

SAR EVALUATION REPORT

IEEE Std 1528-2013

For **Portable Computing Device with WLAN and Bluetooth**

FCC ID: C3K2036 Model Name: 2036

Report Number: R14932101-S3 Issue Date: 4/8/2024

Prepared for MICROSOFT CORP 1 MICROSOFT WAY REDMOND, WA 98052-8300, U.S.

> Prepared by UL LLC 12 LABORATORY DR RTP, NC 27709, U.S.A. TEL: (919) 549-1400



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Rev.	Date	Revisions	Revised By
V1	3/7/2024	Initial Issue	
V2	3/13/2024	Updated device description on title page. Updated DSS value in §1.Corrected tune-up table for UNII-4 Chain 1 in §9.2. Corrected z coordinate in Tables 5-7 in §12.3.	Lindsay Ryan
V3	3/16/2024	Corrected model name in §1 and title page. Updated §6.1 Device Dimensions row to refer to Appendix A.	Lindsay Ryan
V4	3/27/2024	Updated tune-up for §9.3 to include both Standard Power and LPI for SAR back-off power state. Added APD tables to §10.2. Updated device pictures in Appendix A.	Lindsay Ryan
V5	4/5/2024	Updated exposure condition to standalone in §1 and throughout the report. Updated test position naming for clarity. Fixed typo in §6.2. Revised tune-up tables in §9 and added UNII-1 to §9.2. Corrected antenna naming in §9.3 and §12. Updated §10.3 table. Updated Software Version in §6.1. Updated Appendix A with standalone exposure condition.	Lindsay Ryan
V6	4/5/2024	Updated §11 test condition nomenclature to match rest of report. Clarified antenna naming convention in §12 table.	Lindsay Ryan
V7	4/8/2024	Added 6CD to equipment class and updated the 6CD highest value for standalone and simultaneous transmission.	Lindsay Ryan

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1. Attestation of Test Results

Applicant Name	MICROSOFT CORP				
FCC ID	C3K2036				
Model Name	2036				
Applicable Standards	Published RF exposure KDB procedures IEEE Std 1528-2013				
		SAR Limi	ts (W/Kg)		
Exposure Category	Peak spatial-average				
	(ig of lissue)				
General population / Uncontrolled exposure		1.	.6		
PE Eveneuro Conditiona	Equipment Class - Highest Reported SAR (W/kg)				
RF Exposure Conditions	DTS	NII	6CD	DSS	
Standalone*	1.106 1.167 0.531 0.729				
Simultaneous TX	1.518 1.474 1.528 1.52			1.528	
Date Tested	12/11/2023 to 1/25/2024				
Test Results	Pass				
* Note: The standalone RF exposure condition testing was performed at a separation distance of 0 mm.					

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

This report contains data provided by the customer which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the U.S. Government.

Approved & Released By:	Prepared By:
Richard Jankovies	Jundsay Ryan
Richard Jankovics	Lindsay Ryan
Staff Engineer	Engineer
UL LLC	UL LLC

2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE Std 1528-2013, the following FCC Published RF exposure <u>KDB</u> procedures:

- o 248227 D01 802.11 Wi-Fi SAR v02r02
- o 447498 D01 General RF Exposure Guidance v06
- 616217 D04 SAR for laptop and tablets v01r02
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02

In addition to the above, the following information was used:

- <u>TCB Workshop</u> October 2015; RF Exposure Procedures (KDB 941225 D05A)
- o <u>TCB Workshop</u> October 2016; RF Exposure Procedures (Bluetooth Duty Factor)
- <u>TCB Workshop</u> October 2016; RF Exposure Procedures (DUT Holder Perturbations)
- TCB Workshop May 2017; RF Exposure Procedures (Broadband Liquid Above 3 GHz)
- TCB Workshop April 2019; RF Exposure Procedures (Tissue Simulating Liquids (TSL))
- o <u>TCB Workshop</u> April 2019; RF Exposure Procedures (802.11ax SAR Testing)
- o <u>TCB workshop</u> October 2020; 5G and RF Exposure Procedures (U-NII 6-7 GHz SAR Testing)
- <u>TCB Workshop</u> April 2022; RF Exposure Procedures (Sum-Peak Location Separation Ratio)

3. Facilities and Accreditation

UL LLC is accredited by A2LA, cert. # 0751.06 for all testing performed within the scope of this report. Testing was performed at the locations noted below.

The test sites and measurement facilities used to collect data are located at 2800 Perimeter Park Dr, Morrisville, NC, USA.

- SAR Lab 1A
- SAR Lab 2A
- SAR Lab 2B

	Address	ISED CABID	ISED Company Number	FCC Registration
	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
\boxtimes	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A	US0067	27265	825374

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

The DASY system used for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, ADconversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win10 and the DASY8¹ software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

¹ DASY8 software used: DASY16.2.4.2524 and older generations.

4.2. SAR Scan Procedures

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEC/IEEE 62209-1528, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

	\leq 3 GHz	> 3 GHz	
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	$5 \pm 1 \text{ mm}$	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5 \text{ mm}$	
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^{\circ}\pm1^{\circ}$	$20^\circ\pm1^\circ$	
	\leq 2 GHz: \leq 15 mm 2 - 3 GHz: \leq 12 mm	$3 - 4 \text{ GHz} \le 12 \text{ mm}$ $4 - 6 \text{ GHz} \le 10 \text{ mm}$	
Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area}	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be \leq the corresponding x or y dimension of the test device with at least one measurement point on the test device.		

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

			\leq 3 GHz > 3 GHz		
Maximum zoom scan spatial resolution: Δx_{Zoom} , Δy_{Zoom}					
	uniform grid: $\Delta z_{Zoom}(n)$		\leq 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm	
Maximum zoom scan spatial resolution, normal to phantom surface	graded	$\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	\leq 4 mm	$3 - 4$ GHz: ≤ 3 mm $4 - 5$ GHz: ≤ 2.5 mm $5 - 6$ GHz: ≤ 2 mm	
	grid	∆z _{Zoom} (n>1): between subsequent points	≤1.5·∆z	_{Zoom} (n-1)	
Minimum zoom scan volume x, y, z		$ \ge 30 \text{ mm} \qquad \begin{array}{c} 3 - 4 \text{ GHz:} \ge 28 \text{ n} \\ 4 - 5 \text{ GHz:} \ge 25 \text{ n} \\ 5 - 6 \text{ GHz:} \ge 22 \text{ n} \end{array} $			
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium: see draft standard IEEE					

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

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4.3. Test Equipment

The measuring equipment used to perform the tests documented in this report has been calibrated in accordance with the manufacturers' recommendations, and is traceable to recognized national standards.

Dielectric Property Measurements

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Date	Cal. Due Date
Network Analyzer	Keysight	E5063A	MY54100681	8/4/2023	8/4/2024
Dielectric Probe	SPEAG	DAKS-3.5	1051	10/25/2023	10/25/2024
Shorting Block	SPEAG	DAK-3.5 Short	SM DAK 200 DA	10/25/2023	10/25/2024
Thermometer	Fisher Scientific	15-078-181	1817705017	3/30/2023	3/30/2024

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Date	Cal. Due Date
Signal Generator	Keysight	N5181A	MY50140788	1/31/2023	1/31/2024
RF Power Meter	Keysight	N1912A	MY55136012	8/4/2023	8/4/2024
RF Power Sensor	Keysight	N1921A	MY55090023	4/3/2023	4/3/2024
RF Power Sensor	Keysight	N1921A	MY55090030	6/26/2023	6/26/2024
Amplifier	Mini-Circuits	ZVA-183WA-S+	S C484802241	N/A	N/A
Directional Coupler	Mini-Circuits	ZUDC10-183+	2214	NA	NA
Dual Directional Coupler	Werlatone	C5100-10	92249	N/A	N/A
DC Power Supply	Miteq	PS 15V1	1990186	N/A	N/A
RF Power Source	Speag	PowerSource1	4278	6/13/2023	6/13/2024

Lab Equipment

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Date	Cal. Due Date
E-Field Probe	SPEAG	EX3DV4	7709	11/30/2023	11/30/2024
E-Field Probe	SPEAG	EX3DV4	7710	2/3/2023	2/3/2024
E-Field Probe	SPEAG	EX3DV4	7711	3/29/2023	3/29/2024
Data Acquisition Electronics	SPEAG	DAE4	1714	11/22/2023	11/22/2024
Data Acquisition Electronics	SPEAG	DAE4	1715	1/31/2023	1/31/2024
Data Acquisition Electronics	SPEAG	DAE4	1716	3/16/2023	3/16/2024
System Validation Dipole	SPEAG	D2450V2	963	10/20/2023	10/20/2024
System Validation Dipole	SPEAG	D5GHzV2	1213	10/17/2023	10/17/2024
System Validation Dipole	SPEAG	D6.5GHzV2	1068	11/16/2023	11/16/2024
Environmental Indicator	Control Company	06-662-4	200037610	2/24/2022	2/24/2024
Environmental Indicator	Fisher Scientific	Traceable	200037610	2/24/2022	2/24/2024

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Date	Cal. Due Date
RF Power Meter	Keysight	N1911a	MY55116001	7/31/2023	7/31/2024
RF Power Meter	Keysight	N1911a	MY55116002	8/2/2023	8/2/2024
RF Power Meter	Keysight	N1912a	MY55136012	8/2/2023	8/2/2024
RF Power Sensor	Keysight	N1921a	MY55120011	7/31/2023	7/31/2024
RF Power Sensor	Keysight	N1921a	MY55090025	8/21/2023	8/21/2024
RF Power Sensor	Keysight	N1921a	MY55090030	6/30/2023	6/30/2024
RF Power Sensor	Keysight	N1921a	MY55090047	2/2/2023	2/2/2024
RF Power Sensor	Keysight	N1921a	MY55090023	4/3/2023	4/3/2024
RF Power Sensor	Keysight	E9323A	MY55110008	8/21/2023	8/21/2024
RF Power Sensor	Boonton Electronics	RTP5008	11835	8/1/2023	8/1/2024

5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be \leq 30%, for a confidence interval of k = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.

6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	Refer to Appendix A for device description and dimensions.						
Battery Options	The rechargeable battery is not user accessible.						
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other ⊠ Wi-Fi Direct (Wi-Fi 2.4 GHz) ⊠ Wi-Fi Direct (Wi-Fi 5 GHz)						
Test sample information	S/N	Notes					
	0F3BV3923383HH 0F3BV4923383HH	2.4GHz/6GHz Conducted/Radiated 5GHz/BT Conducted/Radiated					
Hardware Version	EV3						
Software Version	1.0.3808.9500						

6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode	Duty Cycle used for SAR testing						
	2.4 GHz	802.11b 802.11g 802.11n (HT20) 802.11n (HT40) 802.11ax (HE20) 802.11ax (HE40) 802.11be (EHT20) 802.11be (EHT40)	97.9% _(802.11b) ¹						
Wi-Fi	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (VHT80) 802.11ac (VHT160) 802.11ax (HE20) 802.11ax (HE40) 802.11ax (HE40) 802.11ax (HE160) 802.11ak (HE160) 802.11be (EHT20) 802.11be (EHT40) 802.11be (EHT40) 802.11be (EHT80) 802.11be (EHT160)	95.1% _(802.11ac 160MHz BW) ¹						
	Does this device support band	Does this device support bands 5.60 ~ 5.65 GHz? ⊠ Yes □ No							
	Does this device support Ban	d gap channel(s)? ⊠ Yes □ No							
	6GHz	802.11a 802.11ax (HE20) 802.11ax (HE40) 802.11ax (HE80) 802.11ax (HE160) 802.11be (EHT20) 802.11be (EHT40) 802.11be (EHT80) 802.11be (EHT160) 802.11be (EHT320)	99.6% (802.11be 320MHz BW) ¹						
Bluetooth	2.4 GHz	BR, EDR, and LE	N/A						
Notes:									

1. Duty cycle for Wi-Fi is referenced from §9

 Daty cycle for WH 1's reference inform gs
 As declared by manufacturer, Fast Connect TAS has the ability to declare different antenna groups, in which the algorithm will ensure that any Wi-Fi Simultaneous scenarios occurring in a given antenna group will stay under the Plimit. Therefore, any simultaneous case that consists of (2.4GHz + 5GHz) or (2.4GHz + 6GHz) on the same antenna group, then TAS will handle such a situation. Therefore, these simultaneous cases are not considered in §12.1.

7. RF Exposure Conditions (Test Configurations)

Refer to Appendix A for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

7.1. Required Test Configurations

The table below identifies the standalone test configurations required for this device:

Test Configurations	Rear of Display	Edge Top ²	Edge Right ²	Bottom	Edge Left ²	Front
Wi-Fi 2.4 GHz SISO Chain 0	Yes	No	No	Yes	No	No
Wi-Fi 2.4 GHz SISO Chain 1	Yes	No	No	Yes	No	No
Wi-Fi 5 GHz SISO Chain 0	Yes	No	No	Yes	No	No
Wi-Fi 5 GHz SISO Chain 1	Yes	No	No	Yes	No	No
Wi-Fi 6 GHz SISO Chain 0	Yes	No	No	Yes	No	No
Wi-Fi 6 GHz SISO Chain 1	Yes	No	No	Yes	No	No
Bluetooth	Yes	No	No	Yes	No	No

Note(s):

1. Yes = Testing is required. No = Testing is not required.

2. Per KDB 616217 D04 SAR for laptop and tablets v01r02, given that tablet use conditions are not supported, SAR exposure testing is not required for the edges of the device.

