless Bluetooth earbud for the right ear which is designed to be used in the ear canal. The antenna is located inside the earbud. SAR was evaluated with a separation distance of 0 mm between the earbud (the ear tip facing the phantom) and the flat phantom. The phantom is filled with head tissue equivalent medium.

4.3 Body-Worn Exposure Conditions

Per manufacturer request, Body-Worn SAR was evaluated as an additional conservative SAR test condition for the left earbud. The DUT was evaluated with a separation distance of 0 mm between the back side of the earbud and the flat phantom. The button side and antenna touching were additionally evaluated. 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.

5.3 RF Exposure Limits for Frequencies Below 6 GHz

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.

5.4 RF Exposure Limits for Frequencies Above 6 GHz

Per §1.1310 (d)(3), the MPE limits are applied for frequencies above 6 GHz. Power Density is expressed in units of W/m^2 or mW/cm^2.

Peak Spatially Averaged Power Density was evaluated over a circular area of 4 cm^2 per interim FCC Guidance for near-field power density evaluations per October 2018 TCB Workshop notes.

Table 6-2
Human Exposure Limits Specified in FCC 47 CFR §1.1310

Human Exposure to Radiofrequency (RF) Radiation Limits		
Frequency Range [MHz]	**Power Density** [mW/cm^2]	**Average Time** [Minutes]
(A) Limits For Occupational / Controlled Environments		
1,500 – 100,000	5.0	6
(B) Limits For General Population / Uncontrolled Environments		
1,500 – 100,000	1.0	30

Note: 1.0 mW/cm^2 is 10 W/m^2

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.

7 RF CONDUCTED POWERS

7.1 Bluetooth/NB UNII Conducted Powers

Table 7-1
Bluetooth Average RF Power

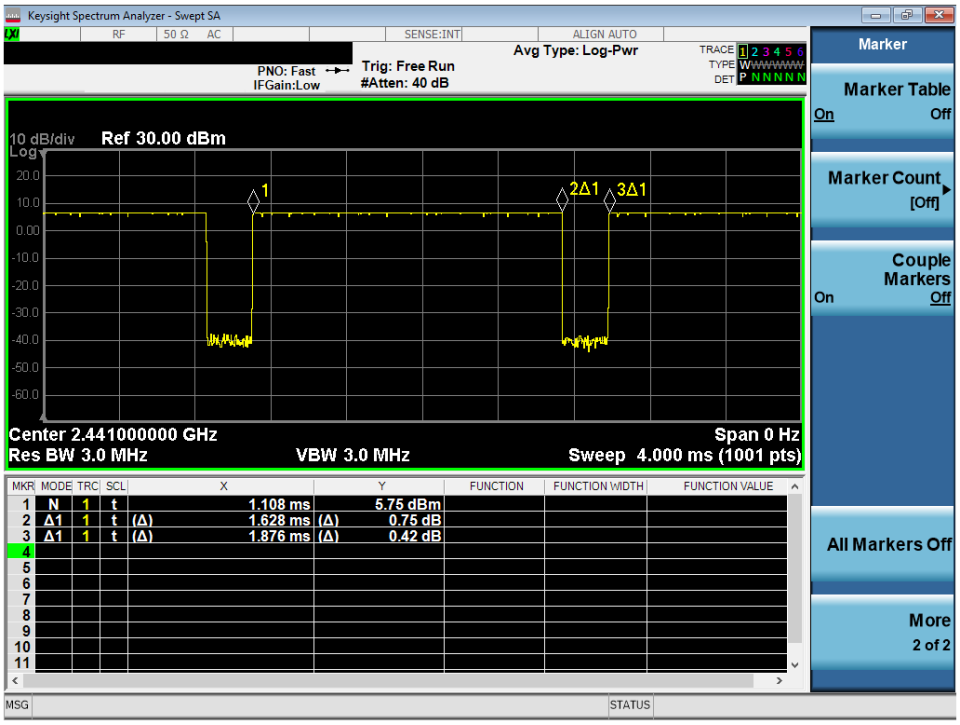
Frequency [MHz]	Modulation	Data Rate [Mbps]	Channel No.	Avg Conducted Power	
				[dBm]	[mW]
2402	LE1M	1.0	0	10.04	10.093
2441	LE1M	1.0	39	9.91	9.795
2480	LE1M	1.0	78	9.98	9.954

Table 7-2
NB UNII Average RF Power

Type	Band	Frequency	Channel	Average
HDRp4	U-NII 1	5157	Low	5.52
		5201	Mid	5.57
		5245	High	5.25
HDRp4	U-NII 3	5731	Low	4.84
		5788	Mid	4.78
		5844	High	4.93
HDRp8	U-NII 5	6108	Low	1.5
		6186	Low-Mid	1.79
		6264	Mid	1.93
		6342	Mid-High	1.82
		6420	High	1.85

7.2 Bluetooth/NB UNII Duty Cycle Plots

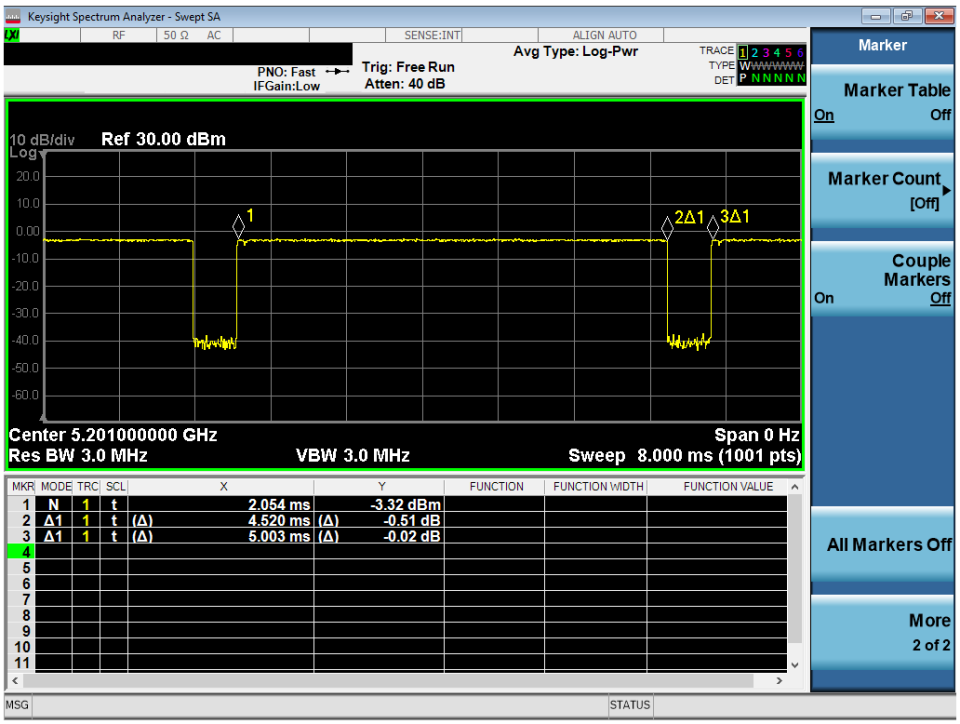
Figure 7-1
2.4 GHz Bluetooth Transmission Plot



Equation 7-1
2.4 GHz Bluetooth Duty Cycle Calculation

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{1.628\ ms}{1.876\ ms} * 100\% = 86.78\%$$

