

APPENDIX D: SAR TISSUE SPECIFICATIONS

Measurement Procedure for Tissue verification:

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

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

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

3 Composition / Information on ingredients

3.2 Mixtures

Description: Aqueous solution with surfactants and inhibitors

Declarable, or hazardous components:

CAS: 107-21-1 EINECS: 203-473-3 Reg.nr.: 01-2119456816-28-0000	Ethanediol STOT RE 2, H373; Acute Tox. 4, H302	>1.0-4.9%
CAS: 68608-26-4 EINECS: 271-781-5 Reg.nr.: 01-2119527859-22-0000	Sodium petroleum sulfonate Eye Irrit. 2, H319	< 2.9%
CAS: 107-41-5 EINECS: 203-489-0 Reg.nr.: 01-2119539582-35-0000	Hexylene Glycol / 2-Methyl-pentane-2,4-diol Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.9%
CAS: 68920-66-1 NLP: 500-236-9 Reg.nr.: 01-2119489407-26-0000	Alkoxyated alcohol, > C₁₆ Aquatic Chronic 2, H411; Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.0%

Additional information:

For the wording of the listed risk phrases refer to section 16.

Not mentioned CAS-, EINECS- or registration numbers are to be regarded as Proprietary/Confidential.

The specific chemical identity and/or exact percentage concentration of proprietary components is withheld as a trade secret.

Figure D-1

Note: Liquid recipes are proprietary SPEAG. Since the composition is approximate to the actual liquids utilized, the manufacturer tissue-equivalent liquid data sheets are provided below.

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Measurement Certificate / Material Test

Item Name **Head Tissue Simulating Liquid (HBL600-10000V6)**
Product No. SL AAH U16 BC (Batch: 240521-1)
Manufacturer SPEAG

Measurement Method

TSL dielectric parameters measured using calibrated DAK probe.

Target Parameters

Target parameters as defined in the IEEE 1528 and IEC 62209 compliance standards.

Test Condition

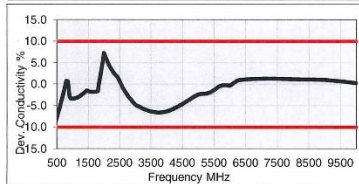
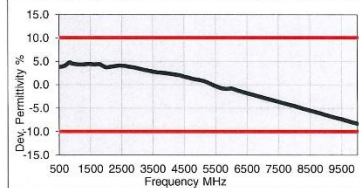
Ambient Condition 22°C ; 30% humidity
TSL Temperature 22°C
Test Date 22-May-24
Operator CL

Additional Information

TSL Density
TSL Heat-capacity

Results

f [MHz]	Measured			Target		Diff.to Target [%]	
	e'	e''	sigma	eps	sigma	Δ-eps	Δ-sigma
600	44.4	25.1	0.84	42.7	0.88	3.9	-4.7
750	43.8	21.2	0.89	41.9	0.89	4.4	-0.4
800	43.6	20.3	0.90	41.7	0.90	4.6	0.3
825	43.6	19.9	0.91	41.6	0.91	4.8	0.4
835	43.6	19.7	0.92	41.5	0.91	4.9	0.9
850	43.5	19.5	0.92	41.5	0.92	4.8	0.4
900	43.4	18.8	0.94	41.5	0.97	4.6	-3.1
1400	42.4	14.9	1.16	40.6	1.18	4.5	-1.6
1450	42.3	14.7	1.18	40.5	1.20	4.4	-1.7
1600	42.1	14.2	1.26	40.3	1.28	4.4	-1.9
1625	42.1	14.1	1.28	40.3	1.30	4.5	-1.4
1640	42.1	14.1	1.29	40.3	1.31	4.6	-1.2
1650	42.0	14.0	1.29	40.2	1.31	4.4	-1.8
1700	41.9	13.9	1.32	40.2	1.34	4.3	-1.6
1750	41.8	13.8	1.35	40.1	1.37	4.3	-1.5
1800	41.8	13.7	1.38	40.0	1.40	4.5	-1.4
1810	41.8	13.7	1.39	40.0	1.40	4.5	-0.7
1825	41.8	13.7	1.40	40.0	1.40	4.5	0.0
1850	41.7	13.7	1.41	40.0	1.40	4.3	0.7
1900	41.6	13.6	1.44	40.0	1.40	4.0	2.9
1950	41.5	13.5	1.47	40.0	1.40	3.8	5.0
2000	41.5	13.5	1.50	40.0	1.40	3.8	7.1
2050	41.4	13.5	1.54	39.9	1.44	3.7	6.6
2100	41.3	13.4	1.57	39.8	1.49	3.7	5.4
2150	41.3	13.4	1.60	39.7	1.53	3.9	4.3
2200	41.2	13.4	1.64	39.6	1.58	3.9	3.9
2250	41.1	13.4	1.68	39.6	1.62	3.9	3.6
2300	41.0	13.4	1.71	39.5	1.67	3.9	2.6
2350	41.0	13.4	1.75	39.4	1.71	4.1	2.3
2400	40.9	13.4	1.79	39.3	1.76	4.1	2.0
2450	40.8	13.4	1.83	39.2	1.80	4.1	1.7
2500	40.7	13.4	1.87	39.1	1.85	4.0	0.8
2550	40.7	13.4	1.91	39.1	1.91	4.2	0.0
2600	40.6	13.5	1.95	39.0	1.96	4.1	-0.7



3500	39.0	14.0	2.73	37.9	2.91	2.8	-6.4
3700	38.7	14.1	2.91	37.7	3.12	2.6	-6.6
5200	36.2	15.7	4.55	36.0	4.66	0.6	-2.2
5250	36.1	15.8	4.60	35.9	4.71	0.4	-2.2
5300	36.0	15.8	4.66	35.9	4.76	0.3	-2.1
5500	35.5	16.0	4.89	35.6	4.96	-0.3	-1.4
5600	35.3	16.1	5.02	35.5	5.07	-0.6	-0.9
5700	35.1	16.2	5.15	35.4	5.17	-0.8	-0.4
5800	35.0	16.3	5.26	35.3	5.27	-0.9	-0.3
6000	34.8	16.3	5.46	35.1	5.48	-0.8	-0.4
6500	33.8	17.0	6.14	34.5	6.07	-1.8	1.1
7000	33.0	17.3	6.73	33.9	6.65	-2.7	1.3
7500	32.1	17.6	7.33	33.3	7.24	-3.6	1.3
8000	31.2	17.8	7.93	32.7	7.84	-4.6	1.2
8500	30.4	18.1	8.54	32.1	8.45	-5.5	1.1
9000	29.5	18.3	9.17	31.5	9.08	-6.4	1.0
9500	28.7	18.5	9.78	31.0	9.71	-7.4	0.7
10000	27.9	18.7	10.38	30.4	10.36	-8.3	0.2

Figure D-2
600 – 10000 MHz Head Tissue Equivalent Matter

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APPENDIX E: MULTI-TX AND ANTENNA SAR CONSIDERATIONS

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E.1 Introduction

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

E.2 Simultaneous Transmission Procedures

This device contains transmitters that may operate simultaneously. Therefore, simultaneous transmission analysis is required. Per FCC KDB Publication 447498 D04v01 and IEC/IEEE 62209-1528:2020 Section 7.4.4, simultaneous transmission SAR test exclusion may be applied when the sum of the 1g SAR for all the simultaneous transmitting antennas in a specific physical test configuration is ≤ 1.6 W/kg. Alternatively, simultaneous transmission SAR test exclusion may be evaluated using Total Exposure Ratio (TER). The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1g SAR.

This device is enabled with Qualcomm® FastConnect Time Average SAR with pre-defined antenna groups (AG0 and AG1) for WLAN. Simultaneous transmission analysis is performed per antenna groups. Below analysis demonstrates the mutually exclusive operation of AG0 and AG1 and the compliance between each antenna group and BT/NFC.

Qualcomm FastConnect TAS algorithm directly adds the time-averaged RF exposure of all simultaneous transmissions of WLAN radios within an antenna group and controls the total RF exposure from all WLAN radios to not exceed FCC limit. Therefore, simultaneous transmission compliance between WLAN operations is demonstrated in the Part 2 Report during algorithm validation.

Note: Please see the original filing for the standalone reported SAR for modes and bands that were not evaluated in this permissive change.

E.3 Antenna Groups

Qualcomm's FastConnect WLAN TAS operates based on pre-defined antenna groups (AG). Tx antennas in the device are grouped based on spatial variation of RF exposure distributions, where the RF exposure of one AG is mutually exclusive from other AG. This is accomplished by demonstrating either of below conditions for all exposure scenarios:

- a) Sum of SAR of one antenna from each of the AGs and the RF exposure from radios outside Smart Transmit is less than regulatory limits. This condition must be demonstrated for all antenna combinations of AGs.
- (or)
- b) Every antenna from each AG meets SPLSR criteria (Section 4.3.2(c) in FCC KDB 447498 D04) with every antenna from another AG. This criteria must be demonstrated for all antenna combinations for each pair of AGs.

