



**RF SAFETY
LAB**

A NEXT GENERATION
TEST LABORATORY™

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SAR EVALUATION REPORT

FCC ID:	A3LNP960XRD	Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea Certification
Model (s):	NP960XRD; NP964XRD	
Device Type:	Portable Laptop	
Report Issue Date:	1/21/2026	

FCC Equipment Class	Body SAR [W/kg]	1g Simultaneous Tx SAR [W/kg]	psPD over 4cm ² [W/m ²]
DTS	0.58	1.54	-
NII	0.77	1.54	-
6CD/6VL	0.22	1.54	5.22
DSS	0.44	1.54	-
FCC Limit	1.6	1.6	10.0

The measurement evaluations presented in this report are based on the maximum performance of the tested device(s), which has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/ general population exposure federal limits in 47CFR § 1.1310 and has been tested in accordance with the measurement procedures specified within this report.

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Steve Liu
President



Table of Contents

1. DUT Specifics	3
2. DUT Conducted Powers.....	6
3. DUT SAR Test Results	9
4. DUT SAR Measurement Variability Requirement.....	12
5. General Introduction.....	12
6. Background on Radiofrequency (RF) Exposure Limits	12
7. RF Safety Laboratory SAR Measurement System.....	15
8. RF Safety Laboratory Power Density Measurement System.....	18
9. Technology Specific Test Setup Requirements	20
10. Equipment List.....	23
11. Conclusion.....	24

Appendix A: SAR Test Plots

Appendix B: Tissue Stimulating Liquids, System Checks and System Validation

Appendix C: System Check Plots

Appendix D: Calibration Certificates

Appendix E: Simultaneous Transmission Analysis

Appendix F : DUT Antenna Diagram and Test Setup Photos



1. DUT Specifics

1.1. Device under Test

The device under test is a wireless device, incorporating the technologies listed in Table 1-1 below. The manufacturer has confirmed that the device is within operational tolerances expected for production units and has the same physical, mechanical, and thermal characteristics expected for production units. The serial number of the device used for each test is indicated alongside the results.

1.2. Maximum SAR per Mode

Table 1-1 Maximum SAR Summary

Band/Mode	Frequency (MHz)	Body SAR [W/kg]
2.4 GHz WIFI	2412 - 2472 MHz	0.582
5 GHz WIFI	5180 - 5885 MHz	0.767
6 GHz WIFI	5935 - 7115 MHz	0.220
2.4 GHz Bluetooth	2402 - 2480 MHz	0.443

1.3. Maximum Time-Averaged Power from Manufacturer

The manufacturer has confirmed that this device follows the below target output power specifications and tolerances. SAR values were scaled to the maximum allowed power (including tolerance) to determine compliance per KDB Publication 447498 D04v01.

Upper tolerance of 1dB is applicable to all bands/modes below.

Table 1-2 2.4 GHz WLAN Target RF Output Power

2.4 GHz WIFI Maximum Power [dBm] - SISO, or SISO in MIMO							
Power Level	Mode		802.11b (CDD + STBC)	802.11g (CDD + STBC)	802.11n (CDD +STBC,SDM)	802.11ax SU (CDD +STBC,SDM)	802.11be SU (CDD +STBC,SDM)
	Channel	Freq. [MHz]	MAIN/ AUX	MAIN/ AUX	MAIN/ AUX	MAIN/ AUX	MAIN/ AUX
Max	All		12	12	12	12	12
	10	2457			9.5		
	11	2462			8		
	12	2467	3	3	0.5	3	3
	13	2472	-1	-1	-1	-1	-1

Note: Only AUX antenna is supported in SISO mode.



Table 1-3 5 GHz WLAN Target RF Output Power

5 GHz WIFI Maximum Power [dBm] - MIMO (MAIN + AUX)									
Power Level	Channel Bandwidth [MHz]	Band	Mode		802.11a (CDD + STBC)	802.11n (CDD + STBC)	802.11ac (CDD + STBC,SDM)	802.11ax SU (CDD + STBC,SDM)	802.11be SU (CDD + STBC,SDM)
			Channel	Freq. [MHz]	MAIN + AUX	MAIN + AUX	MAIN + AUX	MAIN + AUX	MAIN + AUX
Max	20	All	All		14	14	14	14	14
		UNII-1	All UNII-1 Ch.						
		UNII-2A	All UNII-2A Ch.						
		UNII-2C	All UNII-2C Ch.		13	13	13	13	13
		UNII-3	All UNII-3 Ch.		11.5	11.5	11.5	11.5	11.5
		UNII-4	All UNII-4 Ch.		11.5	11.5	11.5	11.5	11.5
	40	All	All			14	14	14	14
		UNII-1	All UNII-1 Ch.						
		UNII-2A	All UNII-2A Ch.						
		UNII-2C	All UNII-2C Ch.			13	13	13	13
		UNII-3	All UNII-3 Ch.			11.5	11.5	11.5	11.5
		UNII-4	All UNII-4 Ch.			11.5	11.5	11.5	11.5
	80	All	All				14	14	14
		UNII-1	All UNII-1 Ch.						
		UNII-2A	All UNII-2A Ch.						
		UNII-2C	All UNII-2C Ch.				13	13	13
		UNII-3	All UNII-3 Ch.				11.5	11.5	11.5
		UNII-4	All UNII-4 Ch.				11.5	11.5	11.5
	160	All	All					14	14
		UNII-1/2A	50 5250						
		UNII-2C	114 5570					13	13
		UNII-3/4	163 5815					11.5	11.5

Table 1-4 6 GHz WLAN Target RF Output Power

6.5 GHz WIFI Maximum Power [dBm] - MIMO (MAIN+AUX)												
Power Level	Channel Bandwidth [MHz]	Band	Mode	802.11a (CDD + STBC)			802.11ax SU (CDD + STBC,SDM)			802.11be SU (CDD + STBC,SDM)		
				MAIN + AUX			MAIN + AUX			MAIN + AUX		
			Channel	LPI	SP	VLP	LPI	SP	VLP	LPI	SP	VLP
Max	20	All	All	6	10	1.5	6	10	1.5	6	10	1.5
		UNII-5	All	6	10		6	10		6	10	
			2	4.5	4.5		4.5	4.5		4.5	4.5	
		UNII-6	All		N/A			N/A			N/A	
		UNII-7	All									
		UNII-8	All		N/A			N/A			N/A	
	40	All	All				9	10	4.5	9	10	4.5
		UNII-5	11					N/A			N/A	
		UNII-6	107					N/A			N/A	
		UNII-7	155					N/A			N/A	
		UNII-8	211					N/A			N/A	
	80	All	All				10	10	7	10	10	7
		UNII-5	7					N/A			N/A	
		UNII-6	103					N/A			N/A	
		UNII-7	151					N/A			N/A	
		UNII-8	215					N/A			N/A	
	160	All	All				10	10	7	10	10	7
		UNII-5	15					N/A			N/A	
		UNII-6/7	111					N/A			N/A	
		UNII-7	143					N/A			N/A	
		UNII-8	207					N/A			N/A	
	320	All	All							10	10	7
		UNII-5									N/A	
		UNII-6/7									N/A	
		UNII-7/8									N/A	

Note: For 2.4/5/6 GHz WLAN, IEEE 802.11ax/be RU measurements are addressed in the associated EMC test report. Per April 2019 TCB Workshop Notes, SAR testing was not required for 802.11ax/be when applying the initial test configuration procedures of KDB 248227, with 802.11ax/be considered a higher order 802.11 mode.