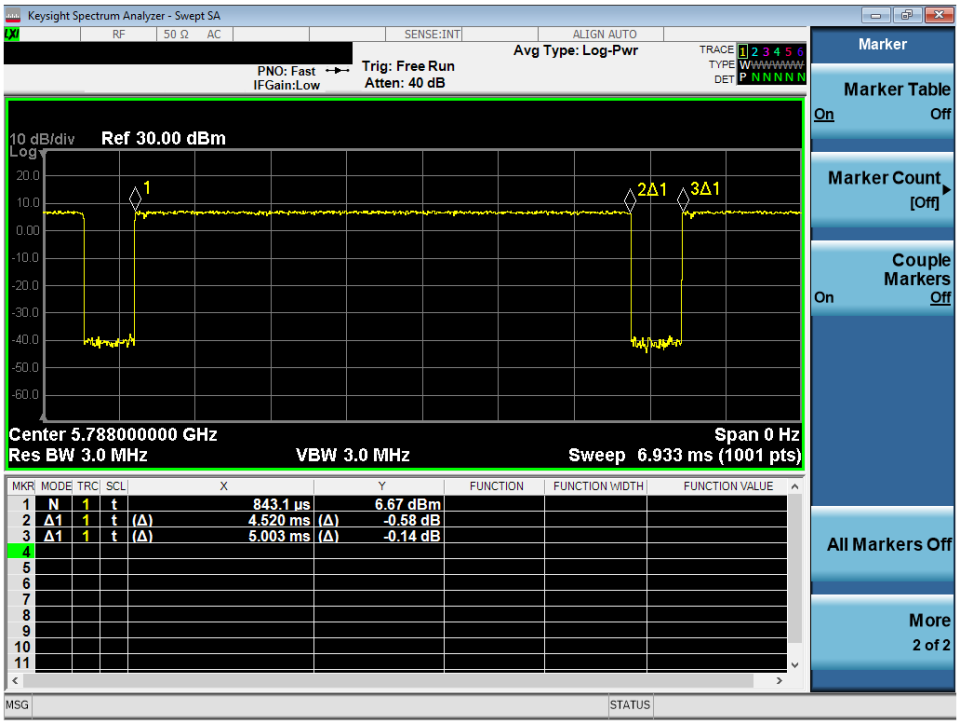
Figure 7-2
NB UNII-1 Transmission Plot



Equation 7-2
NB UNII-1 Duty Cycle Calculation

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{4.520\ ms}{5.003\ ms} * 100\% = 90.35\%$$

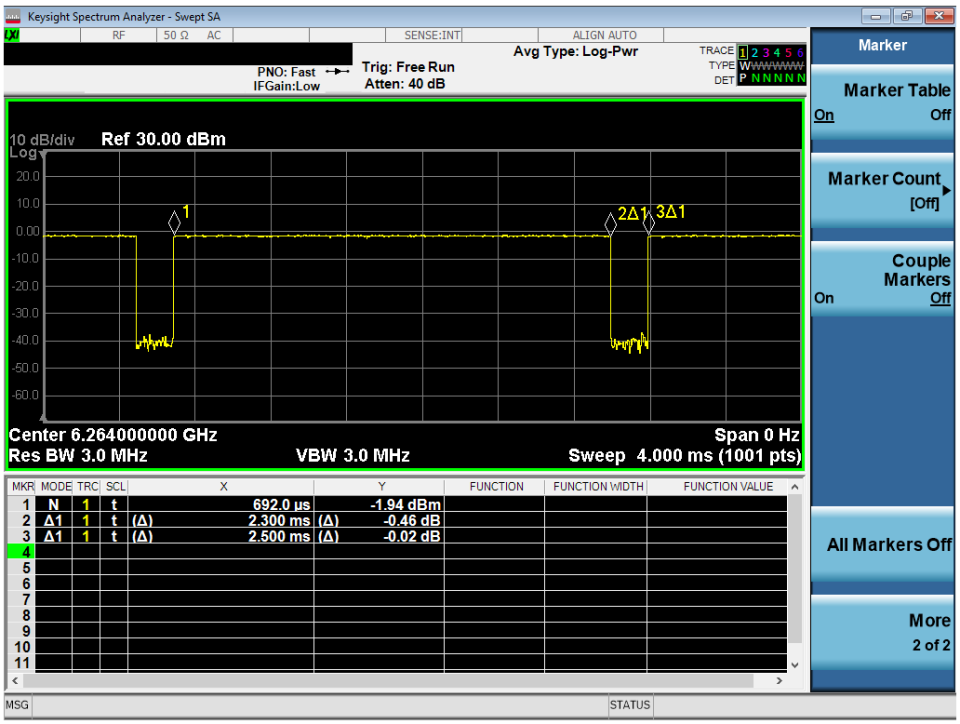
Figure 7-3
NB UNII-3 Transmission Plot



Equation 7-3
NB UNII-3 Duty Cycle Calculation

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{4.520\ ms}{5.003\ ms} * 100\% = 90.35\%$$

Figure 7-4
NB UNII-5 Transmission Plot



Equation 7-4
NB UNII-5 Duty Cycle Calculation

$$Duty\ Cycle = \frac{Pulse\ Width}{Period} * 100\% = \frac{2.300\ ms}{2.500\ ms} * 100\% = 92.00\%$$