This device supports two AGs: AG0 and AG1, with AG0 having 1 antenna (R) and AG1 having 1 antenna (L), and two BT antennas and 1 NFC antenna outside of FastConnect. The conditions are verified through the following criteria

i) (SAR1 + SAR2 criteria): If SPLSR criteria is not used, then the highest reported ER at Plimit (or Pmax when Plimit > Pmax) for each antenna should be obtained out of all supported technologies and frequency bands for each DSI. Demonstrate that the sum of reported SAR of one antenna from each of the AGs and the sum of RF exposure from all supported radios outside of TAS should be less than the regulatory limit as given below for each DSI.

1. Obtain the worst-case reported ER for each antenna group (i.e., maximum reported SAR at Plimit (or Pmax when Plimit > Pmax) out of all supported

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technologies, frequency bands and antennas in AG0 and AG1), denoted as max.SAR.AG0 and max.SAR.AG1, and obtain the worst-case RF exposure for each external radio, and demonstrate that the TER sum of these RF exposures meets: $\{ [\text{max.SAR.AG0} + \text{max.SAR.AG1}] + \text{BT Ant R} + \text{BT Ant L} + \text{NFC} \} \leq 1..$

ii) (SPLSR criteria): For each antenna, obtain the highest reported ER value at Plimit out of all supported technologies for each frequency band. Using these values, demonstrate for a given DSI that every antenna from one AG meets SPLSR criteria with every antenna in another AG for all frequency bands. These criteria must be demonstrated for all antenna pair combinations irrespective of supported simultaneous transmission scenarios as given below for each DSI:

- SPLSR criteria should be met for all antenna pair combinations of AG0 and AG1: {antenna (R) in AG0; antenna (L) in AG1. As it can be seen, these include all combinations of antenna groups, antennas, and frequency bands.}

E.4 Body with Motion (DSI = 1) Antenna Group and Simultaneous Analysis

Table 1
DSI=1 Body with Motion Highest Reported ER per AG (at 0mm)

AG0 Ratio to Limit			
	Configuration	R	Max
Body	Back	0.049	0.049
	Top	0.385	0.385
	Bottom	0.005	0.005
	Right	0.026	0.026
	Left	0.004	0.004
AG1 Ratio to Limit			
	Configuration	L	Max
Body	Back	0.063	0.063
	Top	0.408	0.408
	Bottom	0.009	0.009
	Right	0.003	0.003
	Left	0.088	0.088

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Table 2
DSI=1 Body with Motion AG Verification (at 0mm)

Body	Configuration	AG0 Ratio to Limit	AG1 Ratio to Limit	Bluetooth Ant R at 12 dBm Ratio to Limit	Bluetooth Ant L at 12 dBm Ratio to Limit	NFC Ratio to Limit	AG0 + AG1 + BT Ant R + BT Ant L + NFC Ratio to Limit
	Back	0.049	0.063	0.006	0.014	0.000	0.132
	Top	0.385	0.408	0.043	0.079	0.000	0.915
	Bottom	0.005	0.009	0.003	0.009	0.000	0.026
	Right	0.026	0.003	0.003	0.000	0.000	0.032
	Left	0.004	0.088	0.000	0.003	0.000	0.095

Notes:

- For all combinations where the TER sum of AG0+AG1+BT Ant R + BT Ant L + NFC is less than 1, there's no further analysis required for compliance demonstration.

Table 3
DSI=1 Body with Motion Bluetooth Simultaneous Transmission when WLAN is Inactive

Body	Configuration	Bluetooth Ant R at 17.25 dBm Ratio to Limit	Bluetooth Ant L at 17.25 dBm Ratio to Limit	NFC Ratio to Limit	BT Ant R + BT Ant L + NFC Ratio to Limit
	Back	0.049	0.076	0.000	0.125
	Top	0.356	0.385	0.000	0.741
	Bottom	0.003	0.009	0.000	0.012
	Right	0.003	0.000	0.000	0.003
	Left	0.000	0.003	0.000	0.003

Notes:

- For all combinations where the TER sum of BT Ant R + BT Ant L + NFC is less than 1, there's no further analysis required for compliance demonstration.

E.5 Conclusion

The above numerical summed SAR results for all the combinations of antenna groups and external radios are sufficient to show that AG0 is mutually exclusive from AG1 and that simultaneous transmission cases will not exceed the SAR limit and therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D04v01 and IEEE 1528- 2013 Section 6.3.4.1

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APPENDIX F: SAR SYSTEM VALIDATION

Per FCC KDB Publication 865664 D02v01r02, SAR system validation status should be documented to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles were used with the required tissue- equivalent media for system validation, according to the procedures outlined in FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013. Since SAR probe calibrations are frequency dependent, each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters has been included.

Table F-1
SAR System Validation Summary

SAR System	Freq. (MHz)	Date	Probe SN	DAE	Probe Cal Point		Cond. (σ)	Perm. (ϵ_r)	CW VALIDATION			MOD. VALIDATION		
									SENSITIVITY	PROBE LINEARITY	PROBE ISOTROPY	MOD. TYPE	DUTY FACTOR	PAR
G	2450	04/09/2025	7488	1415	2450	Head	1.867	39.580	PASS	PASS	PASS	OFDM/TDD	PASS	PASS
S	5250	06/28/2025	7661	1558	5250	Head	4.678	37.252	PASS	PASS	PASS	OFDM	N/A	PASS
S	5600	06/28/2025	7661	1558	5600	Head	5.089	36.678	PASS	PASS	PASS	OFDM	N/A	PASS
S	5750	06/28/2025	7661	1558	5750	Head	5.258	36.333	PASS	PASS	PASS	OFDM	N/A	PASS
S	5850	06/28/2025	7661	1558	5850	Head	5.372	36.168	PASS	PASS	PASS	OFDM	N/A	PASS
R	6500	02/27/2025	7570	1638	6500	Head	5.868	34.355	PASS	PASS	PASS	OFDM	N/A	PASS

NOTE: The probes have been calibrated for both CW and modulated signals. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664 D01v01r04 for scenarios when CW probe calibrations are used with other signal types. SAR systems were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5 dB), such as OFDM according to FCC KDB Publication 865664 D01v01r04.

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APPENDIX G: IEEE 802.11AX/BE RU SAR EXCLUSION

G.1 IEEE 802.11ax/be RU SAR Exclusion

To make the most efficient use of the additional available subcarriers (data tones), IEEE 802.11ax/be can utilize Orthogonal Frequency-Division Multiple Access (OFDMA) which divides the existing 802.11 channels into smaller subchannels called Resource Units (RUs). Possible RU sizes are: 26T, 52T, 52T+26T, 106T, 106T+26T, 242T, 484T, 484T+242T, 996T, 996T+242T, 996T+484T, 996Tx2, 996T*2+484T; 996*3; 996T*3+484T and for WIFI 6E additionally 996Tx4.

Per FCC Guidance, 802.11ax/be was considered a higher order 802.11 mode when compared to a/b/g/n/ac to apply KDB Publication 248227 D01v02r02 for OFDM mode selection. Therefore, SAR tests were not required for 802.11ax/be based on the maximum allowed output powers of OFDM modes and the reported SAR values. Per FCC Guidance, maximum conducted powers were performed for each RU size to demonstrate that the output powers would not be higher than the other OFDM 802.11 modes.

G.2 RU Target Powers

G.2.1 2.4 GHz WLAN 802.11ax/be RU WLAN Output Power

The below table is applicable in the following conditions:

- Pmax, DSI=0 (No Motion)

Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
	SISO/SISO in MIMO								SISO/SISO in MIMO							
	Ant R				Ant L				Ant R				Ant L			
Maximum / Nominal Power	26T	52T, 52T+26T	106T, 106T+26T	242T	26T	52T, 52T+26T	106T, 106T+26T	242T	26T	52T, 52T+26T	106T, 106T+26T	242T	26T	52T, 52T+26T	106T, 106T+26T	242T
	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
2.45 GHz 20MHz BW	19.00	18.00	19.00	18.00	19.00	17.50	16.50	19.00	18.00	19.00	18.00	19.00	18.00	19.00	17.50	16.50
			ch. 1: 18.00	17.00	ch. 1: 16.00	15.00	ch. 1: 12.50	11.50			ch. 1: 18.00	17.00	ch. 1: 16.00	15.00	ch. 1: 12.50	11.50
					ch. 2: 18.50	17.50	ch. 2: 14.50	13.50					ch. 2: 18.50	17.50	ch. 2: 14.50	13.50
							ch. 3: 16.00	15.00							ch. 3: 16.00	15.00
							ch. 9: 15.00	14.00							ch. 9: 15.00	14.00
	ch. 10: 18.50	17.50	ch. 10: 18.50	17.50	ch. 10: 18.50	17.50	ch. 10: 15.00	14.00	ch. 10: 18.50	17.50	ch. 10: 18.50	17.50	ch. 10: 18.50	17.50	ch. 10: 15.00	14.00
	ch. 11: 18.00	17.00	ch. 11: 18.00	17.00	ch. 11: 17.50	16.50	ch. 11: 14.00	13.00	ch. 11: 18.00	17.00	ch. 11: 18.00	17.00	ch. 11: 17.50	16.50	ch. 11: 14.00	13.00
	ch. 12: -5.50	-6.50	ch. 12: -0.50	-1.50	ch. 12: -0.50	-1.50	ch. 12: 11.00	10.00	ch. 12: -5.50	-6.50	ch. 12: -0.50	-1.50	ch. 12: -0.50	-1.50	ch. 12: 11.00	10.00
	ch. 13: -9.50	-10.50	ch. 13: -7.00	-8.00	ch. 13: -4.50	-5.50	ch. 13: -2.00	-3.00	ch. 13: -9.50	-10.50	ch. 13: -7.00	-8.00	ch. 13: -4.50	-5.50	ch. 13: -2.00	-3.00
2.45 GHz 40MHz BW	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
	SISO/SISO in MIMO								SISO/SISO in MIMO							
	Ant R				Ant L				Ant R				Ant L			
	484T, 484T+242T				484T, 484T+242T				484T, 484T+242T				484T, 484T+242T			
	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
	ch. 3: 11.00	10.00	ch. 3: 11.00	10.00	ch. 3: 11.00	10.00	ch. 3: 11.00	10.00	ch. 3: 11.00	10.00	ch. 3: 11.00	10.00	ch. 3: 11.00	10.00	ch. 3: 11.00	10.00
	ch. 4: 12.50	11.50	ch. 4: 12.50	11.50	ch. 4: 12.50	11.50	ch. 4: 12.50	11.50	ch. 4: 12.50	11.50	ch. 4: 12.50	11.50	ch. 4: 12.50	11.50	ch. 4: 12.50	11.50
	ch. 5: 14.00	13.00	ch. 5: 14.00	13.00	ch. 5: 14.00	13.00	ch. 5: 14.00	13.00	ch. 5: 14.00	13.00	ch. 5: 14.00	13.00	ch. 5: 14.00	13.00	ch. 5: 14.00	13.00
	ch. 6: 15.00	14.00	ch. 6: 15.00	14.00	ch. 6: 15.00	14.00	ch. 6: 15.00	14.00	ch. 6: 15.00	14.00	ch. 6: 15.00	14.00	ch. 6: 15.00	14.00	ch. 6: 15.00	14.00
	ch. 7: 12.50	11.50	ch. 7: 12.50	11.50	ch. 7: 12.50	11.50	ch. 7: 12.50	11.50	ch. 7: 12.50	11.50	ch. 7: 12.50	11.50	ch. 7: 12.50	11.50	ch. 7: 12.50	11.50
	ch. 8: 11.00	10.00	ch. 8: 11.00	10.00	ch. 8: 11.00	10.00	ch. 8: 11.00	10.00	ch. 8: 11.00	10.00	ch. 8: 11.00	10.00	ch. 8: 11.00	10.00	ch. 8: 11.00	10.00
	ch. 9: 11.00	10.00	ch. 9: 11.00	10.00	ch. 9: 11.00	10.00	ch. 9: 11.00	10.00	ch. 9: 11.00	10.00	ch. 9: 11.00	10.00	ch. 9: 11.00	10.00	ch. 9: 11.00	10.00
	ch. 10: 11.00	10.00	ch. 10: 11.00	10.00	ch. 10: 11.00	10.00	ch. 10: 11.00	10.00	ch. 10: 11.00	10.00	ch. 10: 11.00	10.00	ch. 10: 11.00	10.00	ch. 10: 11.00	10.00
	ch. 11: 0.00	-1.00	ch. 11: 0.00	-1.00	ch. 11: 0.00	-1.00	ch. 11: 0.00	-1.00	ch. 11: 0.00	-1.00	ch. 11: 0.00	-1.00	ch. 11: 0.00	-1.00	ch. 11: 0.00	-1.00

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The below table is applicable in the following conditions:

- DSI = 1 (Motion)

Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
	SISO/SISO in MIMO								SISO/SISO in MIMO							
	Ant R								Ant L							
	26T		52T, 52T+26T		106T, 106T+26T		242T		26T		52T, 52T+26T		106T, 106T+26T		242T	
Maximum / Nominal Power	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
2.45 GHz 20MHz BW	18.25	17.25	18.25	17.25	18.25	17.25	17.50	16.50	18.25	17.25	18.25	17.25	18.25	17.25	17.50	16.50
			ch. 1: 18.00	17.00	ch. 1: 16.00	15.00	ch. 1: 12.50 ch. 2: 14.50 ch. 3: 16.00 ch. 9: 15.00 ch. 10: 15.00	11.50 13.50 15.00 14.00 14.00			ch. 1: 18.00	17.00	ch. 1: 16.00	15.00	ch. 1: 12.50 ch. 2: 14.50 ch. 3: 16.00 ch. 9: 15.00 ch. 10: 15.00	11.50 13.50 15.00 14.00 14.00
	ch. 11: 18.00 ch. 12: -5.50 ch. 13: -9.50	17.00 -6.50 -10.50	ch. 11: 18.00 ch. 12: -0.50 ch. 13: -7.00	17.00 -1.50 -8.00	ch. 11: 17.50 ch. 12: -0.50 ch. 13: -4.50	16.50 -1.50 -5.50	ch. 11: 14.00 ch. 12: 11.00 ch. 13: -2.00	13.00 10.00 -3.00	ch. 11: 18.00 ch. 12: -5.50 ch. 13: -9.50	17.00 -6.50 -10.50	ch. 11: 18.00 ch. 12: -0.50 ch. 13: -7.00	17.00 -1.50 -8.00	ch. 11: 17.50 ch. 12: -0.50 ch. 13: -4.50	16.50 -1.50 -5.50	ch. 11: 14.00 ch. 12: 11.00 ch. 13: -2.00	13.00 10.00 -3.00
	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
	SISO/SISO in MIMO								SISO/SISO in MIMO							
	Ant R								Ant L							
	484T, 484T+242T								484T, 484T+242T							
	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
	ch. 3: 11.00 ch. 4: 12.50 ch. 5: 14.00 ch. 6: 15.00 ch. 7: 12.50 ch. 8: 11.00 ch. 9: 11.00 ch. 10: 11.00 ch. 11: 0.00	10.00 11.50 13.00 14.00 11.50 10.00 10.00 10.00 -1.00	ch. 3: 11.00 ch. 4: 12.50 ch. 5: 14.00 ch. 6: 15.00 ch. 7: 12.50 ch. 8: 11.00 ch. 9: 11.00 ch. 10: 11.00 ch. 11: 0.00	10.00 11.50 13.00 14.00 11.50 10.00 10.00 10.00 -1.00												

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G.2.2 5 GHz WLAN 802.11ax/be RU WLAN Output Power

The below table is applicable in the following conditions:

- Pmax, DSI=0 (No Motion)

		IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
Mode	Band	SISO/SISO in MIMO								SISO/SISO in MIMO							
		Ant R								Ant L							
		26T		52T, 52T+26T		106T, 106T+26T		242T		26T		52T, 52T+26T		106T, 106T+26T		242T	
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
5 GHz WiFi (20MHz BW)	UNII-1	9.00	8.00	12.50	11.50	15.50	14.50	18.50	17.50	9.00	8.00	12.50	11.50	15.50	14.50	18.50	17.50
	UNII-2A	9.00	8.00	12.00	11.00	15.00	14.00	18.00	17.00	9.00	8.00	12.00	11.00	15.00	14.00	18.00	17.00
	UNII-2C	9.00	8.00	11.50	10.50	15.00	14.00	18.00	17.00	9.00	8.00	11.50	10.50	15.00	14.00	18.00	17.00
	UNII-3	20.50	19.50	20.50	19.50	20.50	19.50	20.50	19.50	20.50	19.50	20.50	19.50	20.50	19.50	20.50	19.50
	UNII-4	5.50	4.50	9.50	8.50	12.00	11.00	14.50	13.50	5.50	4.50	9.50	8.50	12.00	11.00	14.50	13.50
Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
		SISO/SISO in MIMO								SISO/SISO in MIMO							
		Ant R								Ant L							
		484T, 484T+242T				484T, 484T+242T											
Maximum / Nominal Power		Max	Nom.	Max	Nom.												
5 GHz WiFi (40MHz BW)	UNII-1	15.00	14.00	15.00	14.00												
	UNII-2A	15.00	14.00	15.00	14.00												
	UNII-2C	15.00	14.00	15.00	14.00												
	UNII-3	18.00	17.00	18.00	17.00												
Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
		SISO/SISO in MIMO								SISO/SISO in MIMO							
		Ant R								Ant L							
		996T, 996T+484T, 996T+484T+242T				996T, 996T+484T, 996T+484T+242T											
Maximum / Nominal Power		Max	Nom.	Max	Nom.												
5 GHz WiFi (80MHz BW)	UNII-1	12.00	11.00	12.00	11.00												
	UNII-2A	13.00	12.00	13.00	12.00												
	UNII-2C	18.00	17.00	18.00	17.00												
	UNII-3	ch. 106: 13.50	12.50	ch. 106: 13.50	12.50	ch. 106: 13.50	12.50	ch. 106: 13.50	12.50	ch. 106: 13.50	12.50	ch. 106: 13.50	12.50	ch. 106: 13.50	12.50	ch. 106: 13.50	12.50
	UNII-4	13.50	12.50	13.50	12.50												
Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
		SISO/SISO in MIMO								SISO/SISO in MIMO							
		Ant R								Ant L							
		996T*2, 996T*2+484T, 996T*3, 996T*3+484T				996T*2, 996T*2+484T, 996T*3, 996T*3+484T											
Maximum / Nominal Power		Max	Nom.	Max	Nom.												
5 GHz WiFi (160MHz BW)	UNII-1/2A	11.50	10.50	11.50	10.50												
	UNII-2C	12.50	11.50	12.50	11.50												
	UNII-3/4	12.50	11.50	12.50	11.50												