Table 1-5 2.4 GHz Bluetooth Target RF Output Power

2.4 GHz Bluetooth Maximum Power [dBm]				
Power Level	Mode	Data Rate	MAIN/AUX	MIMO (MAIN+AUX)
Max	Bluetooth BR	1Mbps	14	15
	Bluetooth EDR	2Mbps	14	14
	Bluetooth EDR	3Mbps	14	14
	BLE	1Mbps	12	10.75
	BLE	2Mbps	12	10.75
	BLE LR s8	125kbps	7.75	N/A
	BLE LR s2	500kbps	7.75	N/A

Note: BLE LR s8 and LR s2 are supported on MAIN antenna.

1.4. Test Guidance Applied

- IEEE 1528-2013
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices)
- FCC KDB Publication 447498 D04v01 (General SAR Guidance)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz)
- FCC KDB Publication 616217 D04 (SAR for laptop and tablets)
- April 2019 TCB Workshop Notes (IEEE 802.11ax)
- IEC 62479:2010
- SPEAG DASY8 Application Note (Interim Procedures for Devices Operating between 6-10 GHz) (April 2023)
- October 2020 TCB Workshop Notes (6-8 GHz Testing)



2. DUT Conducted Powers

2.1. Power Measurement Setup

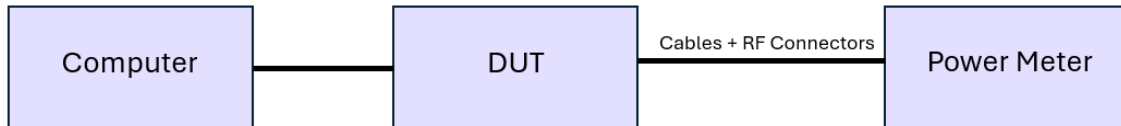


Figure 2-1 FTM Power Measurement Setup

2.2. WIFI Conducted Powers

Table 2-1

2.4 GHz WIFI Conducted Power [dBm] - SISO								
Power Level	Channel Bandwidth [MHz]	Mode		802.11b	802.11g	802.11n	802.11ax	802.11be
		Ch.	Freq. [MHz]	AUX	AUX	AUX	AUX	AUX
Max	22 (802.11b)/ 20 (802.11g/n/ax/be)	1	2412	12.11	12.26	12.16	12.06	12.05
		6	2437	12.21	12.36	12.22	12.07	12.11
		11	2462	12.18	12.34	8.17	12.11	12.19

Table 2-2

2.4 GHz WIFI Conducted Power [dBm] - MIMO																
Power Level	Mode		802.11b			802.11g			802.11n			802.11ax			802.11be	
	Ch.	Freq. [MHz]	MAIN	AUX	MIMO	MAIN	AUX	MIMO	MAIN	AUX	MIMO	MAIN	AUX	MIMO	MAIN	AUX
Max	1	2412	12.99	12.11	15.58	12.99	12.11	15.58	12.94	12.05	15.53	12.91	11.94	15.46	13.00	11.97
	6	2437	13.00	12.14	15.60	13.00	12.25	15.65	12.98	12.09	15.57	12.76	12.01	15.41	12.83	12.04
	11	2462	12.95	12.16	15.58	12.71	12.24	15.49	8.71	7.92	11.34	12.72	12.02	15.39	12.79	12.05



Table 2-3

5 GHz WIFI Conducted Power [dBm] - SISO in MIMO mode													
Power Level	Channel Bandwidth [MHz]	Band	Mode		802.11ac			802.11ax			802.11be		
			Channel	Freq. [MHz]	MAIN	AUX	MIMO	MAIN	AUX	MIMO	MAIN	AUX	MIMO
Max	80	UNII-1	42	5210	11.28	11.8	14.56	11.11	11.54	14.34	11.14	11.58	14.38
		UNII-2A	58	5290	11.24	11.82	14.55	11.14	11.6	14.39	11.19	11.61	14.42
		UNII-2C	106	5530	10.65	10.27	13.47	10.81	10.45	13.64	10.83	10.46	13.66
		UNII-2C	122	5610	10.74	10.55	13.66	10.98	10.34	13.68	10.96	10.42	13.71
		UNII-2C	138	5690	10.95	10.66	13.82	10.74	10.42	13.59	10.76	10.56	13.67
		UNII-3	155	5775	8.42	9.49	12.00	8.59	8.84	11.73	8.64	9.49	12.10
		UNII-4	171	5855	9.00	9.05	12.04	9.05	9.23	12.15	9.06	9.28	12.18

Table 2-4

6.5 GHz WIFI Conducted Power [dBm] - SISO in MIMO mode										
Power Level	Channel Bandwidth [MHz]	Band	Mode		802.11ax			802.11be		
			Channel	Freq. [MHz]	MAIN	AUX	MIMO	MAIN	AUX	MIMO
Max	80	UNII-5	7	5985	7.21	7.93	10.60	7.25	7.87	10.58
		UNII-5	71	6305	7.23	7.76	10.51	7.26	7.76	10.53
		UNII-6	103	6465	7.11	8.00	10.59	7.16	8.00	10.61
		UNII-7	151	6705	7.32	7.78	10.57	7.33	7.87	10.62
		UNII-8	215	7025	7.16	7.73	10.46	7.20	7.81	10.53

2.3. Bluetooth Conducted Powers

Table 2-5

2.4 GHz Bluetooth Conducted Power [dBm] - SISO				
Power Level/Mode	Channel	Freq [MHz]	MAIN	AUX
Max / Bluetooth	0	2402	13.28	14.93
	39	2441	13.01	13.48
	78	2480	13.67	13.81

Table 2-6

2.4 GHz Bluetooth Conducted Power [dBm] - MIMO					
Power Level/Mode	Channel	Freq [MHz]	MAIN	AUX	MIMO
Max / Bluetooth	0	2402	12.19	12.04	15.13
	39	2441	12.04	11.54	14.81
	78	2480	12.16	11.31	14.77