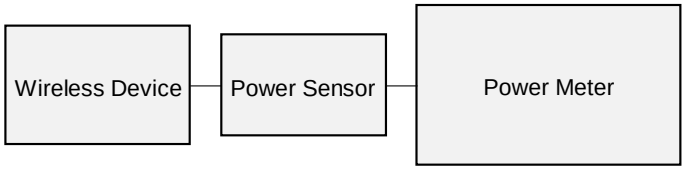


Figure 7-5
Power Measurement Setup

8 SYSTEM VERIFICATION

8.1 Tissue Verification

Table 8-1
Measured Head Tissue Properties

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
08/13/2024	2450 Head	23.5	2300	1.665	39.132	1.670	39.500	-0.31%	-0.93%
			2310	1.676	39.095	1.679	39.480	-0.20%	-0.97%
			2320	1.687	39.055	1.687	39.460	0.01%	-1.03%
			2400	1.779	38.759	1.756	39.289	1.28%	-1.35%
			2450	1.837	38.558	1.800	39.200	2.03%	-1.64%
			2480	1.871	38.447	1.833	39.162	2.07%	-1.83%
			2500	1.893	38.372	1.855	39.136	2.04%	-1.95%
			2510	1.905	38.332	1.866	39.123	2.09%	-2.02%
			2535	1.933	38.221	1.893	39.092	2.13%	-2.23%
			2550	1.952	38.153	1.909	39.073	2.24%	-2.35%
			2560	1.963	38.114	1.920	39.060	2.26%	-2.42%
			2600	2.008	37.963	1.964	39.009	2.25%	-2.68%
			2650	2.069	37.746	2.018	38.945	2.51%	-3.08%
			2680	2.104	37.619	2.051	38.907	2.60%	-3.31%
			2700	2.125	37.533	2.073	38.882	2.52%	-3.47%
08/15/2024	2450 Head	23.7	2300	1.653	38.617	1.670	39.500	-1.02%	-2.24%
			2310	1.663	38.575	1.679	39.480	-0.93%	-2.29%
			2320	1.673	38.531	1.687	39.460	-0.81%	-2.35%
			2400	1.763	38.216	1.756	39.289	0.42%	-2.73%
			2450	1.817	38.012	1.800	39.200	0.94%	-3.03%
			2480	1.852	37.897	1.833	39.162	1.04%	-3.23%
			2500	1.873	37.823	1.855	39.136	0.95%	-3.36%
			2510	1.882	37.785	1.866	39.123	0.87%	-3.42%
			2535	1.909	37.676	1.893	39.092	0.86%	-3.62%
			2550	1.928	37.609	1.909	39.073	1.01%	-3.75%
			2560	1.941	37.569	1.920	39.060	1.10%	-3.82%
			2600	1.984	37.425	1.964	39.009	1.00%	-4.06%
			2650	2.042	37.214	2.018	38.945	1.19%	-4.44%
			2680	2.077	37.103	2.051	38.907	1.25%	-4.64%
			2700	2.096	37.033	2.073	38.882	1.12%	-4.76%
07/29/2024	5200-5800 Head	20.2	5150	4.419	36.684	4.604	36.043	-4.02%	1.78%
			5160	4.432	36.659	4.614	36.031	-3.95%	1.74%
			5170	4.443	36.643	4.624	36.020	-3.92%	1.73%
			5180	4.452	36.620	4.635	36.009	-3.95%	1.70%
			5190	4.464	36.607	4.645	35.998	-3.90%	1.69%
			5200	4.480	36.605	4.655	35.986	-3.76%	1.72%
			5210	4.491	36.601	4.666	35.975	-3.75%	1.74%
			5220	4.494	36.579	4.676	35.963	-3.89%	1.71%
			5240	4.506	36.540	4.696	35.940	-4.05%	1.67%
			5250	4.520	36.528	4.706	35.929	-3.95%	1.67%
			5260	4.533	36.514	4.717	35.917	-3.90%	1.66%
			5270	4.546	36.491	4.727	35.906	-3.83%	1.63%
			5280	4.559	36.479	4.737	35.894	-3.76%	1.63%
			5290	4.568	36.474	4.748	35.883	-3.79%	1.65%
			5300	4.571	36.467	4.758	35.871	-3.93%	1.66%
			5310	4.578	36.450	4.768	35.860	-3.98%	1.65%
			5320	4.587	36.422	4.778	35.849	-4.00%	1.60%
			5500	4.781	36.166	4.963	35.643	-3.67%	1.47%
			5510	4.791	36.148	4.973	35.632	-3.66%	1.45%
			5520	4.801	36.126	4.983	35.620	-3.65%	1.42%
			5530	4.813	36.110	4.994	35.609	-3.62%	1.41%
			5540	4.828	36.097	5.004	35.597	-3.52%	1.40%
			5550	4.842	36.088	5.014	35.586	-3.43%	1.41%
			5560	4.852	36.084	5.024	35.574	-3.42%	1.43%
			5580	4.877	36.065	5.045	35.551	-3.33%	1.45%
			5600	4.896	36.038	5.065	35.529	-3.34%	1.43%
			5610	4.907	36.004	5.076	35.518	-3.33%	1.37%
			5620	4.919	35.977	5.086	35.506	-3.28%	1.33%
			5640	4.939	35.970	5.106	35.483	-3.27%	1.37%
			5660	4.968	35.956	5.127	35.460	-3.10%	1.40%
			5670	4.984	35.940	5.137	35.449	-2.98%	1.39%
			5680	4.993	35.914	5.147	35.437	-2.99%	1.35%
			5690	4.996	35.893	5.158	35.426	-3.14%	1.32%
			5700	5.004	35.861	5.168	35.414	-3.17%	1.26%
			5710	5.014	35.838	5.178	35.403	-3.17%	1.23%
			5720	5.027	35.827	5.188	35.391	-3.10%	1.23%
			5745	5.057	35.825	5.214	35.363	-3.01%	1.31%
			5750	5.063	35.818	5.219	35.357	-2.99%	1.30%
			5755	5.070	35.810	5.224	35.351	-2.95%	1.30%
			5765	5.080	35.787	5.234	35.340	-2.94%	1.26%
			5775	5.085	35.763	5.245	35.329	-3.05%	1.23%
			5785	5.091	35.743	5.255	35.317	-3.12%	1.21%
			5795	5.099	35.734	5.265	35.305	-3.15%	1.22%
			5800	5.107	35.724	5.270	35.300	-3.09%	1.20%
			5805	5.117	35.715	5.275	35.294	-3.00%	1.19%
			5825	5.144	35.684	5.296	35.271	-2.87%	1.17%
			5835	5.156	35.683	5.305	35.230	-2.81%	1.29%
			5850	5.166	35.680	5.320	35.200	-2.89%	1.36%
			5855	5.170	35.669	5.325	35.197	-2.91%	1.34%
			5865	5.176	35.641	5.336	35.190	-3.00%	1.28%
			5875	5.184	35.620	5.347	35.183	-3.05%	1.24%
			5885	5.197	35.599	5.357	35.177	-2.99%	1.20%
			5905	5.221	35.558	5.379	35.163	-2.94%	1.12%