8. Dielectric Property Measurements & System Check

8.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18° C to 25° C and within $\pm 2^{\circ}$ C of the temperature when the tissue parameters are characterized.

The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 - 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

The dielectric constant (ϵr) and conductivity (σ) of typical tissue-equivalent media recipes are expected to

be within \pm 5% of the required target values; but for SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEEE Std 1528-2013, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for ϵ r and σ may be relaxed to \pm 10%. This is limited to frequencies \leq 3 GHz.

Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

	H	ead
	ε _r	σ (S/m)
150	52.3	0.76
300	45.3	0.87
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
915	41.5	0.98
1450	40.5	1.20
1610	40.3	1.29
1800 – 2000	40.0	1.40
2450	39.2	1.80
3000	38.5	2.40
5000	36.2	4.45
5100	36.1	4.55
5200	36.0	4.66
5300	35.9	4.76
5400	35.8	4.86
5500	35.6	4.96
5600	35.5	5.07
5700	35.4	5.17
5800	35.3	5.27
6000	35.1	5.48
6500	34.5	6.07
7000	33.9	6.65

Dielectric Property Measurements Results:

SAD		Band	Tissuo	Frequency	Relativ	e Permittivity	(er)	Co	onductivity (σ)	
Lab	Date	(MHz)	Туре	(MHz)	Measured	Target	Delta (%)	Measured	Target	Delta (%)
				6500	33.7	34.5	-2.46	6.11	6.07	0.59
1A	1/23/2024	6500	Head	5925	34.6	35.2	-1.59	5.39	5.40	-0.19
				7125	32.6	33.8	-3.61	6.83	6.80	0.50
				2450	38.2	39.2	-2.55	1.74	1.80	-3.17
2A	12/11/2023	2450	Head	2400	38.3	39.3	-2.59	1.71	1.75	-2.49
				2480	38.2	39.2	-2.56	1.77	1.83	-3.57
				2450	40.4	39.2	3.09	1.80	1.80	-0.06
2A	1/2/2024	2450	Head	2400	40.5	39.3	3.04	1.76	1.75	0.65
				2480	40.4	39.2	3.08	1.82	1.83	-0.51
				2450	39.5	39.2	0.71	1.77	1.80	-1.89
2A	1/8/2024	2450	Head	2400	39.6	39.3	0.64	1.73	1.75	-1.12
				2480	39.5	39.2	0.73	1.79	1.83	-2.26
				5600	34.2	35.5	-3.78	4.86	5.06	-4.06
2A	1/8/2024	5600	Head	5500	34.4	35.7	-3.58	4.74	4.96	-4.36
				5725	33.9	35.4	-4.10	5.00	5.19	-3.57
				5850	34.7	35.3	-1.81	5.16	5.32	-3.10
2A	1/16/2024	5850	Head	5900	34.6	35.2	-1.82	5.22	5.38	-3.05
				5925	34.5	35.2	-1.90	5.25	5.40	-2.80
				5250	35.3	35.9	-1.76	4.57	4.70	-2.73
2B	12/11/2023	5250	Head	5150	35.5	36.1	-1.63	4.46	4.60	-3.10
				5350	35.2	35.8	-1.78	4.68	4.80	-2.69
				2450	39.3	39.2	0.23	1.86	1.80	3.11
2B	12/26/2023	2450	Head	2400	39.4	39.3	0.24	1.82	1.75	3.90
				2480	39.3	39.2	0.22	1.88	1.83	2.71
				5250	35.3	35.9	-1.82	4.61	4.70	-2.02
2B	12/27/2023	5250	Head	5150	35.5	36.0	-1.63	4.49	4.60	-2.37
				5350	35.1	35.8	-2.04	4.71	4.80	-1.88
			5850	34.2	35.3	-3.09	5.34	5.32	0.38	
2B	1/3/2024	5850	Head	5900	34.1	35.2	-3.04	5.41	5.38	0.46
				5925	34.1	35.2	-3.13	5.44	5.40	0.74

8.2. System Check

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are re-measured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ±0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm for measurements > 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 5 mm (above 6 GHz), 10 mm (1-6 GHz), and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole. For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- Distance between probe sensors and phantom surface was set to 3 mm.
 For 5 GHz band Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was recorded and the results were normalized to 1 W input power.

System Check Results

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within $\pm 10\%$ of the manufacturer calibrated dipole SAR target. Refer to Appendix B for the SAR System Check Plots.

		T		Disate		Measured Results for 1g SAR				Measured Results for 10g SAR				
Lab	Date Type Dipole Type_Serial #	Cal. Due Data	(dBm)	Zoom Scan	Normalize to 1 W	Target (Ref. Value)	Delta ±10 %	Zoom Scan	Normalize to 1 W	Target (Ref. Value)	Delta ±10 %	No.		
1A	1/24/2024	Head	D6.5GHzV2 SN: 1068	11/16/2024	17.00	15.300	305.28	297.00	2.79	2.810	56.07	54.80	2.31	1
2A	12/11/2023	Head	D2450V2 SN: 963	10/20/2024	17.00	2.480	49.48	53.30	-7.16	1.160	23.15	25.10	-7.79	2
2A	1/2/2024	Head	D2450V2 SN: 963	10/20/2024	17.00	2.550	50.88	53.30	-4.54	1.200	23.94	25.10	-4.61	
2A	1/8/2024	Head	D2450V2 SN: 963	10/20/2024	17.00	2.480	49.48	53.30	-7.16	1.170	23.34	25.10	-6.99	
2A	1/8/2024	Head	D5GHzV2 SN: 1213 (5.60 GHz)	10/17/2024	17.00	4.020	80.21	83.80	-4.28	1.140	22.75	23.90	-4.83	3
2A	1/16/2024	Head	D5GHzV2 SN: 1213 (5.85 GHz)	10/17/2024	17.00	3.740	74.62	81.40	-8.33	1.070	21.35	23.10	-7.58	4
2B	12/11/2023	Head	D5GHzV2 SN: 1213 (5.25 GHz)	10/17/2024	17.00	3.700	73.82	80.10	-7.83	1.060	21.15	23.10	-8.44	5
2B	12/26/2023	Head	D2450V2 SN: 963	10/20/2024	17.00	2.460	49.08	53.30	-7.91	1.140	22.75	25.10	-9.38	6
2B	12/27/2023	Head	D5GHzV2 SN: 1213 (5.25 GHz)	10/17/2024	17.00	3.800	75.82	80.10	-5.34	1.090	21.75	23.10	-5.85	
2B	1/3/2024	Head	D5GHzV2 SN: 1213 (5.85 GHz)	10/17/2024	17.00	3.730	74.42	81.40	-8.57	1.070	21.35	23.10	-7.58	7

9. Conducted Output Power Measurements

Tune-Up Power Limits provided by the manufacturer are used to scale measured SAR values.

9.1. Wi-Fi 2.4GHz (DTS Band)

Maximum Output Power (Tune-up Limit) for Wi-Fi 2.4 GHz

The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures.

For "Not required", SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11b/g/n mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.

SAR testing is not required for OFDM mode(s) when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is \leq 1.2 W/kg.

-		FCC SAR						
	2GHz	mode: 11b/g/n/ax/be						
Band	Channel Groups	BW	BW: 20/40/ all ax partial BWs					
		Channels	Chain 0 (Left)	Chain 1 (Right)				
	0	1 to 11	18.75	19.25				
2.4 GHz	1	12	18.75	19.25				
	2	13	18.75	19.25				

SAR back-off power levels are to be used in that state unless Max power state is lower.

Band	Mode	Ch #	Freq. (MHz)	Chain 0 Tune-up	Chain 1 Tune-Up
		1	2412	19.00	19.00
		2	2417	19.75	20.25
DSSS	902 11b	6	2437	19.75	20.25
2.4 GHz	002.110	11	2462	19.75	20.25
		12	2467	12.50	12.50
		13	2472	9.00	9.00
		1	2412	16.00	16.00
		6	2437	19.75	20.25
	802.11g	11	2462	14.50	14.50
		12	2467	13.00	13.00
		13	2472	-3.50	-3.50
		1	2412	15.00	15.00
		6	2437	18.75	18.75
	802.11n (HT20)	11	2462	13.50	13.50
	(11120)	12	2467	13.00	13.00
		13	2472	-3.50	-3.50
		1	2412	15.00	15.00
0		6	2437	18.75	18.75
OFDM	802.11ac	11	2462	13.50	13.50
2.4 0112	(011120)	12	2467	13.00	13.00
		13	2472	-3.50	-3.50
		3	2422	14.50	14.50
		6	2437	16.50	16.50
	802.11n	9	2452	14.00	14.00
	(1140)	10	2457	10.50	10.50
		11	2462	-0.50	-0.50
		3	2422	14.50	14.50
		6	2437	16.50	16.50
	802.11ac	9	2452	14.00	14.00
	(VH140)	10	2457	10.50	10.50
		11	2462	-0.50	-0.50
		1	2412	15.00	15.00
		6	2437	18.75	18.75
	802.11ax	11	2462	13.50	13.50
	(11220)	12	2467	13.00	13.00
		13	2472	-3.50	-3.50
		1	2412	15.00	15.00
		6	2437	18.75	18.75
	802.11be (EHT20)	11	2462	13.50	13.50
	(EF120)	12	2467	13.00	13.00
OFDMA		13	2472	-3.50	-3.50
2.4 GHz		3	2422	14.50	14.50
		6	2437	16.50	16.50
	802.11ax	9	2452	14.00	14.00
	(ПЕ40)	10	2457	10.50	10.50
		11	2462	-0.50	-0.50
		3	2422	14.50	14.50
		6	2437	16.50	16.50
	802.11be	9	2452	14.00	14.00
	(EH140)	10	2457	10.50	10.50
1		11	2462	-0.50	-0.50

Note(s):

Above output power tables are the effective SAR output power tables considering both SAR power and Max power tune-ups.

	Mode	Ch #	Freq. (MHz)	Chain 0	Average Pow	er (dBm)	Chain 1 Average Power (dBm)		
Band				Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
		1	2412	17.40	19.00		17.22	19.00	Yes
DSSS	902 11h	2	2417	18.41	19.75	Yes	19.87	20.25	
2.4 GHz	802.110	6	2437	18.21	19.75		19.80	20.25	
		11	2462	18.07	19.75		20.04	20.25	

Note(s):

SAR is not required for channel 12 and 13 because the tune-up limit and the measured output power for these two channels are not greater than those for the default test channels. Refer to KDB 248227 D01 section 3.1

Duty Factor Measured Results

Mode	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
802.11b	0.6553	0.6691	97.9%	1.02

Note(s):

Duty Cycle = (T on / period) * 100%

Duty Cycle plots

802.11b

📕 Keysight	Spectr	rum A	nalyzer - AP2022.8.16,	27465/44389,							
L	_	RF	50 Ω DC		_	SENSE:INT	40 ver Turer	LIGN AUTO	09:14:17 AM C	Jct 23, 2023	Frequency
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								1	AMkr3 66	i9.1 μs	Auto i une
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MKR MODE	TRC	SCL	X			Y	FUNCTION FUNC	TION WIDTH	FUNCTION	VALUE	<u>Auto</u>
1 Δ2 2 N		t	<u>(Δ)</u>	655.3 µs /	(Δ)	1.235 dB 13 887 dBm					
3 A2		t	(Δ)	669.1 µs	(Δ)	1.113 dB				/	Freq Offs
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9.2. Wi-Fi 5GHz (U-NII Bands)

Maximum Output Power (Tune-up Limit) for Wi-Fi 5 GHz

When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac/ax modes, the channel in the lower order/sequence 802.11 transmission mode is selected.

The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures.

For "Not required", SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac/ax mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.

When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is \leq 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.

		· · _ · _ · _ · _ · _ · _ ·						
			mode: 11a/n/ax/	be				
	5GHz	BW: 20/40/	80/160/ all partial	and M-RU BWs				
	Channel Groups	Channels	Chain 0 (Left)	Chain 1 (Right)				
5.15 to 5.25 GHz	0	36 to 48	12.75	12.5				
5.25 to 5.35 GHz	1	52 to 64	12.75	12.5				
5.47 to 5.725 GHz	2	100 to 144	11.75	12.25				
5.725 to 5.85 GHz	3	149 to 165	11.75	12				
5.85 to 5.925 GHz	4	169 to 181	11.75	12				

SAR back-off power levels are to be used in that state unless Max power state is lower.