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The below table is applicable in the following conditions:

- DSI =1 (Motion)

Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
		SISO/SISO in MIMO								SISO/SISO in MIMO							
		Ant R								Ant L							
		26T		52T, 52T+26T		106T, 106T+26T		242T		26T		52T, 52T+26T		106T, 106T+26T		242T	
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
5 GHz WiFi (20MHz BW)	UNII-1	9.00	8.00	12.50 ch. 36: 12.00	11.50 11.00	15.50 ch. 36: 15.00	14.50 14.00	16.75	15.75	9.00	8.00	12.50 ch. 36: 12.00	11.50 11.00	15.50 ch. 36: 15.00	14.50 14.00	17.25	16.25
	UNII-2A	9.00	8.00	12.00 ch. 64: 11.00	11.00 10.00	15.00 ch. 64: 14.00	14.00 13.00	16.25 ch. 64: 15.00	15.25 14.00	9.00	8.00	12.00 ch. 64: 11.00	11.00 10.00	15.00 ch. 64: 14.00	14.00 13.00	17.25 ch. 64: 15.00	16.25 14.00
	UNII-2C	9.00	8.00	11.50 ch. 144: 11.00	10.50 10.00	15.00 ch. 144: 14.00	14.00 13.00	15.50	14.50	9.00	8.00	11.50 ch. 144: 11.00	10.50 10.00	15.00 ch. 144: 14.00	14.00 13.00	15.00	14.00
	UNII-3	15.00 ch. 149: 9.00	14.00 8.00	15.00 ch. 149: 11.00	14.00 10.00	15.00 ch. 149: 14.00	14.00 13.00	15.00	14.00	15.00 ch. 149: 9.00	14.00 8.00	15.00 ch. 149: 11.00	14.00 10.00	15.00 ch. 149: 14.00	14.00 13.00	15.00	14.00
	UNII-4	5.50	4.50	9.50	8.50	12.00	11.00	14.50	13.50	5.50	4.50	9.50	8.50	12.00	11.00	14.50	13.50
Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
		SISO/SISO in MIMO								SISO/SISO in MIMO							
		Ant R								Ant L							
		484T, 484T+242T				484T, 484T+242T											
Maximum / Nominal Power		Max	Nom.	Max	Nom.												
5 GHz WiFi (40MHz BW)	UNII-1	15.00	14.00	15.00	14.00												
	UNII-2A	15.00	14.00	15.00	14.00												
	UNII-2C	15.00	14.00	15.00	14.00												
	UNII-3	15.00	14.00	15.00	14.00												
	UNII-4	15.00	14.00	14.75	13.75												
Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
		SISO/SISO in MIMO								SISO/SISO in MIMO							
		Ant R								Ant L							
		996T, 996T+484T, 996T+484T+242T				996T, 996T+484T, 996T+484T+242T											
Maximum / Nominal Power		Max	Nom.	Max	Nom.												
5 GHz WiFi (80MHz BW)	UNII-1	12.00	11.00	12.00	11.00												
	UNII-2A	13.00	12.00	13.00	12.00												
	UNII-2C	15.50	14.50	15.00	14.00												
		ch. 106: 13.50 ch. 122: 13.50	12.50 12.50	ch. 106: 13.50 ch. 122: 13.50	12.50 12.50												
	UNII-3	13.50	12.50	13.50	12.50												
UNII-4	13.00	12.00	13.00	12.00													
Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
		SISO/SISO in MIMO								SISO/SISO in MIMO							
		Ant R								Ant L							
		996T*2, 996T*2+484T, 996T*3, 996T*3+484T				996T*2, 996T*2+484T, 996T*3, 996T*3+484T											
Maximum / Nominal Power		Max	Nom.	Max	Nom.												
5 GHz WiFi (160MHz BW)	UNII-1/2A	11.50	10.50	11.50	10.50												
	UNII-2C	12.50	11.50	12.50	11.50												
	UNII-3/4	12.50	11.50	12.50	11.50												

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G.2.3 6 GHz WLAN SP 802.11ax/be RU WLAN Output Power

The below table is applicable in the following conditions:

- Pmax, DSI=0 (No Motion)

Mode		Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
			SISO/SISO in MIMO								SISO/SISO in MIMO							
			Ant R								Ant L							
			26T		52T, 52T+26T		106T, 106T+26T		242T		26T		52T, 52T+26T		106T, 106T+26T		242T	
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	
6 GHz WIFI (20MHz BW) - SP	UNII-5	8.50 ch. 2: -1.50	7.50 -2.50	12.00 ch. 2: 1.50	11.00 0.50	14.00 ch. 2: 3.50	13.00 -2.50	16.50 ch. 2: 7.00	15.50 6.00	8.50 ch. 2: -1.50	7.50 -2.50	12.00 ch. 2: 1.50	11.00 0.50	14.00 ch. 2: 3.50	13.00 2.50	16.50 ch. 2: 7.00	15.50 6.00	
	UNII-7	8.50	7.50	12.00	11.00	15.00	14.00	17.00	16.00	8.50	7.50	12.00	11.00	15.00	14.00	17.00	16.00	
Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)																
		SISO/SISO in MIMO								SISO/SISO in MIMO								
		Ant R								Ant L								
		484T, 484T+242T				484T, 484T+242T				484T, 484T+242T				484T, 484T+242T				
Maximum / Nominal Power		Max	Nom.	Max	Nom.													
6 GHz WIFI (40MHz BW) - SP	UNII-5	17.50	16.50	17.50	16.50													
	UNII-7	18.00 ch. 179: 15.00	17.00 14.00	18.00 ch. 179: 15.00	17.00 14.00													
Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)																
		SISO/SISO in MIMO								SISO/SISO in MIMO								
		Ant R								Ant L								
		996T, 996T+484T, 996T+484T+242T				996T, 996T+484T, 996T+484T+242T				996T, 996T+484T, 996T+484T+242T				996T, 996T+484T, 996T+484T+242T				
Maximum / Nominal Power		Max	Nom.	Max	Nom.													
6 GHz WIFI (80MHz BW) - SP	UNII-5	16.00	15.00	16.00	15.00													
	UNII-7	18.00	17.00	18.00	17.00													
Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)																
		SISO/SISO in MIMO								SISO/SISO in MIMO								
		Ant R								Ant L								
		996T*2, 996T*2+484T, 996T*3, 996T*3+484T				996T*2, 996T*2+484T, 996T*3, 996T*3+484T				996T*2, 996T*2+484T, 996T*3, 996T*3+484T				996T*2, 996T*2+484T, 996T*3, 996T*3+484T				
Maximum / Nominal Power		Max	Nom.	Max	Nom.													
6 GHz WIFI (160MHz BW) - SP	UNII-5	16.00	15.00	16.00	15.00													
	UNII-7	17.50	16.50	17.50	16.50													
Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)																
		SISO/SISO in MIMO								SISO/SISO in MIMO								
		Ant R								Ant L								
		996T*4				996T*4				996T*4				996T*4				
Maximum / Nominal Power		Max	Nom.	Max	Nom.													
6 GHz WIFI (320MHz BW) - SP	UNII-5	15.50	14.50	15.50	14.50													

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The below table is applicable in the following conditions:

- DSI =1 (Motion)