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
08/02/2024	5200-5800 Head	20.2	5150	4.441	36.812	4.604	36.043	-3.53%	2.13%
			5160	4.455	36.797	4.614	36.031	-3.44%	2.13%
			5170	4.464	36.776	4.624	36.020	-3.46%	2.10%
			5180	4.474	36.765	4.635	36.009	-3.47%	2.10%
			5190	4.487	36.762	4.645	35.998	-3.40%	2.12%
			5200	4.500	36.759	4.655	35.986	-3.33%	2.15%
			5210	4.509	36.747	4.666	35.975	-3.36%	2.15%
			5220	4.519	36.722	4.676	35.963	-3.36%	2.11%
			5240	4.539	36.700	4.696	35.940	-3.34%	2.11%
			5250	4.549	36.684	4.706	35.929	-3.34%	2.10%
			5260	4.559	36.663	4.717	35.917	-3.35%	2.08%
			5280	4.592	36.658	4.737	35.894	-3.06%	2.13%
			5290	4.596	36.650	4.748	35.883	-3.20%	2.14%
			5300	4.601	36.630	4.758	35.871	-3.30%	2.12%
			5310	4.606	36.605	4.768	35.860	-3.40%	2.08%
			5320	4.618	36.587	4.778	35.849	-3.35%	2.06%
			5500	4.801	36.321	4.963	35.643	-3.26%	1.90%
			5510	4.811	36.291	4.973	35.632	-3.26%	1.85%
			5520	4.823	36.257	4.983	35.620	-3.21%	1.79%
			5530	4.835	36.236	4.994	35.609	-3.18%	1.76%
			5540	4.844	36.229	5.004	35.597	-3.20%	1.78%
			5550	4.857	36.227	5.014	35.586	-3.13%	1.80%
			5560	4.871	36.214	5.024	35.574	-3.05%	1.80%
			5580	4.901	36.182	5.045	35.551	-2.85%	1.77%
			5600	4.915	36.142	5.065	35.529	-2.96%	1.73%
			5610	4.925	36.123	5.076	35.518	-2.97%	1.70%
			5620	4.937	36.101	5.086	35.506	-2.93%	1.68%
			5640	4.957	36.085	5.106	35.483	-2.92%	1.70%
			5660	4.987	36.059	5.127	35.460	-2.73%	1.69%
			5670	5.004	36.036	5.137	35.449	-2.59%	1.66%
			5680	5.016	36.012	5.147	35.437	-2.55%	1.62%
			5690	5.022	35.996	5.158	35.426	-2.64%	1.61%
			5700	5.028	35.983	5.168	35.414	-2.71%	1.61%
			5710	5.040	35.970	5.178	35.403	-2.67%	1.60%
			5720	5.052	35.950	5.188	35.391	-2.62%	1.58%
			5745	5.082	35.937	5.214	35.363	-2.53%	1.62%
			5750	5.091	35.932	5.219	35.357	-2.45%	1.63%
			5755	5.101	35.929	5.224	35.351	-2.35%	1.64%
			5765	5.116	35.914	5.234	35.340	-2.25%	1.62%
			5775	5.124	35.903	5.245	35.329	-2.31%	1.62%
			5785	5.128	35.895	5.255	35.317	-2.42%	1.64%
			5795	5.134	35.864	5.265	35.305	-2.49%	1.58%
			5800	5.137	35.855	5.270	35.300	-2.52%	1.57%
			5805	5.139	35.844	5.275	35.294	-2.58%	1.56%
			5825	5.165	35.835	5.296	35.271	-2.47%	1.60%
			5835	5.183	35.831	5.305	35.230	-2.30%	1.71%
			5845	5.192	35.818	5.315	35.210	-2.31%	1.73%
			5850	5.196	35.813	5.320	35.200	-2.33%	1.74%
			5855	5.199	35.807	5.325	35.197	-2.37%	1.73%
			5865	5.208	35.789	5.336	35.190	-2.40%	1.70%
			5875	5.216	35.764	5.347	35.183	-2.45%	1.65%
			5885	5.223	35.736	5.357	35.177	-2.50%	1.59%
			5905	5.245	35.705	5.379	35.163	-2.49%	1.54%
08/14/2024	6000 Head	20.0	5935	5.230	35.905	5.411	35.143	-3.35%	2.17%
			5970	5.271	35.856	5.448	35.120	-3.24%	2.10%
			5985	5.290	35.818	5.464	35.110	-3.19%	2.02%
			6000	5.306	35.786	5.480	35.100	-3.17%	1.95%
			6025	5.331	35.751	5.510	35.070	-3.24%	1.94%
			6065	5.378	35.693	5.557	35.022	-3.21%	1.91%
			6075	5.392	35.677	5.569	35.010	-3.17%	1.90%
			6085	5.404	35.656	5.580	34.998	-3.15%	1.88%
			6275	5.651	35.294	5.805	34.770	-2.65%	1.51%
			6285	5.664	35.270	5.816	34.758	-2.61%	1.47%
			6305	5.681	35.224	5.840	34.734	-2.72%	1.41%
			6345	5.733	35.168	5.887	34.686	-2.62%	1.39%
			6475	5.881	34.969	6.041	34.530	-2.65%	1.27%
			6485	5.891	34.961	6.052	34.518	-2.65%	1.28%
			6500	5.908	34.932	6.070	34.500	-2.67%	1.25%
			6505	5.913	34.917	6.076	34.494	-2.69%	1.23%
			6545	5.967	34.856	6.122	34.446	-2.53%	1.19%
			6675	6.127	34.646	6.273	34.290	-2.33%	1.04%
			6685	6.141	34.617	6.285	34.278	-2.29%	0.99%
			6715	6.180	34.532	6.319	34.242	-2.19%	0.85%
			6785	6.257	34.399	6.400	34.158	-2.24%	0.70%
			6825	6.315	34.350	6.447	34.110	-2.04%	0.70%
			6985	6.491	34.093	6.633	33.918	-2.13%	0.52%
			6995	6.503	34.067	6.644	33.906	-2.12%	0.47%
			7000	6.510	34.054	6.650	33.900	-2.10%	0.45%
			7005	6.518	34.044	6.656	33.894	-2.08%	0.44%
			7025	6.534	34.031	6.680	33.870	-2.18%	0.48%
			7980	7.700	32.427	7.816	32.724	-1.48%	-0.91%
			8000	7.698	32.318	7.840	32.700	-1.81%	-1.17%

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.

Note: Per April 2019 TCG Workshop Notes, single head-tissue simulating liquid specified in IEC 62209-1 is permitted to use for all SAR tests.

8.2 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 the 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 APD (W/m²)	1W Target 4cm² APD (W/m²)	1W Normalized 4cm² APD (W/m²)	Deviation 4cm² APD (%)
AM6	2450	HEAD	08/13/2024	22.5	22.5	0.10	855	7499	1644	5.290	52.400	52.900	0.95%				
AM6	2450	HEAD	08/15/2024	22.5	22.6	0.10	750	7499	1644	5.290	52.600	52.900	0.57%				
AM9	5250	HEAD	07/29/2024	21.7	20.0	0.05	1123	3746	1237	3.850	79.400	77.000	-3.02%				
AM9	5250	HEAD	08/02/2024	21.1	20.2	0.05	1163	3746	1237	3.680	79.600	73.600	-7.54%				
AM9	5600	HEAD	07/29/2024	21.7	20.0	0.05	1123	3746	1237	3.980	82.500	79.600	-3.52%				
AM9	5600	HEAD	08/02/2024	21.1	20.2	0.05	1163	3746	1237	4.030	82.800	80.600	-2.66%				
AM9	5750	HEAD	07/29/2024	21.7	20.0	0.05	1123	3746	1237	3.850	79.400	77.000	-3.02%				
AM9	5750	HEAD	08/02/2024	21.1	20.2	0.05	1163	3746	1237	3.760	81.100	75.200	-7.27%				
AM9	5850	HEAD	07/29/2024	21.7	20.0	0.05	1123	3746	1237	3.790	80.100	75.800	-5.37%				
AM9	5850	HEAD	08/02/2024	21.1	20.2	0.05	1163	3746	1237	3.850	79.000	77.000	-2.53%				
AM2	6500	HEAD	08/14/2024	21.2	20.3	0.025	1019	7420	1333	7.320	293.000	292.800	-0.07%	32.8	1320	1312	-0.61%

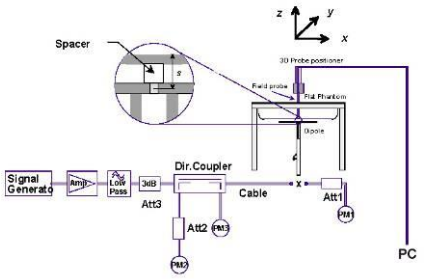


Figure 8-1
System Verification Setup Diagram

Figure 8-2
System Verification Setup Photo

8.3 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.