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Band	Mode	Ch #	Freq. (MHz)	Chain 0 Tune-Up	Chain 1 Tune-Up
		36	5180	13.75	13.50
	802.11a	40	5200	13.75	13.50
		44	5220	13.75	13.50
		36	5180	13.75	13.50
	802.11n	40	5200	13.75	13.50
	(HT20)	44	5220	13.75	13.50
		48	5240	13.75	13.50
	802 1100	30 40	5180	13.75	13.50
	(VHT20)	44	5220	13.75	13.50
		48	5240	13.75	13.50
		36	5180	13.75	13.50
	802.11ax	40	5200	13.75	13.50
	(HE20)	44	5220	13.75	13.50
UNII-1		36	5180	13.75	13.50
5.2 GHZ	802.11be	40	5200	13.75	13.50
	(EHT20)	44	5220	13.75	13.50
		48	5240	13.75	13.50
	802.11n	38	5190	13.75	13.50
	(1140)	46	5230	13.75	13.50
	802.11ac (VHT40)	46	5230	13.75	13.50
	802.11ax	38	5190	13.75	13.50
	(HE40)	46	5230	13.75	13.50
	802.11be	38	5190	13.75	13.50
	(EH140)	46	5230	13.75	13.50
	802.11ac (VHT80)	42	5210	13.75	13.50
	(HE80)	42	5210	13.75	13.50
	(EHT80)	42	5210	13.75	13.50
Band	Mode	Ch #	(MHz)	Chain 0 Tune-Up	Chain 1 Tune-Up
		52	5260	13.75	13.50
	802.11a		5280	13.75	13.50
		64	5320	13.75	13.50
		52	5260	13.75	13.50
	802.11n	56	5280	13.75	13.50
	(HT20)	60	5300	13.75	13.50
		64 52	5320	13.75	13.50
	802.11ac	56	5280	13.75	13.50
	(VHT20)	60	5300	13.75	13.50
		64	5320	13.75	13.50
		52	5260	13.75	13.50
	802.11ax	56	5280	13.75	13.50
	(1120)	64	5320	13.75	13.50
UNII-2A		52	5260	13.75	13.50
0.0 0112	802.11be	56	5280	13.75	13.50
	(EHT20)	60	5300	13.75	13.50
		64	5320	13.75	13.50
	802.11n (HT40)	54 62	5270	13.75	13.50
	802 1100	54	5270	13.75	13.50
	(VHT40)	62	5310	13.75	13.50
	802.11ax	54	5270	13.75	13.50
	(HE40)	62	5310	13.75	13.50
	802.11be	54	5270	13.75	13.50
	802.11ac	62 58	5310 5290	13.75	13.50
	(VHT80) 802.11ax	58	5290	13.50	13.50
	(HE80) 802.11be	58	5290	13.50	13.50
	(EH180) 802.11ac ()/HT160)	50	5250	13.75	13.50
UNII-1 & 2A	(VEL160) 802.11ax (HE160)	50	5250	13.75	13.50
	802.11be (EHT160)	50	5250	13.75	13.50

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Band	Mode	Ch #	Freq. (MHz)	Chain 0 Tune-Up	Chain 1 Tune-Up
		100	5500	12.75	13.25
	802 110	116	5580	12.75	13.25
	002.11a	124	5620	12.75	13.25
		144	5720	12.75	13.25
		100	5500	12.75	13.25
	802.11n	116	5580	12.75	13.25
	(HT20)	124	5620	12.75	13.25
		144	5720	12.75	13.25
		100	5500	12.75	13.25
	802.11ac	116	5580	12.75	13.25
	(VHT20)	124	5620	12.75	13.25
		144	5720	12.75	13.25
		100	5500	12.75	13.25
	802.11ax	116	5580	12.75	13.25
	(HE20)	124	5620	12.75	13.25
		144	5720	12.75	13.25
		100	5500	12.75	13.25
	802.11be	116	5580	12.75	13.25
	(EHT20)	124	5620	12.75	13.25
		144	5720	12.75	13.25
		102	5510	12.75	13.25
	802.11n (HT40)	118	5590	12.75	13.25
UNII-2C 5.5 GHz		126	5630	12.75	13.25
0.0 0112		142	5710	12.75	13.25
	802.11ac (VHT40)	102	5510	12.75	13.25
		118	5590	12.75	13.25
		126	5630	12.75	13.25
		142	5710	12.75	13.25
		102	5510	12.75	13.25
	802.11ax	118	5590	12.75	13.25
	(HE40)	126	5630	12.75	13.25
		142	5710	12.75	13.25
		102	5510	12.75	13.25
	802.11be	118	5590	12.75	13.25
	(EHT40)	126	5630	12.75	13.25
		142	5710	12.75	13.25
	000 44	106	5530	12.75	13.25
	(VHT80)	122	5610	12.75	13.25
	(138	5690	12.75	13.25
	000 44	106	5530	12.75	13.25
	(HE80)	122	5610	12.75	13.25
	()	138	5690	12.75	13.25
	900 445-	106	5530	12.75	13.25
	(EHT80)	122	5610	12.75	13.25
	(2.1.00)	138	5690	12.75	13.25
	802.11ac (VHT160)	114	5570	12.75	13.25
UNII-2C 5.5 GHz	802.11ax (HE160)	114	5570	12.75	13.25
	802.11be (EHT160)	114	5570	12.75	13.25

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Band	Mode	Ch #	Freq. (MHz)	Chain 0 Tune-Up	Chain 1 Tune-Up
		149	5745	12.75	13.00
	802.11a	157	5785	12.75	13.00
		165	5825	12.75	13.00
	802.11n	149	5745	12.75	13.00
	(HT20)	157	5925	12.75	13.00
		149	5745	12.75	13.00
	802.11ac	157	5785	12.75	13.00
	(VH120)	165	5825	12.75	13.00
	802 11av	149	5745	12.75	13.00
	(HE20)	157	5785	12.75	13.00
		165	5825	12.75	13.00
UNII-3	802.11be	149	5785	12.75	13.00
5.8 GHz	(EH120)	165	5825	12.75	13.00
	802.11n	151	5755	12.75	13.00
	(HT40)	159	5795	12.75	13.00
	802.11ac	151	5755	12.75	13.00
	(01140)	159	5795	12.75	13.00
	(HE40)	159	5795	12.75	13.00
	802.11be	151	5755	12.75	13.00
	(EHT40)	159	5795	12.75	13.00
	802.11ac (VHT80)	155	5775	12.75	13.00
	802.11ax (HE80)	155	5775	12.75	13.00
	802.11be (EHT80)	155	5775	12.75	13.00
	802.11a	169	5845	12.75	13.00
	802.11n (HT20)	169	5845	12.75	13.00
	802.11ac (VHT20)	169	5845	12.75	13.00
	802.11ax (HE20)	169	5845	12.75	13.00
	802.11be (EHT20)	169	5845	12.75	13.00
	802.11n (HT40)	167	5835	12.75	13.00
UNII-3 & 4	802.11ac (VHT40)	167	5835	12.75	13.00
	802.11ax (HE40)	167	5835	12.75	13.00
	(EHT40)	167	5835	12.75	13.00
	(VHT80) 802.11ax	171	5855	12.75	13.00
	(HE80) 802.11be	171	5855	12.75	13.00
	(EHT80) 802.11ac	163	5815	12.75	13.00
	(VHI160) 802.11ax	163	5815	12.75	13,00
	(HE160) 802.11be	163	5815	12.75	13.00
Band	(EH1160) Mode	Ch #	Freq.	Chain 0 Tune-Up	Chain 1 Tune-Up
		173	5865	12.75	13.00
	802.11a	177	5885	12.75	13.00
		181	5905	12.75	13.00
	802 11n	173	5865	12.75	13.00
	(HT20)	177	5885	12.75	13.00
		181	5905	12.75	13.00
	802.11ac	177	5885	12.75	13.00
	(VH120)	181	5905	12.75	13.00
	802 11 2	173	5865	12.75	13.00
UNII-4	(HE20)	177	5885	12.75	13.00
5.9 GHz		181	5905	12.75	13.00
	802.11be	173	5885	12.75	13.00
	(EHT20)	181	5905	12.75	13.00
	802.11n (HT40)	175	5875	12.75	13.00
	802.11ac (VHT40)	175	5875	12.75	13.00
	802.11ax (HE40)	175	5875	12.75	13.00
	802.11be (EHT40)	175	5875	12.75	13.00

Note(s):

Above output power tables are the effective SAR output power tables considering both SAR power and Max power tune-ups.

			Freq	Chain 0	Average Pow	er (dBm)	Chain 1 Average Power (dBm)		
Band	Mode	Ch #	(MHz)	Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-1 & 2A	802.11ac (VHT160)	50	5250	12.86	13.75	Yes	13.26	13.50	Yes
			Freq	Chain 0	Average Pow	er (dBm)	Chain 1	Average Pow	er (dBm)
Band Mode	Ch #	(MHz)	Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)	
UNII-2C 5.5 GHz	802.11ac (VHT160)	114	5570	11.52	12.75	Yes	11.82	13.25	Yes
			Freq	Chain 0	Average Pow	er (dBm)	Chain 1	Average Pow	er (dBm)
Band	Mode	e Ch #	Freq. (MHz)	Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-3 & 4	802.11ac (VHT160)	163	5815	11.87	12.75	Yes	12.92	13.00	Yes

Duty Factor Measured Results

Mode	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
802.11ac (VHT160)	0.3633	0.3819	95.1%	1.05

Note(s):

Duty Cycle = (T on / period) * 100%

Duty Cycle plots

802.11ac (VHT160)



9.3. Wi-Fi 6GHz (U-NII 5-8 Bands)

When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/ax/be modes, the channel in the lower order/sequence 802.11 transmission mode is selected.

The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures.

Wi-Fi 6GHz Test channels were determined in one of two ways:

- Wi-Fi 6GHz was Aggregated due to the same transmission mode being selected for SAR testing. 5 total test channels from across all U-NII 5/6/7/8 were selected.
- Wi-Fi 6GHz was Split due to different transmission modes being selected for SAR testing. A minimum of 3 test channels were selected for each individual U-NII Band.

Maximum Output Power for Wi-Fi - 6 GHz

The table below is the maximum output power for this device. SAR back-off is always triggered (static SAR), with Time-Averaged SAR enabled.

Max-power state – Standard Power (Indoor/Outdoor) – Chain 0/1

	20 MHz & Partial BWs						40 MHz				80 MHz					
Freq. Band				Ma	aximum Out SISO/MIN	put Power (10 per Chair	dBm) າ				Maximum C (d SISO/MIM	Output Power Bm) O per Chain			Maximum Ou (dB SISO/MIMC	utput Power m)) per Chain
	Ch #	Center Freq	11a	26T	52T, 52T+26T	106T, 106T+26T	242T	HE20/ EHT20	Ch #	Center Freq	484T, 484T+242T	HE40/ EHT40	Ch #	Center Freq	996T, 996T+484T	HE80/ EHT80
		5935	18.0	9.5	12.5	14.5	18.0	18.0								
	1	5955	18.0	9.5	12.5	14.5	18.0	18.0	3	5965	19.0	19.0				
	5	5975	18.0	9.5	12.5	14.5	18.0	18.0	,	5505	15.0	15.0	7	5985	18.0	19.0
	9	5995	18.0	9.5	12.5	14.5	18.0	18.0	11	6005	19.0	19.0	-			
	13	6015	18.0	9.5	12.5	14.5	18.0	18.0								
	1/	6035	18.0	9.5	12.5	14.5	18.0	18.0	19	6045	19.0	19.0				
	21	6075	18.0	9.5	12.5	14.5	18.0	18.0					23	6065	18.0	19.0
	29	6095	18.0	9.5	12.5	14.5	18.0	18.0	27	6085	19.0	19.0				
	33	6115	18.0	9.5	12.5	14.5	18.0	18.0								
	37	6135	18.0	9.5	12.5	14.5	18.0	18.0	35	6125	19.0	19.0	20	C4 45	40.0	10.0
U-NII-5	41	6155	18.0	9.5	12.5	14.5	18.0	18.0	42	6165	10.0	10.0	39	6145	18.0	19.0
(5.925 to 6.425	45	6175	18.0	9.5	12.5	14.5	18.0	18.0	43	0105	19.0	19.0				
GHz)	49	6195	18.0	9.5	12.5	14.5	18.0	18.0	51	6205	19.0	19.0				
	53	6215	18.0	9.5	12.5	14.5	18.0	18.0	51	0205	15.0	19.0	55	6225	18.0	19.0
	57	6235	18.0	9.5	12.5	14.5	18.0	18.0	59	6245	19.0	19.0	55	0225	10.0	10.0
	61	6255	18.0	9.5	12.5	14.5	18.0	18.0								
	65	6275	18.0	9.5	12.5	14.5	18.0	18.0	67	6285	19.0	19.0				
	59	6295	18.0	9.5	12.5	14.5	18.0	18.0					71	6305	18.0	19.0
	73	6225	18.0	9.5	12.5	14.5	18.0	18.0	75	6325	19.0	19.0				
	81	6355	18.0	9.5	12.5	14.5	18.0	18.0								
	85	6375	18.0	9.5	12.5	14.5	18.0	18.0	83	6365	19.0	19.0				
	89	6395	18.0	9.5	12.5	14.5	18.0	18.0		6 405	10.5	40.5	87	6385	17.0	19.0
	93	6415	18.0	9.5	12.0	13.5	18.0	18.0	91	6405	18.5	18.5				
	117	6535	16.5	8.5	11.0	13.5	17.0	17.0								
	121	6555	17.0	8.5	11.5	13.5	17.0	17.0	123	6565	18.0	18.0				
	125	6575	17.0	8.5	11.5	13.5	17.0	17.0								
	129	6595	17.0	8.5	11.5	13.5	17.0	17.0	131	6605	18.0	18.0				
	133	6615	17.0	8.5	11.5	13.5	17.0	17.0					135	6625	15.5	20.0
	137	6635	17.0	8.5	11.5	13.5	17.0	17.0	139	6645	18.0	18.0				
	141	6655	17.0	8.5	11.5	13.5	17.0	17.0								
U-NII-7	145	66/5	17.0	8.5	11.5	13.5	17.0	17.0	147	6685	18.0	18.0				
(6.525 to	149	6745	17.0	0.5	11.5	13.5	17.0	17.0					151	6705	15.5	20.0
6.875 GHz)	153	6725	17.0	0.J 8.5	11.5	13.5	17.0	17.0	155	6725	18.0	18.0				
	157	6755	17.0	8.5	11.5	13.5	17.0	17.0								
	165	6775	17.0	8.5	11.5	13.5	17.0	17.0	163	6765	18.0	18.0				
	169	6795	17.0	8.5	11.5	13.5	17.0	17.0					167	6785	15.5	20.0
	173	6815	17.0	8.5	11.5	13.5	17.0	17.0	171	6805	18.0	18.0				
	177	6835	17.0	8.5	11.5	13.5	17.0	17.0								
	181	6855	17.0	8.5	11.5	13.5	17.0	17.0	179	6845	18.0	18.0				
	185	6875														