Mode		Band		IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)																	
				SISO/SISO in MIMO								SISO/SISO in MIMO									
				Ant R								Ant L									
				26T		52T, 52T+26T		106T, 106T+26T		242T		26T		52T, 52T+26T		106T, 106T+26T		242T			
Maximum / Nominal Power		Max		Nom.		Max		Nom.		Max		Nom.		Max		Nom.		Max		Nom.	
6 GHz WiFi (20MHz BW) - SP		UNII-5	ch. 2: 8.50	-1.50	7.50	12.00	11.00	13.75	12.75	13.75	12.75	6.00	ch. 2: 8.50	-1.50	7.50	12.00	11.00	14.00	13.00	14.25	13.25
		UNII-7	8.50		7.50	12.00	11.00	13.75	12.75	13.75	12.75	8.50		7.50	12.00	11.00	14.75		13.75	14.75	13.75
Mode		Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)																		
			SISO/SISO in MIMO								SISO/SISO in MIMO										
			Ant R								Ant L										
			484T, 484T+242T				484T, 484T+242T														
Maximum / Nominal Power		Max		Nom.		Max		Nom.													
6 GHz WiFi (40MHz BW) - SP		UNII-5	13.75		12.75		14.25		13.25												
		UNII-7	13.75		12.75		14.75		13.75												
Mode		Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)																		
			SISO/SISO in MIMO								SISO/SISO in MIMO										
			Ant R								Ant L										
			996T, 996T+484T, 996T+484T+242T				996T, 996T+484T, 996T+484T+242T														
Maximum / Nominal Power		Max		Nom.		Max		Nom.													
6 GHz WiFi (80MHz BW) - SP		UNII-5	13.75		12.75		14.25		13.25												
		UNII-7	13.75		12.75		14.75		13.75												
Mode		Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)																		
			SISO/SISO in MIMO								SISO/SISO in MIMO										
			Ant R								Ant L										
			996T*2, 996T*2+484T, 996T*3, 996T*3+484T				996T*2, 996T*2+484T, 996T*3, 996T*3+484T														
Maximum / Nominal Power		Max		Nom.		Max		Nom.													
6 GHz WiFi (160MHz BW) - SP		UNII-5	13.75		12.75		14.25		13.25												
		UNII-7	13.75		12.75		14.75		13.75												
Mode		Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)																		
			SISO/SISO in MIMO								SISO/SISO in MIMO										
			Ant R								Ant L										
			996T*4				996T*4														
Maximum / Nominal Power		Max		Nom.		Max		Nom.													
6 GHz WiFi (320MHz BW) - SP		UNII-5	13.75		12.75		14.25		13.25												

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G.2.4 6 GHz WLAN LPI 802.11ax/be RU WLAN Output Power

The below table is applicable in the following conditions:

- Pmax, DSI=0 (No Motion), DSI=1 (Motion)

		IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
Mode	Band	SISO/SISO in MIMO								SISO/SISO in MIMO							
		Ant R				Ant L				Ant R				Ant L			
		26T		52T, 52T+26T		106T, 106T+26T		242T		26T		52T, 52T+26T		106T, 106T+26T		242T	
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
6 GHz WiFi (20MHz BW) - LPI	UNII-5	-9.00	-10.00	-6.00	-7.00	-4.00	-5.00	-1.50	-2.50	-9.00	-10.00	-6.00	-7.00	-4.00	-5.00	-1.50	-2.50
	UNII-6	-8.50	-9.50	-6.00	-7.00	-4.00	-5.00	-1.50	-2.50	-8.50	-9.50	-6.00	-7.00	-4.00	-5.00	-1.50	-2.50
	UNII-7	-9.00	-10.00	-5.50	-6.50	-3.00	-4.00	-0.50	-1.50	-9.00	-10.00	-5.50	-6.50	-3.00	-4.00	-0.50	-1.50
	UNII-8	-8.50	-9.50	-5.50	-6.50	-3.00	-4.00	-1.00	-2.00	-8.50	-9.50	-5.50	-6.50	-3.00	-4.00	-1.00	-2.00
Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
		SISO/SISO in MIMO								SISO/SISO in MIMO							
		Ant R				Ant L				Ant R				Ant L			
		484T, 484T+242T		484T, 484T+242T		484T, 484T+242T		484T, 484T+242T		484T, 484T+242T		484T, 484T+242T		484T, 484T+242T			
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
6 GHz WiFi (40MHz BW) - LPI	UNII-5	1.50	0.50	1.50	0.50	1.50	0.50	1.50	0.50	1.50	0.50	1.50	0.50	1.50	0.50	1.50	0.50
	UNII-6	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50
	UNII-7	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50
	UNII-8	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50	2.50	1.50
Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
		SISO/SISO in MIMO								SISO/SISO in MIMO							
		Ant R				Ant L				Ant R				Ant L			
		996T, 996T+484T, 996T+484T+242T								996T, 996T+484T, 996T+484T+242T							
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
6 GHz WiFi (80MHz BW) - LPI	UNII-5	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50
	UNII-6	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50
	UNII-7	5.50	4.50	5.50	4.50	5.50	4.50	5.50	4.50	5.50	4.50	5.50	4.50	5.50	4.50	5.50	4.50
		ch. 119: 4.50	3.50	ch. 119: 4.50	3.50	ch. 119: 4.50	3.50	ch. 119: 4.50	3.50	ch. 119: 4.50	3.50	ch. 119: 4.50	3.50	ch. 119: 4.50	3.50	ch. 119: 4.50	3.50
		ch. 135: 4.50	3.50	ch. 135: 4.50	3.50	ch. 135: 4.50	3.50	ch. 135: 4.50	3.50	ch. 135: 4.50	3.50	ch. 135: 4.50	3.50	ch. 135: 4.50	3.50	ch. 135: 4.50	3.50
		ch. 151: 4.50	3.50	ch. 151: 4.50	3.50	ch. 151: 4.50	3.50	ch. 151: 4.50	3.50	ch. 151: 4.50	3.50	ch. 151: 4.50	3.50	ch. 151: 4.50	3.50	ch. 151: 4.50	3.50
		ch. 167: 4.50	3.50	ch. 167: 4.50	3.50	ch. 167: 4.50	3.50	ch. 167: 4.50	3.50	ch. 167: 4.50	3.50	ch. 167: 4.50	3.50	ch. 167: 4.50	3.50	ch. 167: 4.50	3.50
	UNII-8	5.50	4.50	5.50	4.50	5.50	4.50	5.50	4.50	5.50	4.50	5.50	4.50	5.50	4.50	5.50	4.50
Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
		SISO/SISO in MIMO								SISO/SISO in MIMO							
		Ant R				Ant L				Ant R				Ant L			
		996T*2, 996T*2+484T, 996T*3, 996T*3+484T								996T*2, 996T*2+484T, 996T*3, 996T*3+484T							
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
6 GHz WiFi (160MHz BW) - LPI	UNII-5	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50	4.50	3.50
	UNII-6	6.50	5.50	6.50	5.50	6.50	5.50	6.50	5.50	6.50	5.50	6.50	5.50	6.50	5.50	6.50	5.50
	UNII-7	7.00	6.00	7.00	6.00	7.00	6.00	7.00	6.00	7.00	6.00	7.00	6.00	7.00	6.00	7.00	6.00
	UNII-8	7.00	6.00	7.00	6.00	7.00	6.00	7.00	6.00	7.00	6.00	7.00	6.00	7.00	6.00	7.00	6.00
Mode	Band	IEEE 802.11ax/be RU Modulated/Frame Output Power (in dBm)															
		SISO/SISO in MIMO								SISO/SISO in MIMO							
		Ant R				Ant L				Ant R				Ant L			
		996T*4								996T*4							
Maximum / Nominal Power		Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.	Max	Nom.
6 GHz WiFi (320MHz BW) - LPI	UNII-5	9.00	8.00	9.00	8.00	9.00	8.00	9.00	8.00	9.00	8.00	9.00	8.00	9.00	8.00	9.00	8.00
	UNII-6	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50
	UNII-7	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50
	UNII-8	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50	8.50	7.50

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PART 0 SAR CHAR REPORT

Applicant Name:

Microsoft Corporation
One Microsoft Way
Redmond, WA 98052 USA

Date of Testing:

12/08/2025-01/27/2026

Test Site/Location:

Element Washington DC LLC,
Columbia, MD, USA

Document Serial No.:

1M2511200095-13.C3K

FCC ID:

C3K2085

APPLICANT:

MICROSOFT CORPORATION

Report Type:

Part 0 SAR Characterization

DUT Type:

Portable Computing Device

Model(s):

2085

Permissive Change(s):

Please see change document

Only operations relevant to this permissive change were evaluated for compliance. Please see the original compliance evaluation in RF Exposure Technical Report S/N: 1M231170118-21.C3K for complete evaluation of all other operating modes. The operation description includes a description of all changed items.

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



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1 DEVICE UNDER TEST

1.1 Device Overview

This device uses the Qualcomm® FastConnect feature to control and manage transmitting power in real time and to ensure the time-averaged RF exposure is in compliance with the FCC requirement at all times for WLAN operations. Additionally, this device supports BT/NFC technologies, but the output power of these modems is not controlled by the FastConnect algorithm.