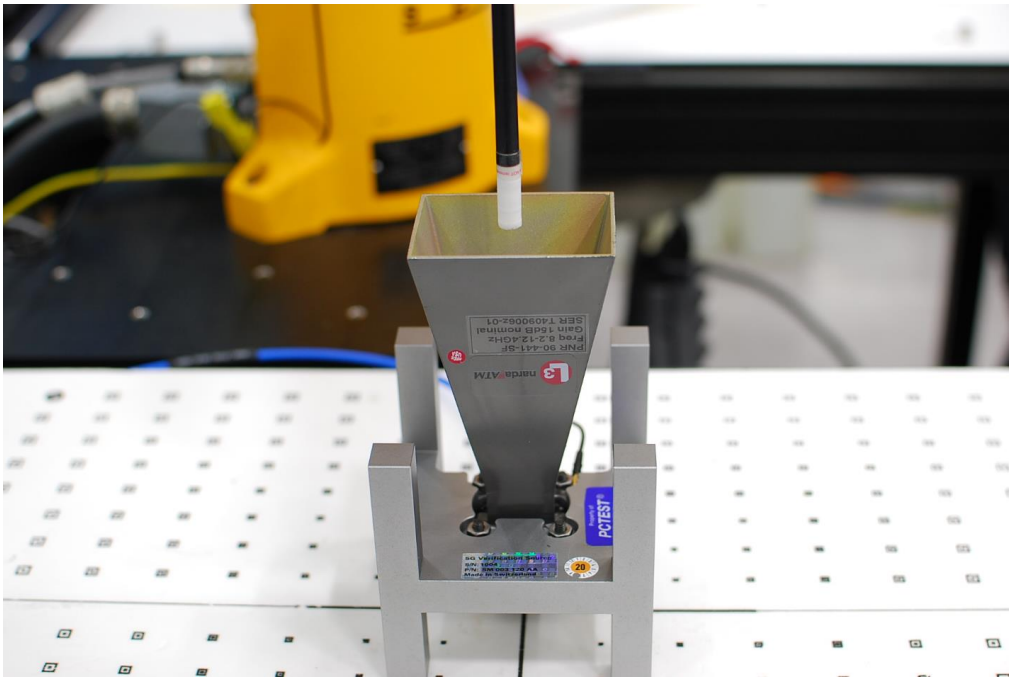


Figure 8-3
System Verification Setup Photo

Table 8-3
10 GHz Verification Results

System Verification												
System	Frequency (GHz)	Date	Source S/N	Probe S/N	DAE S/N	Prad (mW)	Normal psPD (W/m² over 4 cm²)		Deviation (dB)	Total psPD (W/m² over 4 cm²)		Deviation (dB)
							Measured	Target		Measured	Target	
AM5	10	08/17/2024	1006	9487	1582	93.3	67.10	58.50	0.60	67.20	58.90	0.57

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

9 SAR DATA SUMMARY

9.1 2.4 GHz Bluetooth SISO Standalone Head SAR

Table 9-1

Exposure	Band / Mode	Earbud	Serial Number	Duty Cycle [%]	Power Drift [dB]	Frequency [MHz]	Channel #	Data Rate [Mbps]	Max Allowed Power [dBm]	Conducted Power [dBm]	Test Position	Spacing [mm]	Measured 1g SAR [W/kg]	Power Scaling Factor	Duty Cycle Scaling Factor	Reported 1g SAR [W/kg]	Plot #
Head	2.4 GHz Bluetooth	Right	H5RH710021A0000B32	86.78	0.05	2402	0	1	10.50	10.04	Front	0	0.088	1.112	1.152	0.113	A1
Head	2.4 GHz Bluetooth	Right	H5RH710021A0000B32	86.78	-0.02	2441	39	1	10.50	9.91	Front	0	0.058	1.146	1.152	0.077	
Head	2.4 GHz Bluetooth	Right	H5RH710021A0000B32	86.78	-0.02	2480	78	1	10.50	9.98	Front	0	0.051	1.127	1.152	0.066	
ANSI/IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Head 1.6 W/kg (mW/g) averaged over 1 gram						

Note: The reported SAR was scaled to 100% transmission duty factor.

9.2 5 GHz NB-UNII 1 SISO Standalone Head SAR

Table 9-2

Exposure	Band / Mode	Earbud	Serial Number	Duty Cycle [%]	Power Drift [dB]	Frequency [MHz]	Channel #	Data Rate [Mbps]	Max Allowed Power [dBm]	Conducted Power [dBm]	Test Position	Spacing [mm]	Measured 1g SAR [W/kg]	Power Scaling Factor	Duty Cycle Scaling Factor	Reported 1g SAR [W/kg]	Plot #
Head	NB U-NII 1	Right	H5RH710021A0000B32	90.35	0.06	5245	High	4	6.00	5.25	Front	0	0.022	1.189	1.107	0.029	
Head	NB U-NII 1	Right	H5RH710021A0000B32	90.35	0.05	5157	Low	4	6.00	5.52	Front	0	0.026	1.117	1.107	0.032	A2
Head	NB U-NII 1	Right	H5RH710021A0000B32	90.35	0.03	5201	Mid	4	6.00	5.57	Front	0	0.023	1.104	1.107	0.028	
ANSI/IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Head 1.6 W/kg (mW/g) averaged over 1 gram						

Note: The reported SAR was scaled to 100% transmission duty factor.

9.3 5 GHz NB-UNII 3 SISO Standalone Head SAR

Table 9-3

Exposure	Band / Mode	Earbud	Serial Number	Duty Cycle [%]	Power Drift [dB]	Frequency [MHz]	Channel #	Data Rate [Mbps]	Max Allowed Power [dBm]	Conducted Power [dBm]	Test Position	Spacing [mm]	Measured 1g SAR [W/kg]	Power Scaling Factor	Duty Cycle Scaling Factor	Reported 1g SAR [W/kg]	Plot #
Head	NB U-NII 3	Right	H5RH710021A0000B32	90.35	0.04	5844	High	4	6.50	4.93	Front	0	0.014	1.435	1.107	0.022	
Head	NB U-NII 3	Right	H5RH710021A0000B32	90.35	0.09	5731	Low	4	6.50	4.84	Front	0	0.021	1.466	1.107	0.034	
Head	NB U-NII 3	Right	H5RH710021A0000B32	90.35	0.07	5788	Mid	4	6.50	4.78	Front	0	0.019	1.486	1.107	0.031	
ANSI/IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Head 1.6 W/kg (mW/g) averaged over 1 gram						

Note: The reported SAR was scaled to 100% transmission duty factor.

9.4 6 GHz NB-UNII 5 SISO Standalone Head SAR

Table 9-4

Exposure	Band / Mode	Earbud	Serial Number	Duty Cycle [%]	Power Drift [dB]	Frequency [MHz]	Channel #	Data Rate [Mbps]	Max Allowed Power [dBm]	Conducted Power [dBm]	Test Position	Spacing [mm]	Measured 1g SAR [W/kg]	Power Scaling Factor	Duty Cycle Scaling Factor	Reported 1g SAR [W/kg]	Plot #
Head	NB U-NII 5	Right	H5RH710021A0000B32	92.00	0.09	6420	High	8	2.00	1.85	Front	0	0.018	1.035	1.087	0.020	A3
Head	NB U-NII 5	Right	H5RH710021A0000B32	92.00	0.08	6108	Low	8	2.00	1.50	Front	0	0.014	1.122	1.087	0.017	
Head	NB U-NII 5	Right	H5RH710021A0000B32	92.00	0.09	6186	Low-Mid	8	2.00	1.79	Front	0	0.014	1.050	1.087	0.016	
Head	NB U-NII 5	Right	H5RH710021A0000B32	92.00	0.07	6264	Mid	8	2.00	1.93	Front	0	0.015	1.016	1.087	0.017	
Head	NB U-NII 5	Right	H5RH710021A0000B32	92.00	0.01	6342	Mid-High	8	2.00	1.82	Front	0	0.017	1.042	1.087	0.019	
ANSI/IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Head 1.6 W/kg (mW/g) averaged over 1 gram						

Exposure	Band/ Mode	Earbud	Serial Number	Duty Cycle [%]	Power Drift [dB]	Frequency [MHz]	Channel #	Data Rate [Mbps]	Max Allowed Power [dBm]	Conducted Power [dBm]	Test Position	Spacing [mm]	Measured APD [W/m² (4cm²)]	Power Scaling Factor	Duty Cycle Scaling Factor	Reported APD [W/m² (4cm²)]
Head	NB U-NII 5	Right	H5RH710021A0000B32	92.00	0.09	6420	High	8	2.00	1.85	Front	0	0.111	1.035	1.087	0.125
Head	NB U-NII 5	Right	H5RH710021A0000B32	92.00	0.08	6108	Low	8	2.00	1.50	Front	0	0.092	1.122	1.087	0.112
Head	NB U-NII 5	Right	H5RH710021A0000B32	92.00	0.09	6186	Low-Mid	8	2.00	1.79	Front	0	0.088	1.050	1.087	0.100
Head	NB U-NII 5	Right	H5RH710021A0000B32	92.00	0.07	6264	Mid	8	2.00	1.93	Front	0	0.099	1.016	1.087	0.109
Head	NB U-NII 5	Right	H5RH710021A0000B32	92.00	0.01	6342	Mid-High	8	2.00	1.82	Front	0	0.095	1.042	1.087	0.108

Note: The reported SAR was scaled to 100% transmission duty factor.