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Max-power state – Standard Power (Indoor/Outdoor) (continued) – Chain 0/1

			160 IVIHZ		32U IVIHZ							
Freg. Band			Maximum Outpu SISO/MIMO	ut Power (dBm) 9 per Chain			Maximum Output Power (dBm) SISO/MIMO per Chain				Maximum O (dl SISO/MIM	utput Power 3m) O per chain
	Ch #	Center Freq	996T*2 996T*2+484T, 996T*3, 996T*3+484T	HE160/ EHT160	Ch #	Center Freq	996T*4	EHT320	Ch #	Center Freq	996T*4	ЕНТ320
	15	6025	16.0	18.0								
U-NII-S (5.925 to 6.425 GHz) 47	47	6185	16.0	18.0	32	6106	16.0	16.0	- 64	6266	16.0	16.0
	79	6345	18.0	18.0					04			16.0
U-NII-7 (6.525 to 6.875 GHz)	143	6665	16.0	16.0								

Max-power state – Low Power Indoor – Chain 0/1

			2	20 MHz 8	Partial I	3Ws			40 MHz 80 MHz							
Free Band				М	aximum Out SISO/MIN	put Power (10 per Chair	dBm) າ		Maximum Output Power (dBm) SISO/MIMO per Chain		Maximum Outpu (dBm) SISO/MIMO pe		utput Power m)) per Chain			
Treq. band	Ch #	Center Freq	11a	26T	52T, 52T+26T	106T, 106T+26T	242T	НЕ20/ ЕНТ20	Ch #	Center Freq	484T, 484T+242T	HE40/ EHT40	Ch #	Center Freq	996T, 996T+484T	HE80/ EHT80
		5935	0.5	-8.0	-5.0	-2.0	1.0	1.0								
	1	5955	0.5	-8.0	-5.0	-2.0	1.0	1.0	2	5065	25	25				
	5	5975	0.5	-8.0	-5.0	-2.0	1.0	1.0	3	5905	5.5	5.5	7	5985	6.5	65
	9	5995	0.5	-8.0	-5.0	-2.0	1.0	1.0	11	6005	3.5	3.5		5565	0.5	0.5
	13	6015	0.5	-8.0	-5.0	-2.0	1.0	1.0								
	21	6055	0.5	-8.0	-5.0	-2.0	1.0	1.0	19	6045	3.5	3.5				
	25	6075	0.5	-8.0	-5.0	-2.0	1.0	1.0					23	6065	6.5	6.5
	29	6095	0.5	-8.0	-5.0	-2.0	1.0	1.0	27	6085	3.5	3.5				
	33	6115	0.5	-8.0	-5.0	-2.0	1.0	1.0	35	6125	35	35				
	37	6135	0.5	-8.0	-5.0	-2.0	1.0	1.0	55	0125	5.5	5.5	39	6145	6.5	6.5
U-NII-5	41	6155	0.5	-8.0	-5.0	-2.0	1.0	1.0	43	6165	3.5	3.5				
(5.525 to 0.425 GHz)	45	6195	0.5	-8.0	-5.0	-2.0	1.0	1.0								
- ,	53	6215	0.5	-8.0	-5.0	-2.0	1.0	1.0	51	6205	3.5	3.5				
	57	6235	0.5	-8.0	-5.0	-2.0	1.0	1.0	50	6245	25	25	55	6225	6.5	6.5
	61	6255	0.5	-8.0	-5.0	-2.0	1.0	1.0	33	0245	3.5	3.5				
	65	6275	0.5	-8.0	-5.0	-2.0	1.0	1.0	67	6285	3.5	3.5				
	69	6295	0.5	-8.0	-5.0	-2.0	1.0	1.0					71	6305	6.5	6.5
	73	6335	0.5	-8.0	-5.0	-2.0	1.0	1.0	75	6325	3.5	3.5				
	81	6355	0.5	-8.0	-5.0	-2.0	1.0	1.0								
	85	6375	0.5	-8.0	-5.0	-2.0	1.0	1.0	83	6365	3.5	3.5	87	6385	6.5	65
	89	6395	0.5	-8.0	-5.0	-2.0	1.0	1.0	91	6405	3.5	3.5	07	0305	0.5	0.5
	93	6415	0.5	-8.0	-5.0	-2.0	1.0	1.0								
IL-NIL-6	101	6455	-0.5	-9.0	-6.0	-3.0	0.0	0.0	99	6445	3.0	3.0				
(6.425 to 6.525	105	6475	-0.5	-9.0	-6.0	-3.0	0.0	0.0	107	6405	2.0	2.0	103	6465	5.0	5.0
GHz)	109	6495	-0.5	-9.0	-6.0	-3.0	0.0	0.0	107	6485	3.0	3.0				
	113	6515	-0.5	-9.0	-6.0	-3.0	0.0	0.0	115	6525	3.0	3.0				
	117	6535	-0.5	-9.0	-6.0	-3.0	0.0	0.0	110	0525	5.0	5.0	119	6545	5.0	5.0
	121	6555	-0.5	-9.0	-6.0	-3.0	0.0	0.0	123	6565	3.0	3.0	-			
	125	6575	-0.5	-9.0	-6.0	-3.0	0.0	0.0								
	129	6615	-0.5	-9.0	-6.0	-3.0	0.0	0.0	131	6605	3.0	3.0				
	137	6635	-0.5	-9.0	-6.0	-3.0	0.0	0.0					135	6625	5.0	5.0
	141	6655	-0.5	-9.0	-6.0	-3.0	0.0	0.0	139	6645	3.0	3.0				
	145	6675	-0.5	-9.0	-6.0	-3.0	0.0	0.0	147	CCOF	2.0	3.0				
(6.525 to	149	6695	-0.5	-9.0	-6.0	-3.0	0.0	0.0	147	0000	3.0	3.0	151	6705	5.0	5.0
6.875 GHz)	153	6715	-0.5	-9.0	-6.0	-3.0	0.0	0.0	155	6725	3.0	3.0				
	157	6/35	-0.5	-9.0	-6.0	-3.0	0.0	0.0								
	161	6775	-0.5	-9.0	-0.0	-3.0	0.0	0.0	163	6765	3.0	3.0				
	169	6795	-0.5	-9.0	-6.0	-3.0	0.0	0.0					167	6785	5.0	5.0
	173	6815	-0.5	-9.0	-6.0	-3.0	0.0	0.0	171	6805	3.0	3.0				
	177	6835	-0.5	-9.0	-6.0	-3.0	0.0	0.0	170	COAE	20	3.0				
	181	6855	-0.5	-9.0	-6.0	-3.0	0.0	0.0	179	0645	5.0	5.0	183	6865	5.0	5.0
	185	6875	-0.5	-9.0	-6.0	-3.0	0.0	0.0	187	6885	3.0	3.0	105	0005	5.0	5.0
	189	6895	1.0	-7.5	-4.5	-1.5	1.5	1.5								
	193	6025	1.0	-7.5	-4.5	-1.5	1.5	1.5	195	6925	4.5	4.5				
	201	6955	1.0	-7.5	-4.5	-1.5	1.5	1.5		-			199	6945	7.5	7.5
	205	6975	1.0	-7.5	-4.5	-1.5	1.5	1.5	203	6965	4.5	4.5				
U-NII-8	209	6995	1.0	-7.5	-4.5	-1.5	1.5	1.5	244	7005		4.5				
(6.875 to	213	7015	1.0	-7.5	-4.5	-1.5	1.5	1.5	211	/005	4.5	4.5	215	7025	7 -	7 5
7.123 (112)	217	7035	1.0	-7.5	-4.5	-1.5	1.5	1.5	219	7045	45	45	212	7025	1.5	1.5
	221	7055	1.0	-7.5	-4.5	-1.5	1.5	1.5								
	225	7075	1.0	-7.5	-4.5	-1.5	1.5	1.5	227	7085	4.5	4.5				
	229	7095	1.0	-7.5	-4.5	-1.5	1.5	1.5								
1	233	/115	1.0	-7.5	-4.5	-1.5	1.5	1.5		100000000000000000000000000000000000000				100000000000000000000000000000000000000		

160 MHz

Max-power state – Low Power Indoor (continued) – Chain 0/1

220 MU-

	Freq. Band		Maximum Outpu SISO/MIMC	ut Power (dBm)) per Chain			Maximu Power SISO/MIM	m Output r (dBm) O per Chain	Maximum Outpu (dBm) SISO/MIMO pe		utput Power 3m) O per chain	
Freq. Band	Ch #	Center Freq	996T*2 996T*2+484T, 996T*3, 996T*3+484T	HE160/ EHT160	Ch #	Center Freq	996T*4	EHT320	Ch #	Center Freq	996T*4	ЕНТ320
	15	6025	7.5	7.5	31	6105	12.0	12.0				
U-NII-5 (5.925 to 6.425 GHz)	47	6185	7.5	7.5					. 63	6265	12.0	12.0
	79	6345	7.0	7.0					3	0203	12.0	12.0
U-NII-6 (6.425 to 6.525 GHz)	111	6505	6.0	6.0	26	6425	10.5	10.5				
U-NII-7 (6.525 to 6.875 GHz)	143	6665	7.0	7.0	159	6745	10.5	10.5	127	6585	10.5	10.5
	175	6825	7.0	7.0								
U-NII-8 (6.875 to 7.125 GHz)	207	6985	8.5	8.5					191	6905	10.5	10.5

SAR back-off power state – Standard Power (Indoor/Outdoor) / Low Power Indoor – Chain 0/1

SAR back-off power levels are to be used in that state unless Max power state is lower. 6GHz SAR back-off limit is same for SP and LPI.

	6G	BW: 20/4	0/80/160/320 a	all ax/be partial
Frequency Band	Channel Groups SP & LPI	Channels	Chain 0 (Left)	Chain 1 (Right)
E 02E to 6 42E CHr	0	1 to 45	10.5	10.25
5.925 10 0.425 012	1	49 to 93	10.5	10.25
6.425 to 6.525 GHz	2	97 to 113	10.5	10.25
6.525 to 6.875 GHz	3	117 to 185	10.5	10.25
6.875 to 7.125 GHz	4	189 to 233	10.5	10.25

Wi-Fi 6GHz Measured Results – SAR Back-Off Power State

			Freq	Freq. Chain 0 Average Power (dBm)				Chain 1 Average Power (dBm)			
Mode	Power State	Ch #	(MHz)	Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)		
	SP / LPI	31	6105	10.40	10.50	Yes 9.46 9.96 10.42 9.51	9.46	10.50			
802.11be	e)) LPI	95	6425	9.66	10.50		9.96	10.50	Vaa		
6GHZ (EHT320)		159	6745	9.74	10.50		10.42	10.50	res		
		191	6905	9.83	10.50		9.51	10.50			
	Mode 802.11be (EHT320)	ModePower State802.11be (EHT320)SP / LPI	Mode Power State Ch # 802.11be (EHT320) SP / LPI 31 LPI 95 159 191 191 191	Mode Power State Ch # Freq. (MHz) 802.11be (EHT320) SP / LPI 31 6105 LPI 95 6425 159 6745 191 6905	Mode Power State Ch # Freq. (MHz) Chain 0 802.11be (EHT320) SP / LPI 31 6105 10.40 802.11be (EHT320) PLPI 95 6425 9.66 159 6745 9.74 191 6905 9.83	Mode Power State Ch # Freq. (MHz) Chain 0 ×vrage Pow 802.11be (EHT320) SP / LPI 31 6105 10.40 10.50 802.11be (EHT320) SP / LPI 31 6105 9.66 10.50 159 6425 9.66 10.50 10.50 191 6905 9.83 10.50	Mode Power State Ch # Freq. (MHz) Chain 0 +verage Power (dBm) Meas Pwr Tune-up SAR Test (Yes/No) 802.11be (EHT320) SP / LPI 31 6105 10.40 10.50 159 6425 9.66 10.50 Yes 159 6745 9.74 10.50 191 6905 9.83 10.50	Mode Power State Ch # Freq. (MHz) Chain 0 Average Power (dBm) Chain 1 Mode Power State Ch # Freq. (MHz) Meas Pwr Tune-up SAR Test (Yes/No) Meas Pwr Meas Pwr 802.11be (EHT320) SP / LPI 31 6105 10.40 10.50 9.46 802.11be (EHT320) 95 6425 9.66 10.50 9.96 9.96 159 6745 9.74 10.50 10.42 9.51	Mode Power State Ch # Freq. (MHz) Chain 0 - Verage Power (dBm) Chain 1 - Verage Power (dBm)		

Note(s):

4 channels chosen instead of aggregated 5 due to coverage of 320 MHz channels following FCC inquiry.