Band & Mode	Operating Modes	Tx Frequency
2.4 GHz WIFI	Voice/Data	2412 - 2472 MHz
5 GHz WIFI	Voice/Data	U-NII-1: 5180 - 5240 MHz U-NII-2A: 5260 - 5320 MHz U-NII-2C: 5500 - 5720 MHz U-NII-3: 5745 - 5825 MHz U-NII-4: 5845 - 5885 MHz
6 GHz WIFI	Voice/Data	U-NII-5: 5935 - 6415 MHz U-NII-6: 6435 - 6515 MHz U-NII-7: 6535 - 6875 MHz U-NII-8: 6895 - 7115 MHz
2.4 GHz Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz

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1.2 Time-Averaging for SAR

This device is enabled with Qualcomm® FastConnect algorithm to control and manage transmitting power in real time and to ensure that the time-averaged RF exposure from WLAN is in compliance with FCC requirements. This Part 0 report shows SAR characterization of WLAN radios. Characterization is achieved by determining P_{Limit} for WLAN that corresponds to the exposure design targets after accounting for all device design related uncertainties, i.e., SAR_design_target (< FCC SAR limit). The SAR characterization is denoted as SAR Char in this report. Section 1.3 includes a nomenclature of the specific terms used in this report.

The compliance test under the static transmission scenario and simultaneous transmission analysis are reported in Part 1 report. The validation of the time-averaging algorithm and compliance under the dynamic (time- varying) transmission scenario for WLAN technologies are reported in Part 2 report (report SN could be found in Section 1.4 – Bibliography).

1.3 Nomenclature for Part 0 Report

Technology	Term	Description
WLAN	P_{Limit}	Power level that corresponds to the exposure design target (<i>SAR_design_target</i>) after accounting for all device design related uncertainties
	P_{Max}	Maximum tune up output power
	<i>SAR_design_target</i>	Target SAR level < FCC SAR limit after accounting for all device design related uncertainties
	<i>SAR Char</i>	Table containing P_{limit} for all technologies and bands

1.4 Bibliography

Report Type	Report Serial Number
RF Exposure Part 1 Test Report	1M2511200095-01.C3K
RF Exposure Part 2 Test Report	1M2511200095-16.C3K
RF Exposure Compliance Summary Report	1M2511200095-14.C3K
RF Exposure Part 0 Test Report (Original filing)	1M2311170118-21.C3K
RF Exposure Part 1 Test Report (Original filing)	1M2311170118-01.C3K
RF Exposure Part 2 Test Report (Original filing)	1M2311170118-22.C3K
RF Exposure Compliance Summary Report (Original filing)	1M2311170118-02.C3K

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2 SAR MEASUREMENTS

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]

2.2 SAR Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04 (See Table 2-1) 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 2-1) and IEEE 1528-2013. On the basis

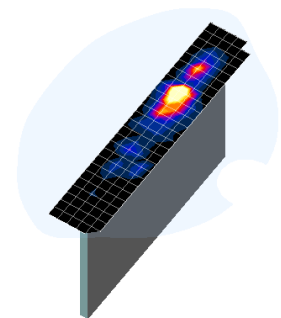


Figure 2-1
Sample SAR Area Scan

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of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):

- a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 2-1. 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 2-1
Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04*

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

*Also compliant to IEEE 1528-2013 Table 6

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3 SAR CHARACTERIZATION

3.1 DSI and SAR Determination

This device uses different Device State Index (DSI) to configure different time averaged power levels based on certain exposure scenarios. Depending on the detection scheme implemented in the smartphone, the worst-case SAR was determined by measurements for the relevant exposure conditions for that DSI. Detailed descriptions of the detection mechanisms are included in the operational description.

When 1g SAR exposure comparison is needed, the worst-case was determined from SAR normalized to 1g SAR limit.

The device state index (DSI) conditions used in Table 3-1 represent different exposure scenarios.

Table 3-1
DSI and Corresponding Exposure Scenarios

Scenario	Description	SAR Test Cases
No Motion and/or with keyboard (DSI=0)	Device detects this DSI when keyboard accessory is attached and at an angle $\leq 210^\circ$ or no motion is detected	KDB Publication 616217 D04v01r02
Motion (DSI=1)	Device detects this DSI when motion is detected and no keyboard accessory is attached or keyboard accessory is attached at $>210^\circ$ angle	KDB Publication 648474 D04v01r03

3.2 SAR Design Target

SAR_design_target is determined by ensuring that it is less than FCC SAR limit after accounting for total device designed related uncertainties specified by the manufacturer (see Table 3-2).

Table 3-2
***SAR_design_target* Calculations**

<i>SAR_design_target</i>	
$SAR_design_target < SAR_regulatory_limit \times 10^{\frac{-Total\ Uncertainty}{10}}$	
1g SAR (W/kg)	
<i>Total Uncertainty</i>	1.0 dB
<i>SAR_regulatory_limit</i>	1.6 W/kg
<i>SAR_design_target</i>	1.0 W/kg

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3.3 SAR Char

SAR test results corresponding to P_{Max} for each antenna/technology/band/DSI can be found in the SAR Part 1 Evaluation Report (report SN could be found in Section 1.4 – Bibliography).

P_{Limit} is calculated by linearly scaling with the measured SAR at the P_{part0} to correspond to the SAR_{design_target} . When $P_{Limit} < P_{Max}$, P_{part0} was used as P_{Limit} in the Smart Transmit EFS. When $P_{Limit} > P_{Max}$ and $P_{part0} = P_{Max}$, calculated P_{Limit} was used in the Smart Transmit EFS. All reported SAR obtained from the P_{part0} SAR tests was less than $SAR_{Design_target} + 1$ dB Uncertainty. The final P_{Limit} determination for each exposure scenario corresponding to SAR_{design_target} are shown in Table 3-3.

Table 3-3
 P_{Limit} Determination

Device State Index (DSI)	P_{Limit} Determination Scenarios
0	P_{Limit} is calculated based on 1g Body SAR at 0 mm for bottom edge with keyboard accessory attached and 1g Body SAR when no motion is detected for back, top, right, and left edges at 25mm
1	P_{Limit} is calculated based on 1g Body Tablet SAR at 0 mm for back, top, bottom, right, and left surfaces with and without keyboard accessory.

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Table 3-4
SAR Characterizations

			Maximum Tune-Up Output Power*	Body
Exposure Scenario				1g
Averaging Volume				0mm
Spacing				1
DSI				
Technology/Band	Antenna	Antenna Group	P _{max}	P _{limit}
2.4 GHz WIFI	R	AG0	20.0	17.25
2.4 GHz WIFI	L	AG1	20.0	17.25
5 GHz WIFI UNII-1	R	AG0	16.5	15.75
5 GHz WIFI UNII-1	L	AG1	16.5	16.25
5 GHz WIFI UNII-2A	R	AG0	16.5	15.25
5 GHz WIFI UNII-2A	L	AG1	16.5	16.25
5 GHz WIFI UNII-2C	R	AG0	17.0	14.50
5 GHz WIFI UNII-2C	L	AG1	17.0	14.00
5 GHz WIFI UNII-3	R	AG0	19.5	14.00
5 GHz WIFI UNII-3	L	AG1	19.5	14.00
5 GHz WIFI UNII-4	R	AG0	16.5	14.00
5 GHz WIFI UNII-4	L	AG1	16.5	13.75
6 GHz WIFI UNII-5	R	AG0	16.5	12.75
6 GHz WIFI UNII-5	L	AG1	16.5	13.25
6 GHz WIFI UNII-6	R	AG0	7.5	7.50
6 GHz WIFI UNII-6	L	AG1	7.5	7.50
6 GHz WIFI UNII-7	R	AG0	17.0	12.75
6 GHz WIFI UNII-7	L	AG1	17.0	13.75
6 GHz WIFI UNII-8	R	AG0	7.5	7.50
6 GHz WIFI UNII-8	L	AG1	7.5	7.50

Notes:

1. When $P_{Max} < P_{Limit}$, the DUT will operate at a power level up to P_{Max} .
2. MIMO is not included in SAR CHAR due to the two antennas being in separate Antenna Groups.