9.5 Bluetooth SISO Standalone Body-Worn SAR

Table 9-5

Exposure	Band / Mode	Earbud	Serial Number	Duty Cycle [%]	Power Drift [dB]	Frequency [MHz]	Channel #	Data Rate [Mbps]	Max Allowed Power [dBm]	Conducted Power [dBm]	Test Position	Spacing [mm]	Measured 1g SAR [W/kg]	Power Scaling Factor	Duty Cycle Scaling Factor	Reported 1g SAR [W/kg]	Plot #
Body-worn	2.4 GHz Bluetooth	Right	H5RH710021A0000B32	86.78	-0.01	2402	0	1	10.50	10.04	Back	0	0.322	1.112	1.152	0.413	
Body-worn	2.4 GHz Bluetooth	Right	H5RH710021A0000B32	86.78	-0.06	2402	0	1	10.50	10.04	Antenna Touching	0	0.436	1.112	1.152	0.559	A4
Body-worn	2.4 GHz Bluetooth	Right	H5RH710021A0000B32	86.78	-0.01	2402	0	1	10.50	10.04	Button	0	0.286	1.112	1.152	0.366	
Body-worn	2.4 GHz Bluetooth	Right	H5RH710021A0000B32	86.78	-0.04	2441	39	1	10.50	9.91	Antenna Touching	0	0.386	1.146	1.152	0.510	
Body-worn	2.4 GHz Bluetooth	Right	H5RH710021A0000B32	86.78	0.00	2480	78	1	10.50	9.98	Antenna Touching	0	0.392	1.127	1.152	0.509	
ANSI/IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Body 1.6 W/kg (mW/g) averaged over 1 gram						

Note: The reported SAR was scaled to 100% transmission duty factor.

9.6 5 GHz NB-UNII 1 Standalone Body-Worn SAR

Table 9-6

Exposure	Band / Mode	Earbud	Serial Number	Duty Cycle [%]	Power Drift [dB]	Frequency [MHz]	Channel #	Data Rate [Mbps]	Max Allowed Power [dBm]	Conducted Power [dBm]	Test Position	Spacing [mm]	Measured 1g SAR [W/kg]	Power Scaling Factor	Duty Cycle Scaling Factor	Reported 1g SAR [W/kg]	Plot #
Body-worn	NB U-NII 1	Right	H5RH710021A0000B32	90.35	-0.01	5245	High	4	6.00	5.25	Back	0	0.625	1.189	1.107	0.822	
Body-worn	NB U-NII 1	Right	H5RH710021A0000B32	90.35	-0.08	5157	Low	4	6.00	5.52	Back	0	0.682	1.117	1.107	0.843	
Body-worn	NB U-NII 1	Right	H5RH710021A0000B32	90.35	0.00	5201	Mid	4	6.00	5.57	Back	0	0.668	1.104	1.107	0.816	
Body-worn	NB U-NII 1	Right	H5RH710021A0000B32	90.35	0.07	5201	Mid	4	6.00	5.57	Antenna Touching	0	0.379	1.104	1.107	0.463	
Body-worn	NB U-NII 1	Right	H5RH710021A0000B32	90.35	-0.11	5201	Mid	4	6.00	5.57	Button	0	0.333	1.104	1.107	0.407	
ANSI/IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Body 1.6 W/kg (mW/g) averaged over 1 gram						

Note: The reported SAR was scaled to 100% transmission duty factor.

9.7 5 GHz NB-UNII 3 Standalone Body-Worn SAR

Table 9-7

Exposure	Band / Mode	Earbud	Serial Number	Duty Cycle [%]	Power Drift [dB]	Frequency [MHz]	Channel #	Data Rate [Mbps]	Max Allowed Power [dBm]	Conducted Power [dBm]	Test Position	Spacing [mm]	Measured 1g SAR [W/kg]	Power Scaling Factor	Duty Cycle Scaling Factor	Reported 1g SAR [W/kg]	Plot #
Body-worn	NB U-NII 3	Right	H5RH710021A0000B32	90.35	-0.13	5844	High	4	6.50	4.93	Back	0	0.738	1.435	1.107	1.172	A5
Body-worn	NB U-NII 3	Right	H5RH710021A0000B32	90.35	-0.07	5731	Low	4	6.50	4.84	Back	0	0.692	1.466	1.107	1.123	
Body-worn	NB U-NII 3	Right	H5RH710021A0000B32	90.35	0.02	5788	Mid	4	6.50	4.78	Back	0	0.674	1.486	1.107	1.109	
Body-worn	NB U-NII 3	Right	H5RH710021A0000B32	90.35	0.08	5844	High	4	6.50	4.93	Antenna Touching	0	0.424	1.435	1.107	0.673	
Body-worn	NB U-NII 3	Right	H5RH710021A0000B32	90.35	-0.19	5844	High	4	6.50	4.93	Button	0	0.546	1.435	1.107	0.867	
Body-worn	NB U-NII 3	Right	H5RH710021A0000B32	90.35	-0.06	5731	Low	4	6.50	4.84	Antenna Touching	0	0.409	1.466	1.107	0.664	
Body-worn	NB U-NII 3	Right	H5RH710021A0000B32	90.35	-0.05	5731	Low	4	6.50	4.84	Button	0	0.432	1.466	1.107	0.701	
Body-worn	NB U-NII 3	Right	H5RH710021A0000B32	90.35	-0.02	5788	Mid	4	6.50	4.78	Antenna Touching	0	0.427	1.486	1.107	0.702	
Body-worn	NB U-NII 3	Right	H5RH710021A0000B32	90.35	-0.08	5788	Mid	4	6.50	4.78	Button	0	0.503	1.486	1.107	0.827	
ANSI/IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Body 1.6 W/kg (mW/g) averaged over 1 gram						

Note: The reported SAR was scaled to 100% transmission duty factor.

9.8 6 GHz NB-UNII 5 Standalone Body-Worn SAR

Table 9-8

Exposure	Band / Mode	Earbud	Serial Number	Duty Cycle [%]	Power Drift [dB]	Frequency [MHz]	Channel #	Data Rate [Mbps]	Max Allowed Power [dBm]	Conducted Power [dBm]	Test Position	Spacing [mm]	Measured 1g SAR [W/kg]	Power Scaling Factor	Duty Cycle Scaling Factor	Reported 1g SAR [W/kg]	Plot #
Body-worn	NB U-NII 5	Right	H5RH710021A0000B32	92.00	-0.08	6420	High	8	2.00	1.85	Back	0	0.296	1.035	1.087	0.333	A6
Body-worn	NB U-NII 5	Right	H5RH710021A0000B32	92.00	-0.02	6108	Low	8	2.00	1.50	Back	0	0.216	1.122	1.087	0.263	
Body-worn	NB U-NII 5	Right	H5RH710021A0000B32	92.00	-0.12	6186	Low-Mid	8	2.00	1.79	Back	0	0.224	1.050	1.087	0.256	
Body-worn	NB U-NII 5	Right	H5RH710021A0000B32	92.00	-0.08	6264	Mid	8	2.00	1.93	Back	0	0.235	1.016	1.087	0.260	
Body-worn	NB U-NII 5	Right	H5RH710021A0000B32	92.00	-0.10	6342	Mid-High	8	2.00	1.82	Back	0	0.212	1.042	1.087	0.240	
Body-worn	NB U-NII 5	Right	H5RH710021A0000B32	92.00	-0.17	6264	Mid	8	2.00	1.93	Button	0	0.117	1.016	1.087	0.129	
Body-worn	NB U-NII 5	Right	H5RH710021A0000B32	92.00	0.08	6264	Mid	8	2.00	1.93	Antenna Touching	0	0.132	1.016	1.087	0.146	
ANSI/IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population											Body 1.6 W/kg (mW/g) averaged over 1 gram						