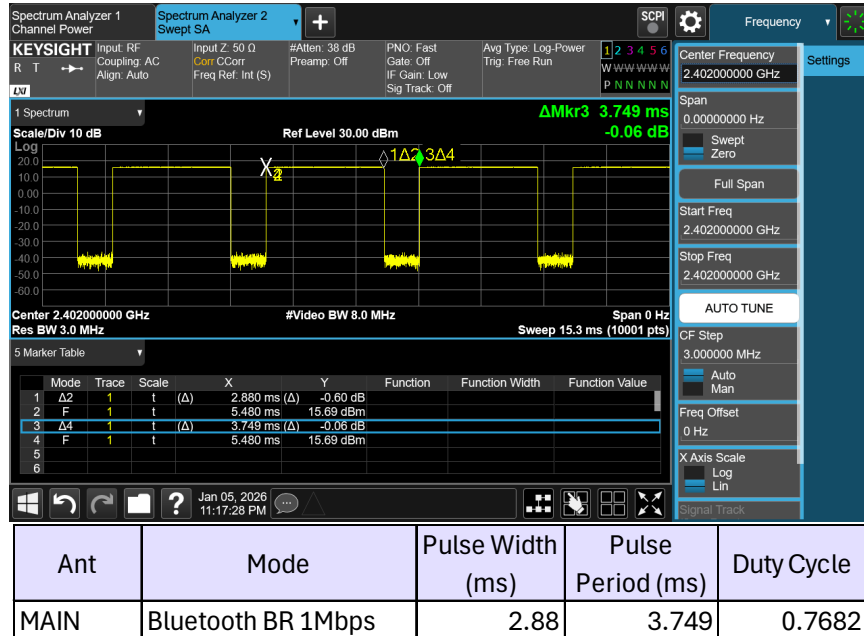


Figure 2-2 2.4 GHz Bluetooth MAIN Ant Duty Cycle Plot and Calculation

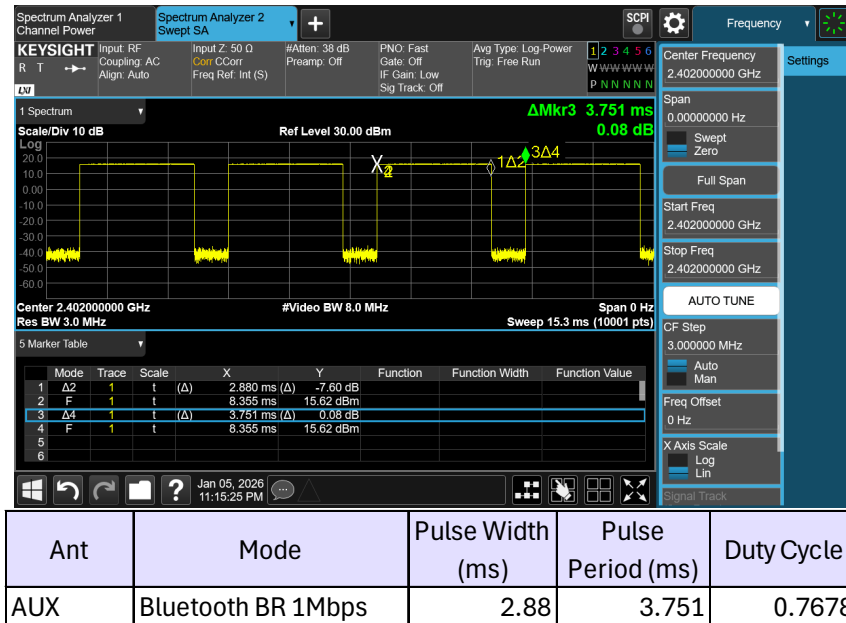
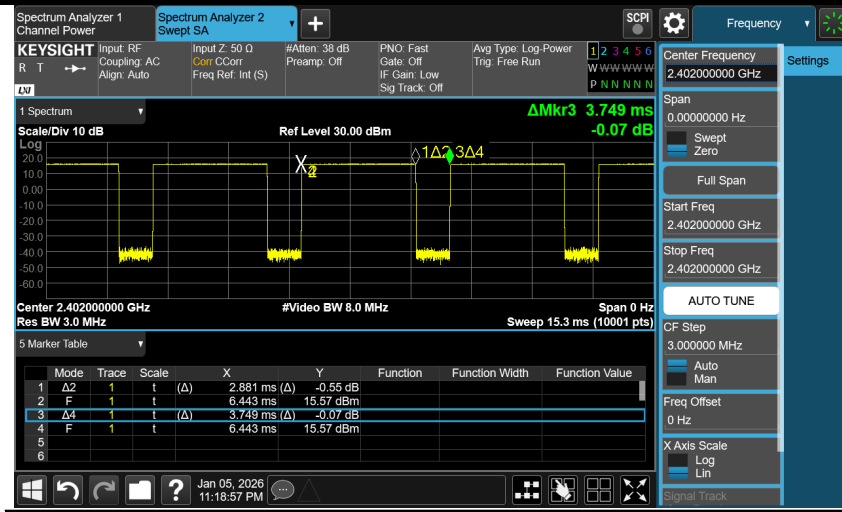


Figure 2-3 2.4 GHz Bluetooth AUX Ant Duty Cycle Plot and Calculation



Ant	Mode	Pulse Width (ms)	Pulse Period (ms)	Duty Cycle
MIMO	Bluetooth BR 1Mbps	2.881	3.749	0.7685

Figure 2-4 2.4 GHz Bluetooth MIMO Duty Cycle Plot and Calculation

3. DUT SAR Test Results

3.1. WIFI SAR Data

Table 3-1

Exposure Condition	Band/Mode	Antenna	DUT SN	Power Drift (dB)	Maximum Duty Cycle [%]	Measured Duty Cycle [%]	Frequency [MHz]	Channel	Modulation/Configuration	Data Rate (Mbps)	Maximum Allowed Power (dBm)	Measured Conducted Power (dBm)	Maximum Allowed Power 2nd Ant (dBm)	Measured Conducted Power 2nd Ant (dBm)	Separation Distance (mm)	Position	Measured 1g SAR [W/kg]	Reported 1g SAR [W/kg]	Test Plot
Body	2.4 GHz WIFI	AUX	0138J	0.13	100.0%	99.9%	2412	1	IEEE 802.11b - 22 MHz	1	13.00	12.11	N/A	N/A	0	Bottom	0.252	0.310	-
Body	2.4 GHz WIFI	AUX	0213A	0.07	100.0%	99.9%	2437	6	IEEE 802.11b - 22 MHz	1	13.00	12.21	N/A	N/A	0	Bottom	0.384	0.461	-
Body	2.4 GHz WIFI	AUX	0138J	0.02	100.0%	99.9%	2462	11	IEEE 802.11b - 22 MHz	1	13.00	12.18	N/A	N/A	0	Bottom	0.327	0.396	-
Body	2.4 GHz WIFI	MIMO	0138J	0.02	100.0%	99.9%	2412	1	IEEE 802.11b - 22 MHz	1	13.00	12.99	13.00	12.11	0	Bottom	0.386	0.474	-
Body	2.4 GHz WIFI	MIMO	0138J	0.03	100.0%	99.9%	2437	6	IEEE 802.11b - 22 MHz	1	13.00	13.00	13.00	12.14	0	Bottom	0.477	0.582	1
Body	2.4 GHz WIFI	MIMO	0138J	0.02	100.0%	99.9%	2462	11	IEEE 802.11b - 22 MHz	1	13.00	12.95	13.00	12.16	0	Bottom	0.399	0.485	-