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4 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	N5182A	MXG Vector Signal Generator	5/30/2025	Annual	5/30/2026	MY48180366
Agilent	N5182A	MXG Vector Signal Generator	8/1/2025	Annual	8/1/2026	MY47420651
Anritsu	MS2038C	20 GHz Network Analyzer	5/14/2025	Annual	5/14/2026	1214109
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB46170464
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433974
Anritsu	MN8110B	I/O Adaptor	CBT	N/A	CBT	6261747881
Rohde & Schwarz	NRP2	Power Meter	5/23/2025	Annual	5/23/2026	103084
Anritsu	MA24106A	USB Power Sensor	5/29/2025	Annual	5/29/2026	1344554
Anritsu	MA24106A	USB Power Sensor	6/26/2025	Annual	6/26/2026	1827529
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	10/15/2024	Biennial	10/15/2026	240763503
Testo	ALARM-HYGROMETER	ALARM-HYGROMETER	7/3/2025	Annual	7/3/2026	83316952
Testo	ALARM-HYGROMETER	ALARM-HYGROMETER	7/3/2025	Annual	7/3/2026	83316953
Testo	ALARM-HYGROMETER	ALARM-HYGROMETER	7/3/2025	Annual	7/3/2026	83316970
Keysight Technologies	N9020A	MXA Signal Analyzer	9/15/2025	Annual	9/15/2026	MY48010233
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MCL	BW-N3W5+	3dB Attenuator	CBT	N/A	CBT	2028
Mini-Circuits	VLF-6000+	Low Pass Filter DC to 6000 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	VLF-6000+	Low Pass Filter DC to 6000 MHz	CBT	N/A	CBT	31634
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	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	11/10/2025	Annual	11/10/2026	1277
SPEAG	DAK-3.5	Dielectric Assessment Kit	8/5/2025	Annual	8/6/2026	1041
SPEAG	DAK-3.5	Dielectric Assessment Kit	7/14/2025	Annual	7/14/2026	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	D2450V2	2450 MHz SAR Dipole	10/7/2025	Annual	10/7/2026	797
SPEAG	D5GHzV2	5 GHz SAR Dipole	2/21/2024	Biennial	2/21/2027	1057
SPEAG	D6.5GHzV2	6.5 GHz SAR Dipole	12/5/2025	Annual	12/5/2026	1018
SPEAG	5G Verification Source 10GHz	10GHz System Verification Antenna	3/4/2025	Annual	3/4/2026	1002
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/11/2025	Annual	3/11/2026	1415
SPEAG	DAE4	Dasy Data Acquisition Electronics	12/3/2025	Annual	12/3/2026	1213
SPEAG	DAE4	Dasy Data Acquisition Electronics	6/5/2025	Annual	6/5/2026	1558
SPEAG	DAE4ip	Dasy Data Acquisition Electronics	2/7/2025	Annual	2/7/2026	1638
SPEAG	EUmmWV3	EUmmWV3 Probe	3/12/2025	Annual	3/12/2026	9421
SPEAG	EX3DV4	SAR Probe	3/7/2025	Annual	3/7/2026	7488
SPEAG	EX3DV4	SAR Probe	6/11/2025	Annual	6/11/2026	7661
SPEAG	EX3DV4	SAR Probe	2/10/2025	Annual	2/10/2026	7570

Note:

1. 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.
2. Each equipment item was used solely within its respective calibration period.

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5 MEASUREMENT UNCERTAINTIES

For SAR Measurements

SAR Uncertainty Budget based on IEEE 1528-2013 (0.3 GHz to 10 GHz)

a	b	c	d	e f(d,k)	f	g	h cx/f/e	i cxg/e	k
Uncertainty component	Reference	Tol. (± %)	Prob. dist.	Dvi.	ci (1g)	ci (10g)	lg ui (± %)	10g ui (± %)	vi
Measurement system									
Probe calibration	E.2.1	9.30	N	1	1	1	9.30	9.30	∞
Axial isotropy	E.2.2	0.25	N	1	0.707	0.707	0.18	0.18	∞
Hemispherical isotropy	E.2.2	1.30	N	1	0.707	0.707	0.92	0.92	∞
Boundary effect	E.2.3	2.00	R	1.73	1	1	1.15	1.15	∞
Linearity	E.2.4	0.30	R	1.73	1	1	0.17	0.17	∞
System detection limits	E.2.4	0.25	R	1.73	1	1	0.14	0.14	∞
Modulation response	E.2.5	4.80	R	1.73	1	1	2.77	2.77	∞
Readout electronics	E.2.6	0.30	N	1	1	1	0.30	0.30	∞
Response time	E.2.7	1.01	R	1.73	1	1	0.58	0.58	∞
Integration time	E.2.8	2.60	R	1.73	1	1	1.50	1.50	∞
RF ambient conditions - noise	E.6.1	3.00	R	1.73	1	1	1.73	1.73	∞
RF ambient conditions - reflections	E.6.1	3.00	R	1.73	1	1	1.73	1.73	∞
Probe positioner mechanical tolerance	E.6.2	0.04	R	1.73	1	1	0.02	0.02	∞
Probe positioning with respect to phantom shell	E.6.3	0.80	R	1.73	1	1	0.46	0.46	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	E.5	4.00	R	1.73	1	1	2.31	2.31	∞
Test sample related									
Test sample positioning	E.4.2	3.12	N	1	1	1	3.12	3.12	35
Device holder uncertainty	E.4.1	1.67	N	1	1	1	1.67	1.67	5
Output power variation - SAR drift	E.2.9	5.00	R	1.73	1	1	2.89	2.89	∞
SAR scaling	E.6.5	0.00	R	1.73	1	1	0.00	0.00	∞
Phantom and tissue parameters									
Phantom shell uncertainty - shape, thickness and permittivity	E.3.1	7.60	R	1.73	1	1	4.39	4.39	∞
Uncertainty in SAR correction for deviations in permittivity and conductivity	E.3.2	0.00	N	1	1	1	0.00	0.00	∞
Liquid conductivity measurement	E.3.3	4.27	N	1	0.78	0.71	3.33	3.03	55
Liquid permittivity measurement	E.3.3	4.18	N	1	0.23	0.26	0.96	1.09	55
Liquid conductivity - temperature uncertainty	E.3.4	3.40	R	1.73	0.78	0.71	1.53	1.39	∞
Liquid permittivity - temperature uncertainty	E.3.4	0.60	R	1.73	0.23	0.26	0.08	0.09	∞
Liquid Conductivity - deviation from target values	E.3.2	5.00	R	1.73	0.64	0.43	1.85	1.24	∞
Liquid Permittivity - deviation from target values	E.3.2	5.00	R	1.73	0.60	0.49	1.73	1.41	∞
Combined standard uncertainty							13.1	12.9	150
Expanded uncertainty (95% confidence interval)							26.2	25.8	

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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 Mechanical Offset	0.00	R	1.73	1	0.00	∞
Probe Spatial Resolution	0.00	R	1.73	1	0.00	∞
Field Impedance Dependence	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

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ELEMENT MATERIALS TECHNOLOGY

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COMPLIANCE SUMMARY REPORT

Applicant Name:

Microsoft Corporation

One Microsoft Way
Redmond, WA 98052 USA
Microsoft Corporation

Test Site/Location:

Element Washington DC LLC,
Columbia, MD, USA

Document Serial No.:

1M2511200095-14.C3K

FCC ID:**C3K2085****APPLICANT:****MICROSOFT CORPORATION****Report Type:**

Compliance Summary

DUT Type:

Portable Computing Device

Model:

2085

Permissive Change(s):

Please see change document



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1 STRATEGY FOR COMPLIANCE DEMONSTRATION

1.1 RF Exposure Evaluation Strategy

The FCC RF exposure limits defined based on time-averaged RF exposure. The device under test (DUT) uses the Qualcomm FastConnect feature to control and manage transmitting power in real time and to ensure at all times the time-averaged RF exposure is in compliance with the FCC requirement via FastConnect TAS for WLAN operations. Additionally, this device supports BT/NFC technologies but the output power of these modems is not controlled by the TAS algorithm.

Demonstrating compliance of DUT enabled with Qualcomm FastConnect feature is completed in three parts:

0. RF Exposure Compliance Test Report Part 0: SAR Characterization

The SAR Characterization, denoted as SAR Char, determines the power limit that meets FCC exposure requirement after accounting for device design related uncertainties for each supported radio configuration and RF exposure usage scenario. The determined power limits will be loaded and stored in the EUT via the Board Data File (BDF), and then used as inputs for TAS to operate.

For WLAN SAR Char is derived from SAR test measurements and conducted power measurements to determine P_{Limit} for each technology/band. The P_{Limit} represents the maximum time-averaged power level for the corresponding radio/antenna configuration.

1. RF Exposure Compliance Test Report Part 1: Test in Static Transmission Condition

Part 1 demonstrates that DUT meets FCC SAR limits when transmitting at pre-determined maximum time-averaged power level: P_{Limit} for WLAN. The SAR measurement in Part 1 is under static transmission condition.

The compliance for BT radio is demonstrated at a fixed power level (fixed = maximum RF tune-up level or power-back off level).

The exposure from the simultaneous transmission of WLAN is evaluated in Part 2 report.

2. RF Exposure Compliance Test Report Part 2: Test in Dynamic Transmission Condition

Part 2 demonstrates compliance in Tx varying transmission conditions and validates Qualcomm FastConnect algorithm. The test results reported in Part 2 demonstrates that DUT complies with FCC RF exposure requirement under Tx varying transmission scenarios, thereby validity of Qualcomm FastConnect algorithm.