Exposure	Band/ Mode	Earbud	Serial Number	Duty Cycle [%]	Power Drift [dB]	Frequency [MHz]	Channel #	Data Rate [Mbps]	Max Allowed Power [dBm]	Conducted Power [dBm]	Test Position	Spacing [mm]	Measured APD [W/m² (4cm²)]	Power Scaling Factor	Duty Cycle Scaling Factor	Reported APD [W/m² (4cm²)]
Body-worn	NB U-NII 5	Right	H5RH710021A0000B32	92.00	-0.08	6420	High	8	2.00	1.85	Back	0	0.905	1.035	1.087	1.018
Body-worn	NB U-NII 5	Right	H5RH710021A0000B32	92.00	-0.02	6108	Low	8	2.00	1.50	Back	0	0.683	1.122	1.087	0.833
Body-worn	NB U-NII 5	Right	H5RH710021A0000B32	92.00	-0.12	6186	Low-Mid	8	2.00	1.79	Back	0	0.716	1.050	1.087	0.817
Body-worn	NB U-NII 5	Right	H5RH710021A0000B32	92.00	-0.08	6264	Mid	8	2.00	1.93	Back	0	0.769	1.016	1.087	0.849
Body-worn	NB U-NII 5	Right	H5RH710021A0000B32	92.00	-0.10	6342	Mid-High	8	2.00	1.82	Back	0	0.685	1.042	1.087	0.776
Body-worn	NB U-NII 5	Right	H5RH710021A0000B32	92.00	-0.17	6264	Mid	8	2.00	1.93	Button	0	0.468	1.016	1.087	0.517
Body-worn	NB U-NII 5	Right	H5RH710021A0000B32	92.00	0.08	6264	Mid	8	2.00	1.93	Antenna Touching	0	0.508	1.016	1.087	0.561

Note: The reported SAR was scaled to 100% transmission duty factor.

9.9 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. To demonstrate compliance for Head, SAR testing was performed on a flat phantom filled with head tissue equivalent medium.
6. Per manufacturer request, Body-Worn SAR was additionally evaluated as a conservative SAR test condition for the right earbud (BCG-A3050).
7. Per FCC KDB Publication 865664 D01v01r04, variability SAR tests were not required since measured SAR results for all frequency bands were less than 0.8 W/kg and 2.0 W/kg for 10g SAR.
8. The orange highlights throughout the report represents the highest scaled SAR per Equipment Class.

Bluetooth/NB UNII Notes

1. Bluetooth/NB UNII SAR was evaluated with a test mode with hopping disabled with DH5 operation. The reported SAR was scaled to the 100% transmission duty factor to determine compliance for a more conservative exposure analysis. See section 7.2 for the time domain plot and calculation for the duty factor of the device.

9.10 Power Density Data

MEASUREMENT RESULTS																					
Frequency (MHz)	Channel	Mode	Maximum Allowed Power [dBm]	Conducted Power [dBm]	Power Drift (dB)	Spacing (mm)	Earbud	DUT Serial Number	Data Rate (Mbps)	Side	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 #
6264	Mid	NB U-NII 5	2.00	1.93	-0.05	2	Right	H5RH710022Y0000B32	8	Front	92	0.25	1.190	1.554	1.016	1.087	0.203	0.348	0.229	0.393	
6264	Mid	NB U-NII 5	2.00	1.93	0.07	2	Right	H5RH710022Y0000B32	8	Back	92	0.25	4.210	1.554	1.016	1.087	0.741	1.272	0.752	1.291	A7
6264	Mid	NB U-NII 5	2.00	1.93	-0.03	2	Right	H5RH710022Y0000B32	8	Antenna Touching	92	0.25	1.310	1.554	1.016	1.087	0.410	0.704	0.427	0.733	
6264	Mid	NB U-NII 5	2.00	1.93	-0.09	2	Right	H5RH710022Y0000B32	8	Button	92	0.25	2.940	1.554	1.016	1.087	0.318	0.546	0.339	0.582	
6108	Low	NB U-NII 5	2.00	1.50	0.04	2	Right	H5RH710022Y0000B32	8	Back	92	0.25	0.954	1.554	1.122	1.087	0.282	0.534	0.390	0.739	
6186	Low-Mid	NB U-NII 5	2.00	1.79	0.00	2	Right	H5RH710022Y0000B32	8	Back	92	0.25	1.390	1.554	1.050	1.087	0.383	0.679	0.417	0.740	
6342	Mid-High	NB U-NII 5	2.00	1.82	-0.03	2	Right	H5RH710022Y0000B32	8	Back	92	0.25	1.150	1.554	1.042	1.087	0.280	0.493	0.350	0.616	
6420	High	NB U-NII 5	2.00	1.85	0.04	2	Right	H5RH710022Y0000B32	8	Back	92	0.25	2.300	1.554	1.035	1.087	0.459	0.802	0.479	0.837	
6264	Mid	NB U-NII 5	2.00	1.93	-0.05	9.57	Right	H5RH710022Y0000B32	8	Back	92	0.25	1.290	1.554	1.016	1.087	0.334	0.573	0.343	0.589	
47 CFR §1.1310 - SAFETY LIMIT Spatial Average Uncontrolled Exposure / General Population								Power Density 10 W/m² averaged over 4 cm²													

Note: The reported SAR was scaled to 100% transmission duty factor.

9.11 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 wall charger for some measurements due to the test duration. It was confirmed that the charger plugged into this DUT did not impact the near-field PD test results.
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 D01.
8. PTP-PR algorithm was used during psPD measurement and calculations.

10 SAR MEASUREMENT VARIABILITY

10.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01, SAR measurement variability was not assessed for each frequency band since all measured SAR values are < 0.8 W/kg for 1g SAR and < 2.0 W/kg for 10g SAR.

10.2 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.