Table 3-2

Exposure Condition	Band/Mode	Antenna	Additional Information	DUT SN	Power Drift (dB)	Maximum Duty Cycle [%]	Measured Duty Cycle [%]	Frequency [MHz]	Channel	Modulation/Configuration	Data Rate (Mbps)	UNII Band	Maximum Allowed Power (dBm)	Measured Conducted Power (dBm)	Maximum Allowed Power 2nd Ant (dBm)	Measured Conducted Power 2nd Ant (dBm)	Separation Distance (mm)	Position	Measured 1g SAR [W/kg]	Reported 1g SAR [W/kg]	Test Plot
Body	5 GHz WIFI	MIMO	12	0138J	0.13	100.0%	99.6%	5290	58	IEEE 802.11ac - 80 MHz	58.5	UNII-2A	12.00	11.24	12.00	11.82	0	Bottom	0.479	0.573	-
Body	5 GHz WIFI	MIMO	11	0138J	0.18	100.0%	99.6%	5530	106	IEEE 802.11ac - 80 MHz	58.5	UNII-2C	11.00	10.65	11.00	10.27	0	Bottom	0.606	0.720	-
Body	5 GHz WIFI	MIMO	10.5	0138J	0.18	100.0%	99.6%	5610	122	IEEE 802.11ac - 80 MHz	58.5	UNII-2C	11.00	10.74	11.00	10.55	0	Bottom	0.587	0.684	-
Body	5 GHz WIFI	MIMO	10	0138J	-0.03	100.0%	99.6%	5690	138	IEEE 802.11ac - 80 MHz	58.5	UNII-2C	11.00	10.95	11.00	10.66	0	Bottom	0.707	0.767	2
Body	5 GHz WIFI	MIMO	9	0138J	0.13	100.0%	99.6%	5775	155	IEEE 802.11ac - 80 MHz	58.5	UNII-3	9.50	8.42	9.50	9.49	0	Bottom	0.589	0.758	-
Body	5 GHz WIFI	MIMO	8.5	0138J	0.13	100.0%	99.6%	5855	171	IEEE 802.11ac - 80 MHz	58.5	UNII-4	9.50	9.00	9.50	9.05	0	Bottom	0.670	0.755	-

Table 3-3

Exposure Condition	Band/Mode	Antenna	DUT SN	Power Drift (dB)	Maximum Duty Cycle [%]	Measured Duty Cycle [%]	Frequency [MHz]	Channel	Modulation/Configuration	Data Rate (Mbps)	UNII Band	Maximum Allowed Power (dBm)	Measured Conducted Power (dBm)	Maximum Allowed Power 2nd Ant (dBm)	Measured Conducted Power 2nd Ant (dBm)	Separation Distance (mm)	Position	Measured 1g SAR [W/kg]	Reported 1g SAR [W/kg]	Measured APD [W/m²]	Reported APD [W/m²]	Test Plot
Body	6 GHz WIFI	MIMO	0138J	0.16	100.0%	99.6%	5985	7	IEEE 802.11ax - 80 MHz	58.5	UNII-5	8.00	7.21	8.00	7.93	0	Bottom	0.183	0.220	1.290	1.553	3
Body	6 GHz WIFI	MIMO	0138J	-0.12	100.0%	99.6%	6305	71	IEEE 802.11ax - 80 MHz	58.5	UNII-5	8.00	7.23	8.00	7.76	0	Bottom	0.116	0.139	0.781	0.936	-
Body	6 GHz WIFI	MIMO	0138J	0.19	100.0%	99.6%	6465	103	IEEE 802.11ax - 80 MHz	58.5	UNII-6	8.00	7.11	8.00	8.00	0	Bottom	0.133	0.164	0.955	1.177	-
Body	6 GHz WIFI	MIMO	0138J	0.19	100.0%	99.6%	6705	151	IEEE 802.11ax - 80 MHz	58.5	UNII-7	8.00	7.32	8.00	7.78	0	Bottom	0.115	0.135	0.892	1.047	-
Body	6 GHz WIFI	MIMO	0138J	0.19	100.0%	99.6%	7025	215	IEEE 802.11ax - 80 MHz	58.5	UNII-8	8.00	7.16	8.00	7.73	0	Bottom	0.143	0.174	0.944	1.150	-



3.2. Bluetooth SAR Data

Table 3-4

Exposure Condition	Band/Mode	Antenna	DUT SN	Power Drift [dB]	Maximum Duty Cycle [%]	Measured Duty Cycle [%]	Frequency [MHz]	Channel	Modulation/Configuration	Maximum Allowed Power [dBm]	Measured Conducted Power [dBm]	Maximum Allowed Power 2nd Ant [dBm]	Measured Conducted Power 2nd Ant [dBm]	Separation Distance [mm]	Position	Measured 1g SAR [W/kg]	Reported 1g SAR [W/kg]	Test Plot
Body	2.4 GHz Bluetooth	AUX	0213A	0.00	79.0%	76.8%	2402	0	FHSS	15.00	14.93	N/A	N/A	0	Bottom	0.236	0.247	-
Body	2.4 GHz Bluetooth	AUX	0213A	0.05	79.0%	76.8%	2441	39	FHSS	15.00	13.48	N/A	N/A	0	Bottom	0.266	0.388	-
Body	2.4 GHz Bluetooth	AUX	0213A	0.03	79.0%	76.8%	2480	78	FHSS	15.00	13.81	N/A	N/A	0	Bottom	0.327	0.443	4
Body	2.4 GHz Bluetooth	MAIN	0213A	-0.10	79.0%	76.8%	2402	0	FHSS	15.00	13.28	N/A	N/A	0	Bottom	0.171	0.261	-
Body	2.4 GHz Bluetooth	MAIN	0213A	0.18	79.0%	76.8%	2441	39	FHSS	15.00	13.01	N/A	N/A	0	Bottom	0.191	0.311	-
Body	2.4 GHz Bluetooth	MAIN	0213A	-0.10	79.0%	76.8%	2480	78	FHSS	15.00	13.67	N/A	N/A	0	Bottom	0.187	0.261	-
Body	2.4 GHz Bluetooth	MIMO	0138J	-0.03	79.0%	76.9%	2402	0	FHSS	13.00	12.19	13.00	12.04	0	Bottom	0.223	0.286	-
Body	2.4 GHz Bluetooth	MIMO	0138J	-0.03	79.0%	76.9%	2441	39	FHSS	13.00	12.04	13.00	11.54	0	Bottom	0.274	0.394	-
Body	2.4 GHz Bluetooth	MIMO	0138J	-0.03	79.0%	76.9%	2480	78	FHSS	13.00	12.16	13.00	11.31	0	Bottom	0.224	0.340	-