Duty Factor Measured Results

Mode	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
802.11be (EHT320)	5.456	5.476	99.6%	1.00

Note(s):

Duty Cycle = (T on / period) * 100%

Duty Cycle plots

802.11be (EHT320)

🊺 Keysight	Spectrum	Analyzer - Al	P2022.8.16,855024438	9,MOR-CO	N2						- ē <u>-</u>
<mark>¤</mark> ⊥ Center	Freq	F 50 S	2 DC 00000 GHz		SENS	E:INT	#Avg Typ	ALIGN AUTO	08:57:26 A TRAI	M Dec 14, 2023 DE 1 2 3 4 5 6	Frequency
10 dB/div		ef 30.00	PNO IFGai	:Fast ↔ n:Low	#Atten: 40	dB	Avginou	. m 	Mkr3 5 2	.476 ms	Auto Tuno
20.0											Center Fre 6.105000000 GH
-10.0		ala paraharan darih Alimin (Katarini Alimin	ada yang birang dari sa tahun sana Ing bir dari dari dari dari sa tahun sa sa sa Ing bir dari dari dari sa	ny na stad ta suffer (11 <mark>1-10-10), phil bij</mark>	n da han kartin da pakarta Distan jugat pakarakan	(Listerationed Materiality) Materiality	lanna dhannan a baile In Pranspillion an chui		a da sina dina lina an Antendesi (Sina da sina)	a de la constata como des A foto-responsa (touto-responsa) 	Start Fre 6.105000000 G⊦
-40.0 -50.0 -60.0	J) 			Stop Fre 6.105000000 G⊢
Center Res BW	6.105 / 8 Mi	000000 · Iz	GHz	#VBW	/ 50 MHz	FUN	CTION FUI	Sweep 8	S .000 ms (Functi	span 0 Hz 8001 pts) onvalue	CF Ste 8.000000 M⊦ <u>Auto</u> Ma
1 Δ2 2 N 3 Δ2 4 5 6	1 t 1 t 1 t	(Δ) (Δ)	5.456 329. 5.476	ims (Δ) 4 μs ims (Δ)	4.934 d -13.476 dBr 2.241 d	B n B				E	Freq Offs 0 H
/ 8 9 10 11 (III						
//SG								STATU	3		

9.4. Bluetooth

Maximum Output Power (Tune-up Limit) for Bluetooth

SAR measurement is not required for the EDR and LE. When the secondary mode is $\leq \frac{1}{4}$ dB higher than the primary mode.

Bluetooth Full Power Tune-Up

Band	Mode	Ch #	Freq. (MHz)	Chain 0 Tune-Up	Chain 1 Tune-Up
		0	2402	20.50	20.50
	BR GFSK	39	2441	20.50	20.50
		78	2480	20.50	20.50
	500	0	2402	17.50	17.50
	EDR, π/4 DQPSK	39	2441	17.50	17.50
Bluetooth		78	2480	17.50	17.50
2.4 GHz	500	0	2402	17.50	17.50
	EDR, 8-DPSK	39	2441	17.50	17.50
	-	78	2480	17.50	17.50
	. –	0	2402	19.50	19.50
	LE, GFSK	19	2440	19.50	19.50
		39	2480	19.50	19.50

Bluetooth WLAN Simultaneous Power Tune-Up

Band	Mode	Ch #	Freq. (MHz)	Chain 0 Tune-Up	Chain 1 Tune-Up
		0	2402	15.50	16.50
	GFSK	39	2441	15.50	16.50
		78	2480	15.50	16.50
		0	2402	15.50	16.50
	EDR, π/4 DQPSK	39	2441	15.50	16.50
Bluetooth		78	2480	15.50	16.50
2.4 GHz		0	2402	15.50	16.50
	EDR, 8-DPSK	39	2441	15.50	16.50
		78	2480	15.50	16.50
		0	2402	15.50	16.50
	LE, GFSK	19	2440	15.50	16.50
		39	2480	15.50	16.50

			Frea	Chain 0	Average Pow	ver (dBm)	Chain 1	Average Pow	ver (dBm)
Band	Mode	Ch #	(MHz)	Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
		0	2402	20.11	20.50		19.60	20.50	
Bluetooth 2 4 GHz	BR GESK	39	2441	18.71	20.50	Yes	19.91	20.50	Yes
2.1 0112	oron	78	2480	19.80	20.50		18.85	20.50	

Bluetooth Measured Results WLAN Simultaneous Power

			Frea.	Chain 0 A	Average Pow	ver (dBm)	Chain 1	Average Pow	er (dBm)
Band	Mode	Ch #	(MHz)	Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
		0	2402	14.81	15.50		15.66	16.50	
2 4 GHz	BR GESK	39	2441	15.08	15.50	Yes	15.74	16.50	Yes
202	0.01	78	2480	13.84	15.50		14.50	16.50	

Duty Factor Measured Results

Mode	Туре	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
GFSK	DH5	2.88	3.75	76.80%	1.30

Note(s):

Duty Cycle = (T on / period) * 100%

Duty Cycle plots

GFSK

	eysight	t Spec	trum	Analyzer -	AP2022.8.16	,33499/4	4389,									- 6 ×
Ce	nter	Fre	RF eq	50 2.441	DOOOOO) GH	z		SEN	SE:INT	#Avg	AL Type: Hold: 1	IGN AUTO RMS	04:41:07 P	M Oct 18, 2023	Frequency
10	dB/di	0	Po	f 20 0	0 dBm	IFG	IO: Fast Sain:Lov	v	#Atten: 3	0 dB			Δ	Mkr3 3. -0	.750 ms	Auto Tune
10 10 0.0		$\sqrt{2}$		1 20.0		<mark>1∆2</mark>	3∆2									Center Freq 2.441000000 GHz
-20. -30. -40.		ulu.				where				arman						Start Freq 2.441000000 GHz
-50. -60. -70.																Stop Freq 2.441000000 GHz
Ce Re	nter s BV	2.4 V 8	410 MH	00000 z) GHz ×		#V	вw	50 MHz		UNCTION	S	weep 1:	S 5.00 ms (span 0 Hz 1001 pts)	CF Step 8.000000 MHz <u>Auto</u> Man
1 2 3 4 5 6	Δ2 Ν Δ2	1	t t	(Δ) (Δ)		2.88 79 3.75	30 ms 5.0 μs 50 ms	(Δ) (Δ)	-0.015 -9.682 dE -0.041	dB 3m dB					E	Freq Offset 0 Hz
8 9 10 11															•	

SAR Test Reduction criteria are as follows:

- Reported SAR(W/kg) for WWAN and Bluetooth = Measured SAR *Tune-up Scaling Factor
- Reported SAR(W/kg) for Wi-Fi and Bluetooth = Measured SAR * Tune-up scaling factor * Duty Cycle scaling factor
- Duty Cycle scaling factor = 1 / Duty cycle (%)

KDB 447498 D01 General RF Exposure Guidance:

Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

- ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

KDB 248227 D01 SAR meas for 802.11:

SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; these are mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.

The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the *initial test position(s)* by applying the DSSS or OFDM SAR measurement procedures in the required wireless mode test configuration(s). The *initial test position(s)* is measured using the highest measured maximum output power channel in the required wireless mode test configuration(s). When the *reported* SAR for the *initial test position* is:

- ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- > 0.4 W/kg, SAR is repeated using the same wireless mode test configuration tested in the <u>initial test position</u> to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the <u>reported</u> SAR is ≤ 0.8 W/kg or all required test positions are tested.
 - For subsequent test positions with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested.
 - When it is unclear, all equivalent conditions must be tested.
- For all positions/configurations tested using the <u>initial test position</u> and subsequent test positions, when the <u>reported</u> SAR is > 0.8 W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the <u>reported</u> SAR is ≤ 1.2 W/kg or all required test channels are considered.
 - The additional power measurements required for this step should be limited to those necessary for identifying subsequent highest output power channels to apply the test reduction.
- When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.
- When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is ≤ 1.2 W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR.

To determine the *initial test position*, Area Scans were performed to determine the position with the *Maximum Value of SAR* (*measured*). The position that produced the highest *Maximum Value of SAR* is considered the worst case position; thus used as the *initial test position*.

10.1. Wi-Fi (DTS Band)

When the 802.11b reported SAR of the highest measured maximum output power channel is ≤ 0.8 W/kg, no further SAR testing is required. If SAR is > 0.8 W/kg and ≤ 1.2 W/kg, SAR is required for the next highest measured output power channel. Finally, if SAR is > 1.2 W/kg, SAR is required for the third channel.

SAR testing is not required for OFDM mode(s) when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is \leq 1.2 W/kg.

			Diet				Area Scan		Power	(dBm)	1-g SAF	R (W/kg)	Diet
Conditions	Mode	Antenna	(mm)	Test Position	Ch #.	Freq. (MHz)	Max. SAR (W/kg)	Duty Cycle	Tune-up Limit	Meas.	Meas.	Scaled	No.
Standalone	802 11b	Chain 0	0	Rear of Display	6	2437	0.078	97.9%	19.75	18.21	0.080	0.116	
Standalone	002.110	Chain 0	0	Bottom	6	2437	0.401	97.9%	19.75	18.21	0.407	0.593	1
			Diet				Area Scan		Power	(dBm)	1-g SAF	R (W/kg)	Diet
Conditions	Mode	Antenna	(mm)	Test Position	Ch #.	Freq. (MHz)	Max. SAR (W/kg)	Duty Cycle	Tune-up Limit	Meas.	Meas.	Scaled	No.
				Rear of Display	6	2437	0.038	97.9%	20.25	19.80	0.037	0.042	
Standalone	802 115	Chain 1	0		2	2417	0.844	97.9%	20.25	19.87	0.842	0.939	
Standalone	002.110	Chain I	0	Bottom	6	2437	0.982	97.9%	20.25	19.80	0.976	1.106	2
					11	2462	0.931	97.9%	20.25	20.06	0.938	1.001	

10.2. Wi-Fi (U-NII Band)

<u>UNII-1 &2A</u>

When the specified maximum output power is the same for both UNII band I and UNII band 2A, begin SAR measurement in UNII band 2A; and if the highest *reported* SAR for UNII band 2A is

- ≤ 1.2 W/kg, SAR is not required for UNII band I
- > 1.2 W/kg, both bands should be tested independently for SAR.

			Diet				Area Scan		Power	(dBm)	1-g SAF	R (W/kg)	Diet
Conditions	Mode	Antenna	(mm)	Test Position	Ch #.	Freq. (MHz)	Max. SAR (W/kg)	Duty Cycle	Tune-up Limit	Meas.	Meas.	Scaled	No.
Standalone	802.11ac	Chain 0	0	Rear of Display	50	5250	0.159	95.1%	13.75	12.86	0.185	0.239	
Standalone	VHT160	Ghain U	Ū	Bottom	50	5250	0.744	95.1%	13.75	12.86	0.805	1.039	3
			Diet				Area Scan		Power	(dBm)	1-g SAF	R (W/kg)	Plot
RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power Tune-up Limit	(dBm) Meas.	1-g SAF Meas.	R (W/kg) Scaled	Plot No.
RF Exposure Conditions	Mode 802.11ac	Antenna	Dist. (mm)	Test Position Rear of Display	Ch #. 50	Freq. (MHz) 5250	Area Scan Max. SAR (W/kg) 0.180	Duty Cycle 95.1%	Power Tune-up Limit 13.50	(dBm) Meas. 13.26	1-g SAF Meas. 0.182	R (W/kg) Scaled 0.202	Plot No.

UNII-2C

			Dist				Area Scan		Power	(dBm)	1-g SAF	R (W/kg)	Diet
Conditions	Mode	Antenna	(mm)	Test Position	Ch #.	Freq. (MHz)	Max. SAR (W/kg)	Duty Cycle	Tune-up Limit	Meas.	Meas.	Scaled	No.
Standalana	802.11ac	Chain 0	0	Rear of Display	114	5570	0.177	95.1%	12.75	11.52	0.180	0.251	
Stanualone	VHT160	Chain 0	0	Bottom	114	5570	0.581	95.1%	12.75	11.52	0.587	0.819	5
			Diet				Area Scan		Power	(dBm)	1-g SAF	R (W/kg)	Blot
Conditions	Mode	Antenna	(mm)	Test Position	Ch #.	Freq. (MHz)	Max. SAR (W/kg)	Duty Cycle	Tune-up Limit	Meas.	Meas.	Scaled	No.
Standalone	802.11ac	Chain 1	0	Rear of Display	114	5570	0.169	95.1%	13.25	11.82	0.176	0.257	
Standalone	VHT160		0	Bottom	114	5570	0.595	95.1%	13.25	11.82	0.632	0.924	6

<u>UNII-3 & 4</u>

			Diet				Area Scan		Power	(dBm)	1-g SAF	R (W/kg)	Plot
Conditions	Mode	Antenna	(mm)	Test Position	Ch #.	Freq. (MHz)	Max. SAR (W/kg)	Duty Cycle	Tune-up Limit	Meas.	Meas.	Scaled	No.
Standalone	802.11ac	Chain 0	0	Rear of Display	163	5815	0.108	95.1%	12.75	11.87	0.106	0.136	
Standalone	VHT160	Chain 0	Ū	Bottom	163	5815	0.819	95.1%	12.75	11.87	0.823	1.060	7
			Diet				Area Scan		Power	(dBm)	1-g SAF	R (W/kg)	Plot
RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power Tune-up Limit	(dBm) Meas.	1-g SAF Meas.	R (W/kg) Scaled	Plot No.
RF Exposure Conditions	Mode 802.11ac	Antenna	Dist. (mm)	Test Position Rear of Display	Ch #. 163	Freq. (MHz) 5815	Area Scan Max. SAR (W/kg) 0.273	Duty Cycle 95.1%	Power Tune-up Limit 13.00	(dBm) Meas. 12.92	1-g SAF Meas. 0.276	R (W/kg) Scaled 0.296	Plot No.