11 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	11/14/2023	Annual	11/14/2024	MY45093852
Agilent	E4438C	ESG Vector Signal Generator	11/15/2023	Annual	11/15/2024	MY45092078
Agilent	N5182A	MXG Vector Signal Generator	10/12/2023	Annual	10/12/2024	MY47400015
Agilent	N5182A	MXG Vector Signal Generator	3/7/2024	Annual	3/7/2025	MY47420603
Agilent	8753ES	S-Parameter Vector Network Analyzer	1/10/2024	Annual	1/10/2025	MY40001472
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB46170464
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433973
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433974
Amplifier Research	150A100C	Amplifier	CBT	N/A	CBT	350132
Anritsu	MN8110B	I/O Adaptor	CBT	N/A	CBT	6261747881
Anritsu	ML2496A	Power Meter	6/24/2024	Annual	6/24/2025	1840005
Anritsu	ML2495A	Power Meter	7/8/2024	Annual	7/8/2025	1039008
Anritsu	MA2411B	Pulse Power Sensor	8/22/2023	Annual	8/22/2024	1726262
Anritsu	MA2411B	Pulse Power Sensor	11/8/2023	Annual	11/8/2024	1027293
Anritsu	MA24106A	USB Power Sensor	12/4/2023	Annual	12/4/2024	1520501
Anritsu	MA24106A	USB Power Sensor	4/15/2024	Annual	4/15/2025	1827528
Mini-Circuits	PWR-4GHS	USB Power Sensor	6/12/2024	Annual	6/12/2025	12001070013
Control Company	4052	Long Stem Thermometer	2/27/2024	Biennial	2/27/2026	240174346
Control Company	4052	Long Stem Thermometer	2/27/2024	Biennial	2/27/2026	240171096
Control Company	4052	Long Stem Thermometer	2/27/2024	Biennial	2/27/2026	240171059
Control Company	4040	Therm./ Clock/ Humidity Monitor	4/15/2024	Biennial	4/15/2026	240310280
Control Company	4040	Therm./ Clock/ Humidity Monitor	4/15/2024	Biennial	4/15/2026	240310282
Control Company	S66279	Therm./ Clock/ Humidity Monitor	2/16/2024	Biennial	2/16/2026	240140051
Mitutoyo	500-196-30	CD-6"ASX 6Inch Digital Caliper	2/16/2022	Triennial	2/16/2025	A20238413
Keysight Technologies	N9020A	MXA Signal Analyzer	4/11/2024	Annual	4/11/2025	MY54500644
Agilent	N9020A	MXA Signal Analyzer	6/14/2024	Annual	6/14/2025	MY56470202
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
Mini-Circuits	VLF-6000+	Low Pass Filter DC to 6000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	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	NC-100	Torque Wrench	4/2/2024	Biennial	4/2/2026	1262
SPEAG	DAK-3.5	Dielectric Assessment Kit	11/13/2023	Annual	11/13/2024	1277
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	7/8/2024	Annual	7/8/2025	1039
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	1331
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1390
SPEAG	5G Verification Source 10GHz	10GHz System Verification Antenna	10/13/2023	Annual	10/13/2024	1006
SPEAG	D2450V2	2450 MHz SAR Dipole	5/11/2022	Triennial	5/11/2025	750
SPEAG	D2450V2	2450 MHz SAR Dipole	11/15/2022	Biennial	11/15/2024	855
SPEAG	D5GHzV2	5 GHz SAR Dipole	3/12/2024	Annual	3/12/2025	1123
SPEAG	D5GHzV2	5 GHz SAR Dipole	6/12/2024	Annual	6/12/2025	1163
SPEAG	D6.5GHzV2	6.5 GHz SAR Dipole	10/11/2023	Annual	10/11/2024	1019
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/18/2023	Annual	10/18/2024	1237
SPEAG	DAE4	Dasy Data Acquisition Electronics	12/7/2023	Annual	12/7/2024	1644
SPEAG	DAE4	Dasy Data Acquisition Electronics	10/18/2023	Annual	10/18/2024	1333
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/9/2024	Annual	4/9/2025	1582
SPEAG	EUmmWV4	mmWave Probe	4/8/2024	Annual	4/8/2025	9487
SPEAG	EX3DV4	SAR Probe	10/16/2023	Annual	10/16/2024	3746
SPEAG	EX3DV4	SAR Probe	10/16/2023	Annual	10/16/2024	7420
SPEAG	EX3DV4	SAR Probe	1/16/2024	Annual	1/16/2025	7499

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.

12 MEASUREMENT UNCERTAINTIES

Applicable for SAR measurements < 6 GHz:

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	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	1.732	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				12.2	12.0	191
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				24.4	24.0	

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

Applicable for SAR measurements > 6 GHz:

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	E2.1	9.3	N	1	1	1	9.3	9.3	∞
Axial Isotropy	E2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E2.2	1.3	N	1	0.7	0.7	0.9	0.9	∞
Boundary Effect	E2.3	2	R	1.732	1	1	1.2	1.2	∞
Linearity	E2.4	0.3	N	1	1	1	0.3	0.3	∞
System Detection Limits	E2.4	0.25	R	1.732	1	1	0.1	0.1	∞
Modulation Response	E2.5	4.8	R	1.732	1	1	2.8	2.8	∞
Readout Electronics	E2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time	E2.7	0.8	R	1.732	1	1	0.5	0.5	∞
Integration Time	E2.8	2.6	R	1.732	1	1	1.5	1.5	∞
RF Ambient Conditions - Noise	E6.1	3	R	1.732	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E6.1	3	R	1.732	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E6.2	0.8	R	1.732	1	1	0.5	0.5	∞
Probe Positioning w/ respect to Phantom	E6.3	6.7	R	1.732	1	1	3.9	3.9	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E5	4	R	1.732	1	1	2.3	2.3	∞
Test Sample Related									
Test Sample Positioning	E4.2	3.12	N	1	1	1	3.1	3.1	35
Device Holder Uncertainty	E4.1	1.67	N	1	1	1	1.7	1.7	5
Output Power Variation - SAR drift measurement	E2.9	5	R	1.732	1	1	2.9	2.9	∞
SAR Scaling	E6.5	0	R	1.732	1	1	0.0	0.0	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E3.1	7.6	R	1.73	1.0	1.0	4.4	4.4	∞
Liquid Conductivity - measurement uncertainty	E3.3	4.3	N	1	0.78	0.71	3.3	3.0	76
Liquid Permittivity - measurement uncertainty	E3.3	4.2	N	1	0.23	0.26	1.0	1.1	75
Liquid Conductivity - Temperature Uncertainty	E3.4	3.4	R	1.732	0.78	0.71	1.5	1.4	∞
Liquid Permittivity - Temperature Unceritainty	E3.4	0.6	R	1.732	0.23	0.26	0.1	0.1	∞
Liquid Conductivity - deviation from target values	E3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Permittivity - deviation from target values	E3.2	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:

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	

13 CONCLUSION

13.1 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]

14 REFERENCES

[1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.

[2] ANSI/IEEE C95.1-2005, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, 2006.

[3] ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, Sept. 1992.

[4] ANSI/IEEE C95.3-2002, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, December 2002.

[5] IEEE Standards Coordinating Committee 39 –Standards Coordinating Committee 34 – IEEE Std. 1528-2013, IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

[6] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for RadioFrequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.

[7] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.

[8] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 1 -124.

[9] K. Pokovic, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.

[10] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.

[11] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.

[12] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.

[13] G. Hartsgrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.

[14] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.

[15] W. Gander, Computermathematick, Birkhaeuser, Basel, 1992.

[16] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.

[17] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.

[18] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.

[19] Prof. Dr. Niels Kuster, ETH, Eidgenössische Technische Hoschschule Zürich, Dosimetric Evaluation of the Cellular Phone.

[20] IEC 62209-1, Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 1: Devices used next to the ear (Frequency range of 300 MHz to 6 GHz), July 2016.

[21] Innovation, Science, Economic Development Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 5, March 2015.

[22] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Range from 3 kHz – 300 GHz, 2015

[23] FCC SAR Test Procedures for 2G-3G Devices, Mobile Hotspot and UMPC Devices KDB Publications 941225, D01-D07

[24] SAR Measurement Guidance for IEEE 802.11 Transmitters, KDB Publication 248227 D01

[25] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB Publications 648474 D03-D04

[26] FCC SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers, FCC KDB Publication 616217 D04

[27] FCC SAR Measurement and Reporting Requirements for 100MHz – 6 GHz, KDB Publications 865664 D01-D02

[28] FCC General RF Exposure Guidance and SAR Procedures for Dongles, KDB Publication 447498, D01-D02

[29] Anexo à Resolução No. 533, de 10 de Septembro de 2009.