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1.2 Nomenclature

Applicable Technologies	Term	Description
WLAN	P_{Limit}	Power level that corresponds to the exposure design target (SAR_{design_target}) after accounting for all device design related uncertainties
	P_{Max}	Maximum tune up output power
	T_{SAR}	Defined time averaging window for $f < 6$ GHz
	SAR_{design_target}	Target SAR level resulting in maximum time-averaged exposure optimized from total uncertainty
	SAR_{Char}	Table containing P_{Limit} for all technologies
	$regulatory\ body$	Regulatory body that the algorithm is designed to comply. Algorithm's time averaging window is dependent on either FCC or ICNIRP requirements.

1.3 Bibliography

Report Type	Report Serial Number
RF Exposure Part 0 Test Report	1M2511200095-13.C3K
RF Exposure Part 1 Test Report	1M2511200095-01.C3K
RF Exposure Part 2 Test Report	1M2511200095-16.C3K
RF Exposure Part 0 Test Report (Original filing)	1M2311170118-21.C3K
RF Exposure Part 1 Test Report (Original filing)	1M2311170118-01.C3K
RF Exposure Part 2 Test Report (Original filing)	1M2311170118-22.C3K
RF Exposure Compliance Summary Report (Original filing)	1M2311170118-02.C3K

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2 TIME AVERAGING ALGORITHM

2.1 Algorithm Description

The FCC RF exposure limit is defined based on time-averaged RF exposure. When running in a wireless device, Qualcomm FastConnect algorithm enables more elegant power control mechanisms for RF exposure management. It ensures at all times the wireless device is in compliance with the FCC limit of RF exposure time-averaged over a defined time window, denoted as T_{SAR} for specific absorption rate and time windows, respectively.

The Qualcomm FastConnect algorithm not only ensures the wireless device complies with RF exposure requirement, but also improves the user experience and network performance.

For a given wireless device, RF exposure is proportional to the transmitting power.

- Once the SAR of the wireless device is characterized at a transmit power level, RF exposure at a different power level for the characterized configurations can be scaled by the change in the corresponding power level.
- Therefore, for a characterized device, RF exposure compliance can be achieved through transmit power control and management.

The Qualcomm FastConnect algorithm embedded in Qualcomm modems reliably controls the transmit power of the wireless device in real time to maintain the time-averaged transmit power, in turn, time-averaged RF exposure, below the predefined time-averaged power limit for each characterized technology and band.

- This predefined time-averaged power limit is denoted as P_{Limit} corresponding SAR limit (frequency < 6 GHz) in this report.
- The wireless device continuously transmitting at P_{Limit} level complies with the FCC RF exposure requirement.

In a simultaneous transmission scenario, the algorithm manages all active transmitters and make sure the total exposure ratio from each transmitter not exceeding to 1.

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2.2 Basic concept of the algorithm

The Qualcomm FastConnect algorithm controls and manages the instantaneous transmit power (Tx) to maintain the time-averaged Tx power and therefore, time-averaged RF exposure in compliance with FCC limits.

- If time-averaged transmit power approaches P_{Limit} , then the modem needs to limit instantaneous transmit power to ensure the time-averaged transmit power does not exceed P_{Limit} in any T_{SAR} time windows since the time-averaged RF exposure is required to comply with the FCC RF exposure limit in any T_{SAR} time window.
- The wireless device can instantaneously transmit at high transmit powers and exceed the P_{Limit} level for a short duration before limiting the power to maintain the time-averaged transmit power under P_{Limit} .
- If the wireless device transmits at high power for a long time, then the radio link needs to be dropped to be compliant with time-averaged Tx power requirement (see Figure 2-1).
- To avoid dropping the radio link, TAS algorithm starts the power limiting enforcement earlier in time to back off the Tx power to a reserve level, so the wireless device can maintain the radio link at a minimum reserve power level for as long as needed, and at the same time ensure the time-averaged Tx power over any defined time window is less than P_{Limit} at all times (see Figure 2-2). At all times, TAS meets the below equation:

$$time.avg.Tx\ power = \frac{1}{T_{SAR}} \int_{t-T_{SAR}}^t inst.Tx\ power(t) dt \leq P_{limit}$$

Equation 2-1

where, *time.avg.Tx power* is the transmit power averaged between $t-T_{SAR}$ and t time period; T_{SAR} is the time window defined by FCC for time-averaging RF exposure for Tx frequency less than 6GHz (sub6); *inst. Tx power (t)* is the instantaneous transmit power at t time instant; P_{Limit} is the predefined time-averaged power limit.

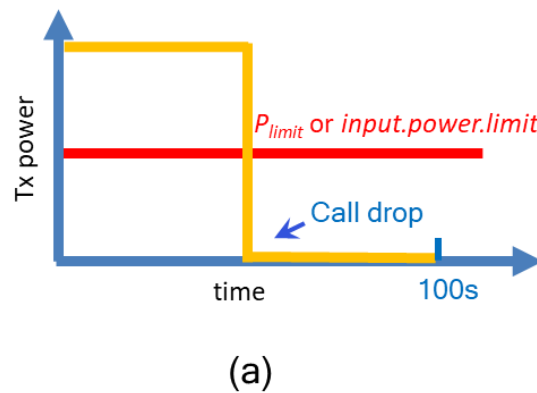


Figure 2-1
Transmit at high power when needed and permitted

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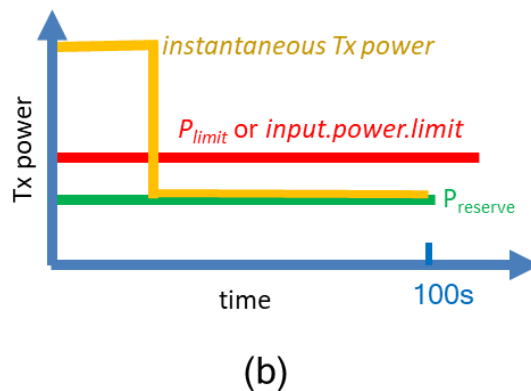


Figure 2-2
Transmit with reserve power to support continuous transmission at a minimum power level

- In the case of simultaneous transmission, TAS manages all active transmitters and make sure the total exposure ratio is less than 1

$$\sum \frac{\frac{1}{T_{SAR}} \int_{t-T_{SAR}}^t SAR(t) dt}{FCC SAR limit} \leq 1$$

Equation 2-2

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2.3 Configurable Parameters

The following input parameters are required for functionality of Qualcomm FastConnect TAS algorithm. These parameters cannot be accessed by the end user, because at the factory they are entered through the BDF entries by the OEM.

Input Parameter	Description
<i>regulatory body</i>	- Inputs of “0” and “1” corresponding to FCC and ICNIRP requirements for the averaging time windows. - For FCC, algorithm uses an averaging window of 100 seconds for $f < 3$ GHz, 60 seconds for $3 \text{ GHz} < f < 6 \text{ GHz}$, and 4 seconds for $24 \text{ GHz} < f < 42 \text{ GHz}$.
<i>Tx_power_at_SAR_design_target</i> (P_{Limit} in dBm) $f < 6 \text{ GHz}$	The maximum time-averaged transmit power, in dBm, corresponding to the <i>SAR_design_target</i>. <i>SAR_design_target</i> is pre-determined for this DUT and it is less than regulatory SAR limit after accounting for all design related tolerances. The time-averaged SAR is assessed against this <i>SAR_design_target</i> in real time to determine the compliance. P_{Limit} could vary with technology, band and Device State Index (DSI) and therefore, it has the unique value for each technology, band and DSI.

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3 DUT DESCRIPTION

3.1 Device Overview

Band & Mode	Operating Modes	Tx Frequency
2.4 GHz WIFI	Voice/Data	2412 - 2472 MHz
5 GHz WIFI	Voice/Data	U-NII-1: 5180 - 5240 MHz U-NII-2A: 5260 - 5320 MHz U-NII-2C: 5500 - 5720 MHz U-NII-3: 5745 - 5825 MHz U-NII-4: 5845 - 5885 MHz
6 GHz WIFI	Voice/Data	U-NII-5: 5935 - 6415 MHz U-NII-6: 6435 - 6515 MHz U-NII-7: 6535 - 6875 MHz U-NII-8: 6895 - 7115 MHz
2.4 GHz Bluetooth	Data	2402 - 2480 MHz
NFC	Data	13.56 MHz

This device uses the Qualcomm FastConnect feature to control and manage transmitting power in real time and to ensure at all times the time-averaged RF exposure is in compliance with the FCC requirement for WLAN operations. Additionally, this device supports BT/NFC technologies but the output power of these modems is not controlled by the FastConnect algorithm.

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4 COMPLIANCE SUMMARY

4.1 RF Exposure Compliance Summary

All transmission scenarios that the DUT supports comply with FCC time-averaged RF exposure requirements, as shown in Table 4-1.

Table 4-1
Reported RF Exposure Levels

	RFx Evaluation	Power Level	FCC Limit	<i>Reported</i> RF Exposure Level	Test Report
SAR (W/kg)	Standalone 1g SAR	P_{limit}	1.6	0.79	FCC SAR Evaluation Report (Part 1)
	Simultaneous Tx 1g SAR	P_{limit}	1.6	1.59	

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