3.1. 6.5 GHz WIFI iPD Data

Table 3-5

Exposure Condition	Band/Mode	Antenna	DUT SN	Power Drift [dB]	Maximum Duty Cycle [%]	Measured Duty Cycle [%]	Frequency [MHz]	Channel	Modulation/Configuration	Data Rate (Mbps)	Maximum Allowed Power [dBm]	Measured Conducted Power [dBm]	Maximum Allowed Power 2nd Ant [dBm]	Measured Conducted Power 2nd Ant [dBm]	IEC 62479 Uncertainty Scaling Factor	Separation Distance [mm]	Position	Measured Normal psPD [W/m ²]	Scaled Normal psPD [W/m ²]	Measured Total psPD [W/m ²]	Scaled Total psPD [W/m ²]	Test Plot
Body	6 GHz WIFI	MIMO	0138J	-0.03	100.0%	99.6%	5985	7	IEEE 802.11ax 80 MHz	68.1	8.00	7.21	8.00	7.93	1.119	2	Bottom	2.220	2.992	3.870	5.215	5
Body	6 GHz WIFI	MIMO	0138J	-0.06	100.0%	99.6%	6305	71	IEEE 802.11ax 80 MHz	68.1	8.00	7.23	8.00	7.76	1.119	2	Bottom	1.850	2.482	2.920	3.917	-
Body	6 GHz WIFI	MIMO	0138J	-0.05	100.0%	99.6%	6465	103	IEEE 802.11ax 80 MHz	68.1	8.00	7.11	8.00	8.00	1.119	2	Bottom	0.461	0.636	1.020	1.407	-
Body	6 GHz WIFI	MIMO	0138J	-0.01	100.0%	99.6%	6705	151	IEEE 802.11ax 80 MHz	68.1	8.00	7.32	8.00	7.78	1.119	2	Bottom	0.259	0.340	1.100	1.445	-
Body	6 GHz WIFI	MIMO	0138J	-0.14	100.0%	99.6%	7025	215	IEEE 802.11ax 80 MHz	68.1	8.00	7.16	8.00	7.73	1.119	2	Bottom	0.695	0.947	1.660	2.263	-

3.2. General SAR Testing Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013 and FCC KDB Publication 447498 D04v01.
2. Liquid tissue depth was at least 15.0 cm for all frequencies.
3. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D04v01.
4. Batteries are fully charged at the beginning of the SAR measurements.
5. Simultaneous transmission analysis is provided in Appendix E.

3.3. WLAN Notes:

1. Since U-NII-1 and U-NII-2A bands have the same maximum output power and the highest reported SAR for U-NII-2A is less than 1.2 W/kg, SAR is not required for U-NII-1 band according to FCC KDB Publication 248227 D01v02r02.
2. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4 GHz WIFI operations, the initial test configuration was selected according to the 802.11 transmission modes with the highest maximum allowed powers. SAR for other 802.11 modes was not required due to the maximum allowed powers and the highest reported SAR.
3. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 5 GHz WIFI operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission modes were not investigated since the highest reported SAR for initial test configuration adjusted by the ratio of maximum



output powers is less than 1.2 W/kg for 1g evaluations.

4. Per KDB Publication 248227 D01v02r02, SAR for MIMO was evaluated by following the simultaneous SAR provisions from KDB Publication 447498 D04v01 making a measurement with both antennas transmitting simultaneously or by evaluating the summation of the 1g or 10g SAR values of each antenna.
5. When the maximum reported 1g averaged SAR is ≤ 0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg for 1g evaluations or all test channels were measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency is considered for SAR measurements.
6. 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. Procedures used to measure the duty factor are identical to that in the associated Part 15 test reports.
7. Per KDB Publication 248227 D01v02r02, channels 12 and 13 are not required for SAR testing when their maximum outpower is not higher than channel 1, 6 and 11.
8. For 6 GHz WIFI Operations:
 - Per FCC Guidance, both SAR and Power Density measurements were performed to demonstrate compliance.
 - Per FCC Guidance, SAR was performed using 6.5 GHz SAR probe calibration factor for WIFI 6E. Per October 2020 TCB workshop notes, 5 channels were tested for WIFI 6E.
 - Per October 2020 TCB Workshop notes, absorbed power density (APD) using a 4cm² averaging area is reported based on SAR measurements for 6 GHz WIFI.
 - Power density was calculated by repeated E-field measurements on two measurement planes separated by $\lambda/4$.
 - 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 1.52 dB (41.9%) was used to determine the psPD measurement scaling factor.

3.4. Bluetooth Note:

1. Per October 2016 TCB Workshop Notes, the reported SAR was scaled to the 79.0% transmission duty factor for Bluetooth to determine compliance. See Section 2.3 for the time domain plot and calculation for the duty factor of the device.
2. The highest frame average power configurations between Bluetooth and Bluetooth LE were evaluated for SAR.



4. DUT SAR Measurement Variability Requirement

Per FCC KDB Publication 865664 D01v01r04, SAR measurement variability was not required since the measured SAR results for a frequency band were less than 0.8 W/kg for 1g SAR and 2.0 W/kg for 10g SAR.

5. General Introduction

Title 47 of the Code of Federal Regulations (CFR) pertains to United States Federal regulation for Telecommunications. The **Federal Communications Commission (FCC)** is the agency responsible for implementing and enforcing these regulations. The rules define a **radiofrequency device** as any device which in its operation is capable of emitting radiofrequency energy by radiation, conduction, or other means.

47CFR §2.1093(b) states, “A **portable device** is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that the RF source's radiating structure(s) **is/are within 20 centimeters of the body of the user.**”

Also, 47CFR §2.1093(d)(6) states, that General population/uncontrolled exposure limits defined in §1.1310 “apply to portable devices intended for use by consumers or persons who are exposed as a consequence of their employment and may not be fully aware of the potential for exposure or cannot exercise control over their exposure.”

47CFR §2.1093(d)(2) states that evaluation of compliance within FCC’s SAR limits can be demonstrated by laboratory measurements. This test report serves this purpose.

6. Background on Radiofrequency (RF) Exposure Limits

6.1. Controlled Environment

Controlled environments are defined as locations where the RF field intensities have been adequately characterized by means of measurement or calculation and exposure is incurred by persons who are: aware of the potential for RF field exposure, cognizant of the intensity of the RF fields in their environment, aware of the potential health risks associated with RF field exposure and able to control their risk using mitigation strategies. 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.