UNII-5 & 6 & 7 & 8

			Dist				Area Scan		Power	(dBm)	1-g SAF	R (W/kg)	Plot
Conditions	Mode	Antenna	(mm)	Test Position	Ch #.	Freq. (MHz)	Max. SAR (W/kg)	Duty Cycle	Tune-up Limit	Meas.	Meas.	Scaled	No.
				Rear of Display	31	6105	0.082	99.6%	10.50	10.40	0.092	0.095	
					31	6105	0.391	99.6%	10.50	10.40	0.401	0.412	9
Standalone	802.11be EHT320	Chain 0	0	Pottom	95	6425	0.244	99.6%	10.50	9.66	0.309	0.376	
				Bollom	159	6745	0.201	99.6%	10.50	9.74	0.203	0.243	
					191	6905	0.229	99.6%	10.50	9.83	0.222	0.260	
			Diet				Area Scan		Power	(dBm)	1-g SAF	R (W/kg)	Plot
RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power Tune-up Limit	(dBm) Meas.	1-g SAF Meas.	R (W/kg) Scaled	Plot No.
RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position Rear of Display	Ch #. 159	Freq. (MHz) 6745	Area Scan Max. SAR (W/kg) 0.132	Duty Cycle 99.6%	Power Tune-up Limit 10.50	(dBm) Meas. 10.42	1-g SAF Meas. 0.142	R (W/kg) Scaled 0.145	Plot No.
RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position Rear of Display	Ch #. 159 31	Freq. (MHz) 6745 6105	Area Scan Max. SAR (W/kg) 0.132 0.339	Duty Cycle 99.6% 99.6%	Power Tune-up Limit 10.50 10.50	(dBm) Meas. 10.42 9.46	1-g SAF Meas. 0.142 0.378	R (W/kg) Scaled 0.145 0.482	Plot No.
RF Exposure Conditions	Mode 802.11be EHT320	Antenna Chain 1	Dist. (mm) 0	Test Position Rear of Display	Ch #. 159 31 95	Freq. (MHz) 6745 6105 6425	Area Scan Max. SAR (W/kg) 0.132 0.339 0.411	Duty Cycle 99.6% 99.6% 99.6%	Power Tune-up Limit 10.50 10.50 10.50	(dBm) Meas. 10.42 9.46 9.96	1-g SAF Meas. 0.142 0.378 0.452	R (W/kg) Scaled 0.145 0.482 0.514	Plot No.
RF Exposure Conditions	Mode 802.11be EHT320	Antenna Chain 1	Dist. (mm)	Test Position Rear of Display Bottom	Ch #. 159 31 95 159	Freq. (MHz) 6745 6105 6425 6745	Area Scan Max. SAR (W/kg) 0.132 0.339 0.411 0.485	Duty Cycle 99.6% 99.6% 99.6%	Power Tune-up Limit 10.50 10.50 10.50 10.50	(dBm) Meas. 10.42 9.46 9.96 10.42	1-g SAF Meas. 0.142 0.378 0.452 0.519	R (W/kg) Scaled 0.145 0.482 0.514 0.531	Plot No.

UNII-5 & 6 & 7 & 8 Absorbed Power Density (APD)

			Diet					Power	(dBm)	Meas. APD	Scaled APD
Conditions	Mode	Antenna	(mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Tune-up Limit	Meas.	(W/m^2 over 4cm^2)	(W/m^2 over 4cm^2)
				Rear of Display	31	6105	99.6%	10.50	10.40	0.740	0.760
					31	6105	99.6%	10.50	10.40	3.010	3.092
Standalone	802.11be EHT320	Chain 0	0	Pottom	95	6425	99.6%	10.50	9.66	2.280	2.778
				Bollom	159	6745	99.6%	10.50	9.74	1.480	1.770
					191	6905	99.6%	10.50	9.83	1.630	1.910
			Diet					Power	(dBm)	Meas. APD	Scaled APD
RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Power Tune-up Limit	(dBm) Meas.	Meas. APD (W/m^2 over 4cm^2)	Scaled APD (W/m^2 over 4cm^2)
RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position Rear of Display	Ch #. 159	Freq. (MHz) 6745	Duty Cycle 99.6%	Power Tune-up Limit 10.50	(dBm) Meas. 10.42	Meas. APD (W/m ² over 4cm ²) 1.130	Scaled APD (W/m ² over 4cm ²) 1.156
RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position Rear of Display	Ch #. 159 31	Freq. (MHz) 6745 6105	Duty Cycle 99.6% 99.6%	Power Tune-up Limit 10.50 10.50	(dBm) Meas. 10.42 9.46	Meas. APD (W/m ² over 4cm ²) 1.130 2.780	Scaled APD (W/m ² over 4cm ²) 1.156 3.546
RF Exposure Conditions	Mode 802.11be EHT320	Antenna Chain 1	Dist. (mm)	Test Position Rear of Display	Ch #. 159 31 95	Freq. (MHz) 6745 6105 6425	Duty Cycle 99.6% 99.6% 99.6%	Power Tune-up Limit 10.50 10.50 10.50	(dBm) Meas. 10.42 9.46 9.96	Meas. APD (W/m ² over 4cm ²) 1.130 2.780 3.340	Scaled APD (W/m ² over 4cm ²) 1.156 3.546 3.797
RF Exposure Conditions	Mode 802.11be EHT320	Antenna Chain 1	Dist. (mm)	Test Position Rear of Display Bottom	Ch #. 159 31 95 159	Freq. (MHz) 6745 6105 6425 6745	Duty Cycle 99.6% 99.6% 99.6%	Power Tune-up Limit 10.50 10.50 10.50 10.50	(dBm) Meas. 10.42 9.46 9.96 10.42	Meas. APD (W/m ² over 4cm ²) 1.130 2.780 3.340 3.830	Scaled APD (W/m ² over 4cm ²) 1.156 3.546 3.797 3.917

10.3. Bluetooth Bluetooth Full Power

			Diet				Power	(dBm)	1-g SAF	R (W/kg)	Diet
Conditions	Mode	Antenna	(mm)	Test Position	Ch #.	Freq. (MHz)	Tune-up Limit	Meas.	Meas.	Scaled	No.
Standalone	BR	Chain 0	0	Rear of Display	0	2402	20.50	20.11	0.106	0.116	
Standalone	DH5	Chain 0	0	Bottom	0	2402	20.50	20.11	0.621	0.679	11
			Diet				Power	(dBm)	1-g SAF	R (W/kg)	Diet
RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power Tune-up Limit	(dBm) Meas.	1-g SAF Meas.	R (W/kg) Scaled	Plot No.
RF Exposure Conditions	Mode BR GESK	Antenna	Dist. (mm)	Test Position Rear of Display	Ch #. 39	Freq. (MHz) 2441	Power Tune-up Limit 20.50	(dBm) Meas. 19.91	1-g SAF Meas. 0.066	R (W/kg) Scaled 0.076	Plot No.

Bluetooth WLAN Simultaneous Power

			Dict				Power	(dBm)	1-g SAF	R (W/kg)	Plot
Conditions	Mode	Antenna	(mm)	Test Position	Ch #.	Freq. (MHz)	Tune-up Limit	Meas.	Meas.	Scaled	No.
Standalone	BR	Chain 0	0	Rear of Display	39	2441	15.50	15.08	0.021	0.023	
Standalone	DH5	Chain 0	0	Bottom	39	2441	15.50	15.08	0.252	0.278	13
			Dict				Power	(dBm)	1-g SAF	R (W/kg)	Plot
RF Exposure Conditions	Mode	Antenna	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power Tune-up Limit	(dBm) Meas.	1-g SAF Meas.	R (W/kg) Scaled	Plot No.
RF Exposure Conditions	Mode BR	Antenna	Dist. (mm)	Test Position Rear of Display	Ch #. 39	Freq. (MHz) 2441	Power Tune-up Limit 16.50	(dBm) Meas. 15.74	1-g SAF Meas. 0.017	R (W/kg) Scaled 0.020	Plot No.

11. SAR Measurement Variability

In accordance with published RF Exposure KDB 865664 D01 SAR measurement 100 MHz to 6 GHz. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

- 1) Repeated measurement is not required when the original highest measured SAR is < 0.8 or 2 W/kg (1-g or 10-g respectively); steps 2) through 4) do not apply.
- When the original highest measured SAR is ≥ 0.8 or 2 W/kg (1-g or 10-g respectively), repeat that measurement once.
- 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 or 3.6 W/kg (~ 10% from the 1-g or 10-g respective SAR limit).
- 4) Perform a third repeated measurement only if the original, first, or second repeated measurement is ≥ 1.5 or 3.75 W/kg (1-g or 10-g respectively) and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

						Fir	rst	Sec	ond	Third
Frequency				Repeated	Highest	Repe	ated	Repe	ated	Repeated
Band	Air Interface	RF Exposure Conditions	Test Position	SAR	Measured	Measured	Largest to	Measured	Largest to	Measured
(MHz)				(Yes/No)	SAR (W/kg)	SAR	Smallest	SAR	Smallest	SAR
						(W/ka)	SAR Ratio	(W/ka)	SAR Ratio	(W/ka)
2400	Wi-Fi 802.11b	Standalone	Bottom	Yes	0.976	0.951	1.00	N/A	N/A	N/A
2400	BT	Standalone	Bottom	No	0.636	N/A	N/A	N/A	N/A	N/A
5200	Wi-Fi 802.11ac	Standalone	Bottom	Yes	1.050	1.020	1.03	N/A	N/A	N/A
5500	Wi-Fi 802.11ac	Standalone	Bottom	No	0.632	N/A	N/A	N/A	N/A	N/A
5800	Wi-Fi 802.11ac	Standalone	Bottom	Yes	1.030	1.02	1.01	N/A	N/A	N/A
6500	Wi-Fi 802.11be	Standalone	Bottom	No	0.519	N/A	N/A	N/A	N/A	N/A

Note(s):

Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is < 1.20.