6.2. Uncontrolled Environment

Uncontrolled environments are defined as locations where either insufficient assessment of RF fields have been conducted or where persons who are allowed access to these areas have not received proper RF field awareness/safety training and have no means to assess or, if required, to mitigate their exposure to RF fields. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed, or in which persons who may not be made fully aware of the potential for exposure, or cannot exercise control over their exposure. Members of the general public would fall under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

6.3. RF Exposure Limits for 100kHz – 6 GHz

Table 6-1 Human Exposure to RF Radiation Limits in 47 CFR §1.1310 - SAR Basic Restrictions for frequencies 100kHz ~ 6 GHz

Environment	Condition	SAR	Averaging volume
Uncontrolled / General Population	Head, Neck Trunk	1.6 W/kg	1g cube
	Extremity	4.0 W/kg	10g cube
Controlled	Head/Trunk	8 W/kg	1g cube
	Extremity / Limbs	20 W/kg	10g cube

6.4. RF Exposure Limits for 6 - 100 GHz

Per FCC 47 CFR §1.1310, the power density limits are applied for frequencies between 6 GHz and 100 GHz as shown below. Note that 10 W/m² is equivalent to 1 mW/cm².



Table 6-2 Human Exposure to RF Radiation Limits in 47 CFR §1.1310

Environment	Power Density (W/m ²)	Average Time (minutes)
Uncontrolled / General Population	10	30
Controlled	50	6

6.5. General FCC Policy on Human Exposure to RF

Quoted from the FCC OET [website](#):

The FCC is required by the National Environmental Policy Act of 1969, among other things, to evaluate the effect of emissions from FCC-regulated transmitters on the quality of the human environment. Several organizations, such as the American National Standards Institute (ANSI), the Institute of Electrical and Electronics Engineers, Inc. (IEEE), and the National Council on Radiation Protection and Measurements (NRC) have issued recommendations for human exposure to RF electromagnetic fields.

On August 1, 1996, the Commission adopted the NCRP's recommended Maximum Permissible Exposure limits for field strength and power density for the transmitters operating at frequencies of 300 kHz to 100 GHz. In addition, the Commission adopted the specific absorption rate (SAR) limits for devices operating within close proximity to the body as specified within the ANSI/IEEE C95.1-1992 guidelines. (See [Report and Order, FCC 96-326](#))

The Commission's requirements are detailed in Parts 1 and 2 of the FCC's Rules and Regulations [47 C.F.R. 1.1307(b), 1.1310, 2.1091, 2.1093]. The potential hazards associated with RF electromagnetic fields are discussed in the FCC's [RF Safety FAQ](#).



7. RF Safety Laboratory SAR Measurement System

7.1. SAR Measurement Hardware and Software

Peak spatially averaged SAR (psSAR) measurements are performed using a DASY8 robot system with cDASY8 module SAR software. The DASY8 is made by SPEAG in Switzerland and consists of a 6-axis robot, robot controller, computer, dosimetric probe, probe alignment light beam unit, and various SAR phantoms.

7.2. E-Field Probe

Manufacturer	Schmid & Partner Engineering AG
Model	EX3DV4
Description	Smallest isotropic electric (E-) field probe for high precision specific absorption rate (SAR) measurements
Frequency Range	4 MHz - 10.0 GHz
Dynamic Range	10 μ W/g – >100 mW/g
Overall Length (mm)	337
Body Diameter (mm)	12
Tip Length (mm)	9
Tip Diameter (mm)	2.5
Probe Tip to Sensor X Calibration Point (mm)	1
Probe Tip to Sensor Y Calibration Point (mm)	1
Applications	High precision dosimetric measurements in any exposure scenario (e.g. very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better than 30%
Compatibility	DASY8 robot + cDASY8 module SAR software

7.3. Peak Spatially Averaged SAR (psSAR) Measurements

SAR Evaluations are performed using the following procedure compliant to FCC KDB Publication 865664 D01v01r04 and IEEE 1528:2013:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-



head and body interface, and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04 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 and IEEE 1528:2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):
 - a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than the area scan and zoomscan resolutions specified in FCC KDB Publication 865664 D01v01r04 section 2.7.1 and IEEE 1528:2013 table 6. 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.
 - d. The zoom scan is confirmed to meet both of the following parameters if the result is $> 0.1 \text{ W/kg}$. If the result does not meet the below parameters, it is re-measured with a finer resolution scan until the below parameters are met.
 - (1) The smallest horizontal distance from the local SAR peaks to all points 3 dB below the SAR peak shall be larger than the horizontal grid steps in both x- and y-directions.
 - (2) The ratio of the SAR at the second measured point (M2) to the SAR at the closest measured point (M1) at the x-y location of the measured maximum SAR value shall be at least 30%
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.



7.4. Test Positions

7.4.1. Device Holder

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

7.4.2. Body SAR Test

Since bottom edge of the device is in close proximity to the user's body, body SAR is measured with the bottom edge positioned against a flat phantom at 0mm test distance, representative of the operating conditions expected by users.

7.5. RF Safety Laboratory SAR System Measurement Uncertainty

SAR Uncertainty for DUTs According to 62209-1528										
(Frequencies: 300 MHz - 10 GHz)										
Symbol	Input Quantity (Xi) (Source of Uncertainty)	62209-1528 Ref	Unc. (xi)	Prob. Dist. PDFi	Div(qi)	ci (1g)	ci (10g)	Std Unc (1g)	Std. Unc (10g)	vi
Measurement System Errors										
CF	Probe Calibration	8.4.1.1	18.6%	N (k=2)	2	1	1	9.30%	9.3%	∞
CFdrift	Probe Calibration Drift	8.4.1.2	1.7%	R	$\sqrt{3}$	1	1	1.0%	1.0%	∞
LIN	Probe Linearity and Detection Limit	8.4.1.3	4.7%	R	$\sqrt{3}$	1	1	2.7%	2.7%	∞
BBS	Broadband Signal	8.4.1.4	2.8%	R	$\sqrt{3}$	1	1	1.6%	1.6%	∞
ISO	Probe Isotropy	8.4.1.5	7.6%	R	$\sqrt{3}$	1	1	4.4%	4.4%	∞
DAE	Other probe and data acquisition errors	8.4.1.6	2.4%	N	1	1	1	2.4%	2.4%	∞
AMB	RF Ambient and Noise	8.4.1.7	1.8%	N	1	1	1	1.8%	1.8%	∞
Δ_{xyz}	Probe Positioning Errors	8.4.1.8	0.005 mm	N	1	0.5	0.5	0.3%	0.3%	
DAT	Data Processing Errors	8.4.1.9	3.5%	N	1	1	1	3.5%	3.5%	∞
Phantom and Device Errors										
LIQ(σ)	Measurement of Phantom Conductivity	8.4.2.1	2.5%	N	1	0.78	0.71	2.0%	1.8%	∞
LIQ(Tc)	Temperature Effects (Medium)	8.4.2.2	3.4%	R	$\sqrt{3}$	0.78	0.71	1.5%	1.4%	∞
EPS	Shell Permittivity	8.4.2.3	14.0%	R	$\sqrt{3}$	0.5	0.5	4.0%	4.0%	∞
DIS	Distance between the radiating element of the DUT and the phantom medium	8.4.2.4	2.0%	N	1	2	2	4.0%	4.0%	∞
Dxyz	Repeatability of Positioning the DUT or source against the phantom	8.4.2.5	1.0%	N	1	1	1	1.0%	1.0%	5
H	Device Holder Effects	8.4.2.6	3.6%	N	1	1	1	3.6%	3.6%	8
MOD	Effect of Operating mode on probe sensitivity	8.4.2.7	2.4%	R	$\sqrt{3}$	1	1	1.4%	1.4%	∞
RFdrift	Variation in SAR due to Drift in output of DUT	8.4.2.9	2.5%	N	1	1	1	2.5%	2.5%	∞
VAL	Validation Antenna Uncertainty (Validation measurement only)	8.4.2.10	0.0%	N	1	1	1	0.0%	0.0%	∞
Pin	Uncertainty in Accepted Power (Validation Measurement only)	8.4.2.11	0.0%	N	1	1	1	0.0%	0.0%	∞
Correction to the SAR Results										
C(ϵ' , σ)	Phantom Deviation from Target (ϵ' , σ)	8.4.3.1	1.9%	N	1	1	0.84	1.9%	1.6%	∞
C(R)	SAR Scaling	8.4.3.2	0.0%	R	$\sqrt{3}$	1	1	0.0%	0.0%	∞
u(Δ SAR)	Combined Uncertainty							14.2%	14.1%	∞
U	Expanded Uncertainty and Effective Degrees of Freedom (k=2)							28.4%	28.3%	