12. Simultaneous Transmission Conditions

26Hz SGHz 6GHz 8T 26Hz SGHz 6GHz 8T 1 x x x x x SGHz SGHz MMO 3 x x x x GGHz MMO 3 x x x GGHz MMO 4 x x GGHz MMO GGHz BT B 5 x x x x BT B GGHz BT B 6 x x x x ST B BT B ST S ST S <td< th=""><th></th><th>_</th><th>Chair</th><th>10</th><th></th><th></th><th></th><th>Uh</th><th>ain 1</th><th></th><th>Comment</th></td<>		_	Chair	10				Uh	ain 1		Comment
1 x		2GHz	5GHz	6GHz	BT	2G	łz	5GHz	6GHz	BT	
2 x x x x x Gelt MIMO 3 x x Gelt MIMO Gelt MIMO 4 x x Bit Gelt MIMO 5 x x Bit x Z4GHz + 8T 6 x x x Z4GHz + 8T Gelt MIMO 7 x x x Z4GHz + 8T Gelt MIMO 9 x x x S6Hz + 8T Gelt MIMO 10 x x x S6Hz + 8T Gelt MIMO 11 x x x S6Hz + 8T Gelt MIMO 12 x x x x S6Hz + 8T S6Hz + 8T 13 x x x x Gelt + 8GHz + S6Hz + 10 S6Hz + 8GHz + 5GHz + 10 14 x x x x Gelt + 8GHz + 5GHz	1	х				x					2GHz MIMO
3 x x x 6000000000000000000000000000000000000	2		x					×			5GHz MIMO
4 x b x B Tip 5 x - - x x $2.464z + 8T$ 6 - x - x $3T + 2.464z + 8T$ 7 x - - x $T + 2.464z + 8T$ 9 - - x - $T + 2.464z + 8T$ 10 - - x - $T + 6.64z + 8T$ 11 - - x - $T + 6.64z + 8T$ 12 - - x - - $T + 6.64z + 8T$ 13 - - - - x - $T + 6.64z + 8T$ 14 - - - - - - - $T + 6.64z + 8T$ 15* - - - - - - - $T + 6.64z + 664z + 6$	3			x					x		6GHz MIMO
5 x	- 4				x					x	BT iBF
6 x x x x st	5	x								x	2.4GHz + BT
7 x	6				x	x					BT+ 2.4GHz
8 X X X X X X GGHL + 8T 9 X X X X BT + 5GHz 10 X X X BT + 5GHz 11 X X X BT + 5GHz 12 X X X Store 14 X X X Store 14 X X X Store 15* X X X Store Store 15* X X X Store Store 16* X X X Store Store 17* X X X X Store 18* X X X X Store 20* X X X X Store 20* X X X Store Store 21* X X X Store Store	7		x							x	5GHz +BT
9 x	8			x						x	6GHz + BT
10 x x x x x bit is a second se	9				x			x			BT + 5GHz
11 x x x 12 x x x 13 x x x 14 x x x 14 x x x 14 x x x 15* x x x 16* x x x 17* x x x 18* x x x 19* x x x 19* x x x 19* x x x 10* x x x 10* x x x 10* x x x 12* x x x 12* x x x 2* x x <	10				x				x		BT + 6GHz
12 X X X X X X X X X SGH2 + (SGH2 + 8T) 13 X X X X X SGH2 + (SGH2 + 8T) 14 X X X SGH2 + (SGH2 + 8T) 15* X X X X SGH2 + (SGH2 + 8T) 15* X X X X SGH2 + (SGH2 + 8T) 16* X X X X (2.4GH2 + 5GH2) + (2.4GH2 + 5GH2) 17* X X X X (2.4GH2 + 5GH2) + (2.4GH2 + 5GH2) 18* X X X X (2.4GH2 + 5GH2) + (2.4GH2 + 5GH2) 19* X X X X (2.4GH2 + 5GH2) + (2.4GH2 + 5GH2) 20* X X X X SGH2 + 8T) + (2.4GH2 + 5GH2) 21* X X X X X SGH2 + 8T) 22* X X X X X SGH2 + 8T) 24* X X X X (2.4GH2 + 5GH2) + (2.4GH2 + 5GH2) 26* X X X X (2.4GH2 + 5GH2) + 8T 26* X X X (2.4GH2 + 5GH2) + 8T 26*	11		x		x			x			(5GHz+BT) +5GHz
13 x	12			x	x				x		(6GHz +BT) +6GHz
14 x	13		x					x		×	5GHz + (5GHz +BT)
15* x x x x x x x (2.4GHz + 5GHz) + (2.4GHz + 5GHz) 16* x x x x x x (2.4GHz + 5GHz) + (2.4GHz + 5GHz) x 17* x x x x x (2.4GHz + 5GHz) + (2.4GHz + 5GHz) x 18* x x x x (2.4GHz + 5GHz) + (2.4GHz + 5GHz) x 19* x x x x (2.4GHz + 5GHz) + (2.4GHz + 5GHz) x 20* x x x x x (2.4GHz + 5GHz) + 6GHz x 21* x x x x x x GGHz + 12.4GHz + 6GHz) x 22* x x x x x (2.4GHz + 5GHz) + 8T x 26* x x x x (2.4GHz + 5GHz) + 16.4GHz + 5GHz) x 27* x x x x (2.4GHz + 5GHz) + 16.4GHz + 5GHz) x 28* x	14			x					x	x	6GHz + (6GHz +BT)
16* x x x x x (2.4GHz+6GHz) + 6GHz) 17* X X X X X (2.4GHz+6GHz) + 6GHz) 18* X X X X (2.4GHz+6GHz) + 6GHz) 19* X X X SGHz+ (2.4GHz+6GHz) + 6GHz) 20* X X X GGHz+ (2.4GHz+6GHz) 21* X X X GGHz+ (2.4GHz+6GHz) 22* X X X BT + (2.4GHz+6GHz) 23* X X X X BT + (2.4GHz+6GHz) 24* X X X X BT + (2.4GHz+6GHz) 25* X X X X X 26* X X X X (2.4GHz+6GHz) + 8T 26* X X X X (2.4GHz+6GHz) + 12.4GHz + 6GHz) 27* X X X X (2.4GHz+6GHz) + 12.4GHz + 5GHz) 28* X X <	15*	x	x			×		x			(2.4GHz + 5GHz) + (2.4GHz + 5GHz)
17* x 24* x x x x x x x x (2.46Hz+66Hz) +8T (2.46Hz+66Hz) +8T (2.46Hz+66Hz) +8T (2.46Hz+66Hz) +8T (2.46Hz+66Hz) +8T (2.46Hz+66Hz) +8T (16*	x		×		×			x		(2.4GHz + 6GHz) + (2.4GHz + 6GHz)
18* x	17*	x	x					x			(2.4GHz+5GHz) +5GHz
19* x x x x x x x SGH2+ (2.4GH2+SGH2) 20* x x x x x x GGH2+ (2.4GH2+SGH2) 21* x x x x x BT+ (2.4GH2+SGH2) BT+ (2.4GH2+SGH2) 22* x x x x x x BT+ (2.4GH2+SGH2) BT 24* x x x x x x BT+ (2.4GH2+SGH2) BT 24* x x x x x x (2.4GH2+SGH2) BT 25* x x x x x (2.4GH2+SGH2) BT (2.4GH2+SGH2) BT 26* x x x x x x (2.4GH2+SGH2) BT (2.4GH2+SGH2) BT (2.4GH2+SGH2) BT (2.4GH2+SGH2) BT (2.4GH2+SGH2) BT (2.4GH2+SGH2) (2.4GH2+SGH2) (2.4GH2+SGH2) SGH2 SGH2 BT (2.4GH2+SGH2) (2.4GH2+SGH2) (2.4GH2+SGH2) (2.4GH2+SGH2) SGH2 SGH2 SGH2	18*	x		×					x		(2.4GHz+6GHz) +6GHz
20* x	19*		x			×		x			5GHz+ (2.4GHz+5GHz)
21* x x x x x x x x BT+ (2.4GHz+SGHz) 22* x x x x x x x BT+ (2.4GHz+SGHz) 23* x x x x x x x x BT+ (2.4GHz+SGHz) 23* x x x x x x x (2.4GHz+SGHz) + 8T 25* x x x x x x (2.4GHz+SGHz) + 8T 26* x x x x x x x x (2.4GHz+SGHz) + 8T 26* x x x x x x x x (2.4GHz+SGHz) + 8T 28* x x x x x x x x (2.4GHz+SGHz) + 6GHz) 29* x x x x x x x 2.4GHz + 5GHz x 30 x x x x x x x 2.4GHz + 5GHz x x x <th< td=""><td>20*</td><td></td><td></td><td>x</td><td></td><td>×</td><td></td><td></td><td>x</td><td></td><td>6GHz+ (2.4GHz+6GHz)</td></th<>	20*			x		×			x		6GHz+ (2.4GHz+6GHz)
22* x x x x x bit is a state of the state of	21*				x	×		x			BT+ (2.4GHz+5GHz)
23* x	22*				x	×			x		BT + (2.4GHz +6GHz)
24* x	23*	х	×							×	(2.4GHz +5GHz) +BT
25* x x x x x x x (5GHz + BT) + (2.4GHz + 5GHz) 26* x x x x x x x (6GHz + BT) + (2.4GHz + 5GHz) 27* x x x x x x (2.4GHz + 5GHz) + (5GHz + 8T) 28* x x x x x (2.4GHz + 5GHz) + (5GHz + 8T) 29 x x x x (2.4GHz + 5GHz) + (5GHz + 8T) 30 x x x x (2.4GHz + 5GHz) + (5GHz + 8T) 31 x x x x 2.4GHz + 5GHz 31 x x x x 2.4GHz + 5GHz 32 x x x x 2.4GHz + 6GHz 33 x x x x 5GHz + 8T 34 x x x x 5GHz + 8T 35 x x x x 2.4GHz + 5GHz + 2.4GHz <td< td=""><td>24*</td><td>х</td><td></td><td>×</td><td></td><td></td><td></td><td></td><td></td><td>×</td><td>(2.4GHz +6GHz) +BT</td></td<>	24*	х		×						×	(2.4GHz +6GHz) +BT
26* x x x x x x x (6GHz + BT) + (2.4GHz + 6GHz) 27* x x x x x x x (2.4GHz + 5GHz) + (5GHz + BT) 28* x x x x x (2.4GHz + 5GHz) + (5GHz + BT) 29 x x x x (2.4GHz + 5GHz) + (5GHz + BT) 30 x x x 2.4GHz + 5GHz 5GHz 31 x x x x 2.4GHz + 5GHz 5GHz 31 x x x x 2.4GHz + 5GHz 5GHz 33 x x x x x 5GHz + 2.4GHz 34 x x x x x 5GHz + 8T 35 x x x x 2.4GHz + 5GHz + 2.4GHz 36* x x x x 2.4GHz + 5GHz + 2.4GHz 38* x x x x 2.4GHz + 5GHz	25*		x		x	×		x			(5GHz + BT) + (2.4GHz +5GHz)
27* X X X X X X X (2.4GHz+5GHz) + (5GHz+8T) 28* X X X X X X X (2.4GHz+5GHz) + (5GHz+8T) 29 X X X X X (2.4GHz+5GHz) + (5GHz+8T) 30 X X X X (2.4GHz+5GHz) + (5GHz+8T) 31 X X X 2.4GHz+5GHz 5GHz 31 X X X 2.4GHz+5GHz 5GHz 32 X X X X 2.4GHz+5GHz 33 X X X X 5GHz+12.4GHz 34 X X X X 5GHz+81 35 X X X X 6GHz+81 36 X X X X 6GHz+81 37* X X X 2.4GHz+5GHz+12.4GHz 38* X X X 2.4GHz+12.4GHz+12.4GHz	26*			x	x	×			x		(6GHz + BT) + (2.4GHz +6GHz)
28* x x x x x x (2.4GHz+6GHz)+ (6GHz+8T) 29 x . . x . 2.4GHz+5GHz)+ (6GHz+8T) . 30 x . . x . . . 2.4GHz+5GHz)+ (6GHz+8T) 31 x . . . x . . . 2.4GHz+5GHz)+ (6GHz+8T) 32 . x .	27*	x	x					x		x	(2.4GHz+5GHz) + (5GHz+BT)
29 x x x 2.4GHz+ 5GHz 30 x x x 2.4GHz+ 6GHz 6GHz 31 x x x x 2.4GHz+ 6GHz 6GHz 31 x x x x 6GHz +2.4GHz 6GHz 32 x x x x 6GHz +2.4GHz 5GHz +2.4GHz 33 x x x x x 5GHz +2.4GHz 5GHz +81 34 x x x x x 5GHz +81 5GHz +81 35 x x x x 5GHz +81 6GHz + 81 6GHz + 81 36 x x x x 2.4GHz +5GHz +2.4GHz 6Hz + 81 37* x x x x 2.4GHz +5GHz +2.4GHz 6Hz + 81 38* x x x x 2.4GHz +5GHz +2.4GHz 2.4GHz +5GHz 40* x x x x x 2.4GHz +5GHz 2.4GHz +5GHz <tr< td=""><td>28*</td><td>х</td><td></td><td>x</td><td></td><td></td><td></td><td></td><td>x</td><td>x</td><td>(2.4GHz+6GHz) + (6GHz+BT)</td></tr<>	28*	х		x					x	x	(2.4GHz+6GHz) + (6GHz+BT)
30 x x x 2.4GHz+ 6GHz 31 x x x x 5GHz+ +2.4GHz 5GHz+ +2.4GHz 32 x x x x x 6GHz+ +2.4GHz 5GHz+BT 33 x x x x x x 5GHz+BT 34 x x x x x 5GHz+BT 35 x x x x 5GHz+BT 36 x x x 5GHz+BT 37* x x x x 5GHz+BT 38* x x x x 2.4GHz+5GHz+2.4GHz 39* x x x x 2.4GHz+6GHz+2.4GHz 39* x x x x 2.4GHz+6GHz+2.4GHz 40* x x x x 2.4GHz+6GHz 41* 2.4GHz+6GHz 2.4GHz+6GHz 2.4GHz+6GHz 41* 2.4GHz+6GHz x x x 2.4GHz+6GHz 44*	29	x						x			2.4GHz+ 5GHz
31 x x x x 5GHz + 2.4GHz 32 x x x x 6GHz + 2.4GHz 33 x x x x x 5GHz + 2.4GHz 33 x x x x x 5GHz + 2.4GHz 34 x x x x x 5GHz + 2.4GHz 34 x x x x x 5GHz + 2.4GHz 35 x x x x x 6GHz + 8T 36 x x x x 2.4GHz + 5GHz + 2.4GHz 38* x x x x 2.4GHz + 5GHz + 2.4GHz 39* x x x x 2.4GHz + 42.4GHz + 5GHz 40* x x x x 2.4GHz + 5GHz 41* x x x 2.4GHz + 5GHz 42* x x x 2.4GHz + 5GHz 44* x x x<	30	х							x		2.4GHz+ 6GHz
32 x x x x 6GHz + 2.4GHz 33 × × × × SGHz + BT 34 × × × × × SGHz + BT 35 × × × × × SGHz + BT SGHz + BT 36 × × × × SGHz + BT SGHz + BT 37* × × × × SGHz + BT SGHz + SGHz SGHz + SGHz 38* × × × × × × SGHz + SGHz SGHz + SGHz 39* × × × × × × 2.4GHz + SGHz SGHz + SGHz 40* × × × × × × 2.4GHz + SGHz SGHz + SGHz 41* × × × × × 2.4GHz + SGHz 2.4GHz + SGHz 42* × × × × 2.4GHz + SGHz 2.	31		x			×					5GHz + 2.4GHz
33	32			×		×					6GHz + 2.4GHz
34 x x x x x 66Hz + BT 35 x x x x 66Hz + BT 66Hz + BT 36 x x x x 66Hz + BT 66Hz + BT 37* x x x x x 2.46Hz + 56Hz + 2.46Hz 38* x x x x x 2.46Hz + 66Hz + 2.46Hz 39* x x x x 2.46Hz + 66Hz + 2.46Hz 40* x x x x 2.46Hz + 66Hz + 2.46Hz 41* x x x x 2.46Hz + 66Hz 43* x x x x 2.46Hz + 66Hz 44* x x x x 2.46Hz + 66Hz 44* x x x x x 2.46Hz + 66Hz 44* x x x x x 2.46Hz + 66Hz 45 x x x x x 2.46Hz + 66Hz 46 x x x x x<	33							x		x	SGHz +BT
35 x x x 36 x x x 37* x x x 38* x x x 39* x x x 40* x x x 41* x x x 42* x x x 43* x x x 44* x x x 45 x x x 46 x x x	34								x	x	6GHz + BT
36 x x x x 66Hz + BT 37* x x x x 2.4GHz + 5GHz + 2.4GHz 38* 38* x x x x 2.4GHz + 5GHz + 2.4GHz 38* 39* x x x x 2.4GHz + 46Hz + 2.4GHz 38* 40* x x x x 2.4GHz + 42.4GHz + 5GHz 38* 40* x x x x 2.4GHz + 42.4GHz + 5GHz 38* 41* x x x x 2.4GHz + 5GHz 38* 42* x x x x 2.4GHz + 5GHz 38* 43* x x x x 2.4Ghz + 5GHz 38*	35		x		×						SGHz +BT
37* x x x x x 2.4GHz +5GHz +2.4GHz 38* x x x x 2.4GHz +5GHz +2.4GHz 2.4GHz +5GHz 39* x x x x 2.4GHz +5GHz +2.4GHz 2.4GHz +5GHz 39* x x x x 2.4GHz +5GHz 2.4GHz +5GHz 40* x x x x 2.4GHz +5GHz 2.4GHz +5GHz 41* x x x x 2.4GHz +5GHz 42* x x x x 2.4GHz +5GHz 43* x x x x 2.4GHz +5GHz 2.4GHz +5GHz 44* x x x x 2.4Ghz +5GHz 2.4Ghz + 5GHz +	36			x	x						6GHz + BT
38* x x x x x 2.4GHz +6GHz +2.4GHz 39* x x x x x 2.4GHz +6GHz +2.4GHz 40* x x x x 2.4GHz +6GHz +2.4GHz 40* x x x x 2.4GHz +42.4GHz +5GHz 41* x x x 2.4GHz +5GHz 42* x x x 2.4GHz +5GHz 43* x x x x 2.4GHz +5GHz 44* x x x x 2.4Ghz +5GHz 44* x x x x 2.4Ghz +5GHz 44* x x x 2.4Ghz +5GHz 44* x x x x 2.4Ghz +5GHz 44* x x x x 5GHz +8T + 5GHz +8T 46 x x x x x 6GHz +8T + 6GHz +8T	37*	x	x			x					2.4GHz +5GHz +2.4GHz
39* x x x x x 40* x x x x 2.4GHz +(2.4GHz+5GHz) 41* x x x x 2.4GHz +(2.4GHz+5GHz) 41* x x x x 2.4GHz +(2.4GHz+5GHz) 42* x x x x 2.4GHz +(2.4GHz+5GHz) 43* x x x x 2.4GHz+5GHz 44* x x x 2.4Ghz+5GHz 45 x x x x SGHz+8T 46 x x x x 6GHz+8T	38*	x		x		x					2.4GHz +6GHz +2.4GHz
40* x x x x 2.4GHz + (2.4GHz+6GHz) 41* x x x 2.4GHz + (2.4GHz+6GHz) 42* x x x 2.4GHz + 5GHz 43* x 2.4GHz+5GHz 2.4GHz+6GHz 44* x x 2.4GHz+6GHz 45 x x x x SGHz+8T + 5GHz+8T 46 x x x x x 6GHz+8T + 6GHz+8T	39*	x				x		x			2.4GHz +(2.4GHz+5GHz)
41* x x x x 2.4GHz + 5GHz 42* x x x x 2.4GHz + 5GHz 43* x x x x 2.4GHz + 5GHz 44* x x x 2.4Ghz + 5GHz x 45 x x x x 5GHz + BT + 5GHz + BT 46 x x x x x 6GHz + BT + 6GHz + BT	40*	x				x			x		2.4GHz +(2.4GHz+6GHz)
42* x x x x 2.4GHz + 5GHz 43* x x 2.4Ghz + 5GHz 2.4Ghz + 5GHz 44* x x x 2.4Ghz + 5GHz 45 x x x x 46 x x x x	41*					x		x			2.4GHz + 5GHz
43* X X 2.4Ghz+5GHz 44* X X 2.4Ghz+6GHz 45 X X X 46 X X X	42*					x			x		2.4GHz + 6GHz
44* x x z 2.4Ghz+6GHz 45 X X X X SGHz+BT SGHz+BT 46 X X X X X GGHz+BT 6GHz+BT	43*	x	x								2.4Ghz+5GHz
45 X X X X SGHz +BT +	44*	x		x							2.4Ghz+6GHz
46 X X X 6GHz+BT 6GHz+BT	45		x		x			x		x	5GHz +BT + 5GHz+BT
	46			x	x				x	x	6GHz +BT + 6GHz+BT

Note:

* As declared by manufacturer, Fast Connect TAS has the ability to declare different antenna groups, in which the algorithm will ensure that any Wi-Fi Simultaneous scenarios occurring in a given antenna group will stay under the Plimit. Therefore, any simultaneous case that consists of (2.4GHz + 5GHz) or (2.4GHz + 6GHz) on the same antenna group, then TAS will handle such a situation. Therefore, these simultaneous cases are not considered in §12.1.

12.1. Simultaneous Transmission SAR

KDB 447498 D01 General RF Exposure Guidance provides two procedures for determining simultaneous transmission SAR test exclusion: Sum of SAR and SAR to Peak Location Ratio (SPLSR)

Sum of SAR

To qualify for simultaneous transmission SAR test exclusion based upon Sum of SAR the sum of the reported standalone SARs for all simultaneously transmitting antennas shall be below the applicable standalone SAR limit. If the sum of the SARs is above the applicable limit then simultaneous transmission SAR test exclusion may still apply if the requirements of the SAR to Peak Location Ratio (SPLSR) evaluation are met.

SAR to Peak Location Ratio (SPLSR)

KDB 447498 D01 General RF Exposure Guidance explains how to calculate the SAR to Peak Location Ratio (SPLSR) between pairs of simultaneously transmitting antennas:

$$SPLSR = (SAR_1 + SAR_2)^{1.5} / Ri$$

Where:

SAR¹ is the highest reported or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

SAR₂ is the highest reported or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

Ri is the separation distance between the pair of simultaneous transmitting antennas. When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$

In order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR > 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of: $(SAR_1 + SAR_2)^{1.5}/Ri \le 0.04$

When an individual antenna transmits at on two bands simultaneously, the sum of the highest <u>reported</u> SAR for the frequency bands should be used to determine SAR_1 or SAR_2 . When SPLSR is necessary, the smallest distance between the peak SAR locations for the antenna pair with respect to the peaks from each antenna should be used.

The antennas in all antenna pairs that do not qualify for simultaneous transmission SAR test exclusion must be tested for SAR compliance, according to the enlarged zoom scan and volume scan post-processing procedures in KDB Publication 865664 D01.

12.2. Sum of the SAR for WLAN 2.4GHz, 5GHz, and 6GHz and Bluetooth WLAN Simultaneous Power

				Standalone	SAR (W/kg)			
RF Exposure	WLAN	2.4 GHz	WLAN	5 GHz	WLAN	6 GHz	В	Т
Conditions	Chain 0	Chain 1	Chain 0	Chain 1	Chain 0	Chain 1	Chain 0 Chain 1	
	(1)	2	3	(4)	(5)	6	(7)	8
Standalone	0.593	1.106	1.060	1.167	0.412	0.531	0.278	0.307

		Σ 1-g S	AR (W/kg)			
2.4 GH	Iz + BT	5 G	Hz + BT		6 GHz	+ BT
(1) + (8)	(2) + (7)	(3) + (8)	(4) + (7)	(5) +	(8)	(6) + (7)
0.900	1.384	1.367	1.445	0.71	19	0.809
		Σ 1-g SA	AR (W/kg)			
2.4 GHz MIN	10	5 GHz MIMO	6 GHz MIM	0		BT MIMO
1+2		3+4	5+6			(7) + (8)
1.699		2.227	0.943			0.585
		Σ 1-g SA	AR (W/kg)			
	2.4 GHz + 5 GH	Z		2.4 GHz -	+ 6 GHz	
1+4		2+3	1+6			2+5
1.760		2.166	1.124			1.518
		Σ 1-g SA	AR (W/kg)			
	5 GHz + BT			6 GHz	+ BT	
3+7		<u>(4)</u> + (8)	(5) + (7)			6 + 8
1.338		1.474	0.690			0.838
		Σ 1-g SA	AR (W/kg)			
	5 GHz MIMO +	ЗТ		6 GHz MI	VIO + BT	
3 + 4 + (7)	3+4+8	5 + 6 + (7	(5) + 6) + 8
2.505		2.534	1.221			1.250
		Σ 1-g SA	AR (W/kg)			
	5 GH	z MIMO + BT MIMO	6 GHz MIMO + B	т мімо		
	3) + (4) + (7) + (8)	5 + 6 + 7	+ 8		
		2.812	1.528			

Note:

Simultaneous combinations that exceed 1.6 W/kg, as shown highlighted in red, are addressed with SPLSR in the following Section §12.3.

12.3. SAR to Peak Location Separation Ratio (SPLSR)

Mode		Peak SAR	Х	Y	Z	Test Case	d: Calculated	SPLSR	Volume Sca
		W/kg	mm	mm	mm	 	distance (mm)	(≤ 0.04)	(Yes/No)
2.4GHz on Chain 0	1	0.593	-100.5	97.0	-177.0	1+2	199.50	0.01	No
2.4 GHz on Chain 1	2	1.106	-100.5	-102.5	-177.0				





Figure 2 – Bottom – WLAN 5GHz MIMO on Chain 0 + Chain 1

Mode		Peak SAR	Х	Y	Z	Test Case	d: Calculated	SPLSR	Volume Scan
Mode	-	W/kg	mm	mm	mm	Test base	distance (mm)	(≤ 0.04)	(Yes/No)
UNII-3&4 on Chain 0	3	1.060	-102.9	90.7	-177.0	3+4	179.51	0.02	No
UNII-1&2A on Chain 1	4	1.167	-101.2	-88.8	-177.0				



Figure 3 – Bottom – WLAN 2.4GHz on Chain 0 + WLAN 5GHz on Chain 1

Mode		Peak SAR	Х	Y	Z	Test Case	d: Calculated	SPLSR	Volume Scan
Mode		W/kg	mm	mm	mm	Test base	distance (mm)	(≤ 0.04)	(Yes/No)
2.4GHz on Chain 0	1	0.593	-100.5	97.0	-177.0	1+4	185.80	0.01	No
UNI-1&2A on Chain 1	4	1.167	-101.2	-88.8	-177.0				



Figure 4 – Bottom – WLAN 5GHz on Chain 0 + WLAN 2.4GHz on Chain 1

Mode		Peak SAR	Х	Y	Z	Test Case	d: Calculated	SPLSR	Volume Scan
Mode		W/kg	mm	mm	mm	Test base	distance (mm)	(≤ 0.04)	(Yes/No)
UNII-3&4 on Chain 0	3	1.060	-190.2	90.7	-177.0	3+2	208.99	0.02	No
2.4GHz on Chain 1	2	1.106	-110.5	-102.5	-177.0				



Figure 5 – Bottom – WLAN 5GHz + BT on Chain 0 + WLAN 5GHz on Chain 1

Mode		Peak SAR	Х	Y	Z	Test Case	d: Calculated	SPLSR	Volume Scan
Mode		W/kg	mm	mm	mm	103t Case	distance (mm)	(≤ 0.04)	(Yes/No)
UNII-3&4 + BT on Chain 0	3+7	1.388	-102.9	90.7	-177.0	(3) + (7) + (4)	179.51	0.02	No
UNII-1&2A on Chain 1	4	1.167	-101.2	-88.8	-177.0				



Figure 6 – Bottom – WLAN 5GHz on Chain 0 + WLAN 5GHz + BT on Chain 1

Mode		Peak SAR	Х	Y	Z		Test Case	d: Calculated	SPLSR	Volume Scan
Wode	mode		mm	mm	mm			distance (mm)	(≤ 0.04)	(Yes/No)
UNII-3&4 on Chain 0	3	1.060	-102.9	90.7	-177.0		(3) + (4) + (8)	179.51	0.02	No
UNII-1&2A + BT on Chain 1	(4) + (8)	1.474	-101.2	-88.8	-177.0					



Figure 7 – Bottom – WLAN 5GHz MIMO + BT MIMO

Mode		Peak SAR	Х	Y	Z		Test Case	d: Calculated	SPLSR	Volume Scan
		W/kg	mm	mm	mm			distance (mm)	(≤ 0.04)	(Yes/No)
UNII-3&4 + BT on Chain 0	3+7	1.388	-102.9	90.7	-177.0		(3) + (7) + (4) + (8)	179.51	0.03	No
UNII-1&2A + BT on Chain 1	(4) + (8)	1.474	-101.2	-88.8	-177.0					



Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because either the sum of the 1-g SAR is < 1.6 W/kg or the SPLSR is < 0.04 for all circumstances that require SPLSR calculation.

Appendixes

Refer to separated files for the following appendixes.

- Appendix A: SAR Setup Photos
- Appendix B: SAR System Check Plots
- **Appendix C: SAR Highest Test Plots**
- Appendix D: SAR Tissue Ingredients
- Appendix E: SAR Probe Certificates
- Appendix F: SAR Dipole Certificates

END OF REPORT