8. RF Safety Laboratory Power Density Measurement System

8.1. Power Density Measurement Hardware and Software

Peak spatially averaged power density (psPD) measurements are performed using a DASY8 robot system with cDASY8 module mmWave software. The DASY8 is made by SPEAG in Switzerland and consists of a 6-axis robot, robot controller, computer, dosimetric probe, and probe alignment light beam unit.

8.2. E-Field Probe

Manufacturer	Schmid & Partner Engineering AG
Model	EUmmWVx
Description	E-field probe for high precision power density (PD) measurements
Frequency Range	750 MHz - 110 GHz
Dynamic Range	< 20 - 10,000 V/m with PRE-10 (min < 50 - 3,000 V/m)
Overall Length (mm)	320
Body Diameter (mm)	8
Tip Length (mm)	23
Tip Diameter (mm)	8
Probe Tip to Sensor X Calibration Point (mm)	1.5
Probe Tip to Sensor Y Calibration Point (mm)	1.5
Applications	High precision dosimetric measurements of devices and transmitters above 6 GHz
Compatibility	DASY8 robot + cDASY8 module mmWave software



8.3. Peak Spatially Averaged Power Density (psPD) Measurements

Electromagnetic field reconstruction is based on Maxwell's equations and uses the Gerchberg-Saxton algorithm to calculate power density. The general measurement procedure is as follows:

1. Measure the local E-field at a point within the measurement region and where the field is higher than the noise level. This reference level will be used to assess output DUT drift during the measurement.
2. Measure the E-field over the measurement region. Measurement techniques are determined by the measurement system manufacturer. In the near-field, a step size of $\lambda/4$ or less is required.
3. Check that the peak is captured. Calculate the psPD on the evaluation surface from the measured fields and ensure the psPD is accurately calculated according to the equation below. Averaging area, A, and averaging shape is specified by the applicable exposure limits or regulatory requirements.

$$psPD = \frac{1}{2A_{av}} \iint_{A_{av}} \|Re\{E \times H\}\| dA$$

4. Measure the local E-field at the same location chosen in the first step. The DUT drift is estimated as the difference between the squared amplitude of the field values taken. When measurement drift was greater than 5%, the psPD measurement and drift measurements were repeated.

8.4. RF Safety Laboratory Power Density System Measurement Uncertainty

Power Density Uncertainty for DUTs According to IEC/IEEE 63195							
Symbol	Description	Unc. (+/- dB)	Probab. Distri.	Div.	cl	Std. Unc. (+/- dB)	vi
Measurement System							
CAL	Calibration	0.49	N	1	1	0.49	∞
COR	Probe correction	0.00	R	V3	1	0.00	∞
FRS	Frequency Response	0.20	R	V3	1	0.12	∞
SCC	Sensor cross coupling	0.00	R	V3	1	0.00	∞
ISO	Isotropy	0.50	R	V3	1	0.29	∞
LIN	Linearity	0.20	R	V3	1	0.12	∞
PSC	Probe scattering	0.00	R	V3	1	0.00	∞
PPD	Probe positioning offset	0.30	R	V3	1	0.17	∞
PPR	Probe positioning repeatability	0.04	R	V3	1	0.02	∞
SMD	Sensor mechanical offset	0.00	R	V3	1	0.00	∞
PSR	Probe spatial resolution	0.00	R	V3	1	0.00	∞
FLD	Field impedance dependence	0.00	R	V3	1	0.00	∞
MED	Measurement drift	0.05	R	V3	1	0.03	∞
APN	Amplitude and phase noise	0.04	R	V3	1	0.02	∞
TR	Measurement area truncation	0.00	R	V3	1	0.00	∞
DAQ	Data acquisition	0.03	N	1	1	0.03	∞
SMP	Sampling	0.00	R	V3	1	0.00	∞
REC	Field reconstruction	0.60	R	V3	1	0.35	∞
SNR	Signal-to-noise ratio	0.00	R	V3	1	0.00	∞
TRA	ITE/MEQ	0.00	R	V3	1	0.00	∞
SCA	Power density scaling	0.00	R	V3	1	0.00	∞
SAV	Spatial averaging	0.10	R	V3	1	0.06	∞
DUT and Environmental							
PC	Probe coupling with DUT	0.00	R	V3	1	0.00	∞
MOD	Modulation response	0.40	R	V3	1	0.23	∞
IT	Integration time	0.00	R	V3	1	0.00	∞
RT	Response time	0.00	R	V3	1	0.00	∞
DH	Device holder influence	0.10	R	V3	1	0.06	∞
DA	DUT alignment	0.00	R	V3	1	0.00	∞
AC	RF ambient conditions	0.04	R	V3	1	0.02	∞
TEM	Laboratory temperatures	0.05	R	V3	1	0.03	∞
REF	Laboratory reflections	0.04	R	V3	1	0.02	∞
MSI	Immunity / secondary reception	0.00	R	V3	1	0.00	∞
DRI	Drift of the DUT	0.21	R	V3	1	0.12	∞
Combined Standard Uncertainty						0.76	∞
Expanded Standard Uncertainty and Effective Degrees of Freedom (k=2)						1.52	



9. Technology Specific Test Setup Requirements

9.1. 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.

9.2. SAR Testing with 802.11 Transmitters

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

9.2.1. General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters.

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

9.2.2. Initial Test Position Procedure

The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.



9.2.3. 2.4 GHz SAR Test Requirements

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

- 1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
- 2) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements.

2.4 GHz 802.11 g/n OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is > 1.2 W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Procedures should be followed. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

9.2.4. OFDM Transmission Mode and SAR Test Channel Selection

When the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., then 802.11n or 802.11g then 802.11n, is used for SAR measurement.

9.2.5. Initial Test Configuration Procedure

For OFDM, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order IEEE 802.11 mode. The channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured. When there are multiple untested



channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

9.2.6. Subsequent Test Configuration Procedures

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



10. Equipment List

Manufacturer	Model	Description	Serial Number	Calibration Date	Calibration Due	CBT
Amplifier Research	1554GBAM1	RF Broadband Amplifier (4 - 8 GHz)	0554497			✓
Amplifier Research	551G4	RF Broadband Amplifier (800 MHz - 4.2 GHz)	331258			✓
Anritsu	MG3691B	Anritsu MG3691B Signal Generator	54914	3/10/24	3/10/26	
Anritsu	MA24118A	Microwave USB Power Sensor (10MHz - 18 GHz)	2123431	1/13/2025	1/13/2026	
Anritsu	MA24118A	Microwave USB Power Sensor (10MHz - 18 GHz)	2123500	1/13/2025	1/13/2026	
Rohde & Schwarz	NRP8S	Power Sensor 10 MHz - 8 GHz	114184	3/10/25	3/10/26	
Rohde & Schwarz	NRP8S	Power Sensor 10 MHz - 8 GHz	114183	3/10/25	3/10/26	
Rohde & Schwarz	NRP8S	Power Sensor 10 MHz - 8 GHz	114343	6/10/25	6/10/26	
Rohde & Schwarz	ZNL20	Vector Network Analyzer	101202	9/12/2024	9/12/2026	
Control Company	4040	Ambient Thermometer	230581662	7/17/2025	7/17/2027	
Control Company	4040	Ambient Thermometer	230581657	7/17/2025	7/17/2027	
Control Company	4040	Ambient Thermometer	230581656	7/17/2025	7/17/2027	
Control Company	4352	Long Stem Liquid Thermometer	230662212	4/23/2025	4/23/2027	
Control Company	4352	Long Stem Liquid Thermometer	230662223	4/23/2025	4/23/2027	
Control Company	4352	Long Stem Liquid Thermometer	230662291	4/23/2025	4/23/2027	
Micro-Coax	UFB205A-0-0240-30x30	SMA M-F RF Test Cable (DC - 18 GHz)	-			✓
Mini-Circuits	BW-N20W20+	20dB RF Fixed Attenuator (DC - 18 GHz)	-			✓
Mini-Circuits	BW-N20W20+	20dB RF Fixed Attenuator (DC - 18 GHz)	-			✓
Mini-Circuits	BW-S3W2+	3dB RF Fixed Attenuator (DC - 18 GHz)	-			✓
Mini-Circuits	BW-S3W2+	3dB RF Fixed Attenuator (DC - 18 GHz)	-			✓
Mini-Circuits	CBL-6FT-SMNM+	Precision Test Cable SMA/N (DC - 18 GHz)	3318			✓
Mini-Circuits	CBL-6FT-SMNM+	Precision Test Cable SMA/N (DC - 18 GHz)	3335			✓
Mini-Circuits	CBL-6FT-SMNM+	Precision Test Cable SMA/N (DC - 18 GHz)	3329			✓
Mini-Circuits	NF-SF50+	RF Adapter N Male to SMA Female (DC - 18 GHz)	-			✓
Mini-Circuits	VLF-8400+	Coaxial Low Pass Filter (DC - 8.4 GHz)	-			✓
Mini-Circuits	VLF-6000+	Coaxial Low Pass Filter (DC - 6 GHz)	-			✓
Mini-Circuits	VLF-3000+	Coaxial Low Pass Filter (DC - 3 GHz)	-			✓
Mitutoyo	CD-4"AX	Digital Caliper	B23243217	8/28/2025	8/28/2027	
Narda	24785-20	20 dB SMA Fixed Attenuator (DC - 4.0 GHz)	-			✓
Narda	4226-20 (26733)	20 dB SMA Directional Coupler (0.5 - 18 GHz)	0201			✓
SPEAG	10 GHz System Verification Source	10 GHz System Verification Source	1074	9/15/2025	9/15/2026	
SPEAG	D2450V2	2450 MHz System Validation Dipole	1112	11/25/2024	11/25/26	
SPEAG	D5GHV2	5GHz System Validation Dipole	1396	11/15/2024	11/15/2026	
SPEAG	D6.5GHV2	6.5GHz System Validation Dipole	1104	11/14/2024	11/14/2026	
SPEAG	DAE4ip	Data Acquisition Electronics with Integ. Power	1843	7/30/2025	7/30/2026	
SPEAG	DAE4ip	Data Acquisition Electronics with Integ. Power	1844	11/6/2025	11/6/2026	
SPEAG	DAE4ip	Data Acquisition Electronics with Integ. Power	1905	4/25/2025	4/25/2026	
SPEAG	DAE4ip	Data Acquisition Electronics with Integ. Power	1839	9/15/25	9/15/2026	
SPEAG	DAK-3.5	DAK-3.5 Dielectric Probe	1349	8/5/2025	8/5/2026	
SPEAG	EX3DV4	SAR Measurement Probe	7872	8/8/2025	8/8/2026	
SPEAG	EX3DV4	SAR Measurement Probe	7859	5/5/2025	5/5/2026	
SPEAG	EX3DV4	SAR Measurement Probe	7853	11/7/25	11/7/2026	
SPEAG	EUmmWV4	mmWave Measurement Probe	9690	9/17/2025	9/17/2026	
SPEAG	Powersource1	Signal Generator	4341	1/9/2025	1/9/2026	
SPEAG	SE UMS 171 E	MAIA Modulation and Interference Analyzer	1817			
SPEAG	SE UMS 171 EA	MAIA Modulation and Interference Analyzer	1820			
SPEAG	SE UMS 171 EA	MAIA Modulation and Interference Analyzer	1815			
SPEAG	SE UMS 176 C	ANT Wideband Communication Antenna	1601			
SPEAG	SE UMS 176 C	ANT Wideband Communication Antenna	1610			
SPEAG	SE UMS 176 C	ANT Wideband Communication Antenna	1590			

✓Note: Components calibrated before testing. Prior to testing, the measurement paths containing a cable, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator, power sensor, or VNA) 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.



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11. Conclusion

The SAR evaluation indicates that the DUT is capable of compliance with the RF radiation exposure limits of the FCC, 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.