SAR EVALUATION REPORT

PERMISSIVE CHANGE

FCC 47 CFR § 2.1093
IEEE Std 1528-2013

For

Radio Module
(Tested inside of Panasonic Tablet PC FZ-G2)

FCC ID: ACJ9TGWL20B

Model Name: WL20B

Report Number: 13489132H-A-R1
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Prepared for

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CERTIFICATE 5107.02

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

Revision History

Rev.	Date	Revisions	Revised By
-	4/14/2021	Initial Issue	T. Shimada
1	5/26/2021	Page 12: Modified “5. Measurement Uncertainty”	T. Shimada
1	5/26/2021	Page 15: Modified “7. RF Exposure Conditions (Test Configurations)”; Section 14 → Appendix B	T. Shimada
1	5/26/2021	Page 18: Fixed typo of Clause number of “Simultaneous Transmission SAR Analysis”	T. Shimada

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1. Attestation of Test Results

Applicant Name	PANASONIC CORPORATION OF NORTH AMERICA
FCC ID	ACJ9TGWL20B
Model Name	WL20B
Applicable Standards	FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013
Exposure Category	SAR Limits (W/Kg) Peak spatial-average (1g of tissue)
General population / Uncontrolled exposure	1.6
RF Exposure Conditions	Equipment Class - Highest Reported SAR (W/kg) WLAN
Standalone	0.94
Simultaneous TX	1.18 W/kg (refer to Section 11 of this report.) (The highest SAR across exposure conditions)
Date Tested	2/15/2021 to 2/24/2021
Test Results	Pass

UL Japan, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Japan, Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Japan, Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Japan, Inc. will constitute fraud and shall nullify the document. This test report must not be used by the customer to claim product certification, approval, or endorsement by the A2LA accreditation body. This report is written to support regulatory compliance of the applicable standards stated above.

Approved & Released By:	Prepared By:
Takayuki Shimada Leader	Hisayoshi Sato Engineer

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2. Test Methodology

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE STD 1528- 2013, TCB workshop updates, and the following KDB Procedures:

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

Additional Guidance: TCB workshop

- o TCB workshop

3. Facilities and Accreditation

*Shielded room for SAR testings

The test sites and measurement facilities used to collect data are located at 4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN.

*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 199967

ISED Lab Company Number: 2973C / CAB identifier: JP0002

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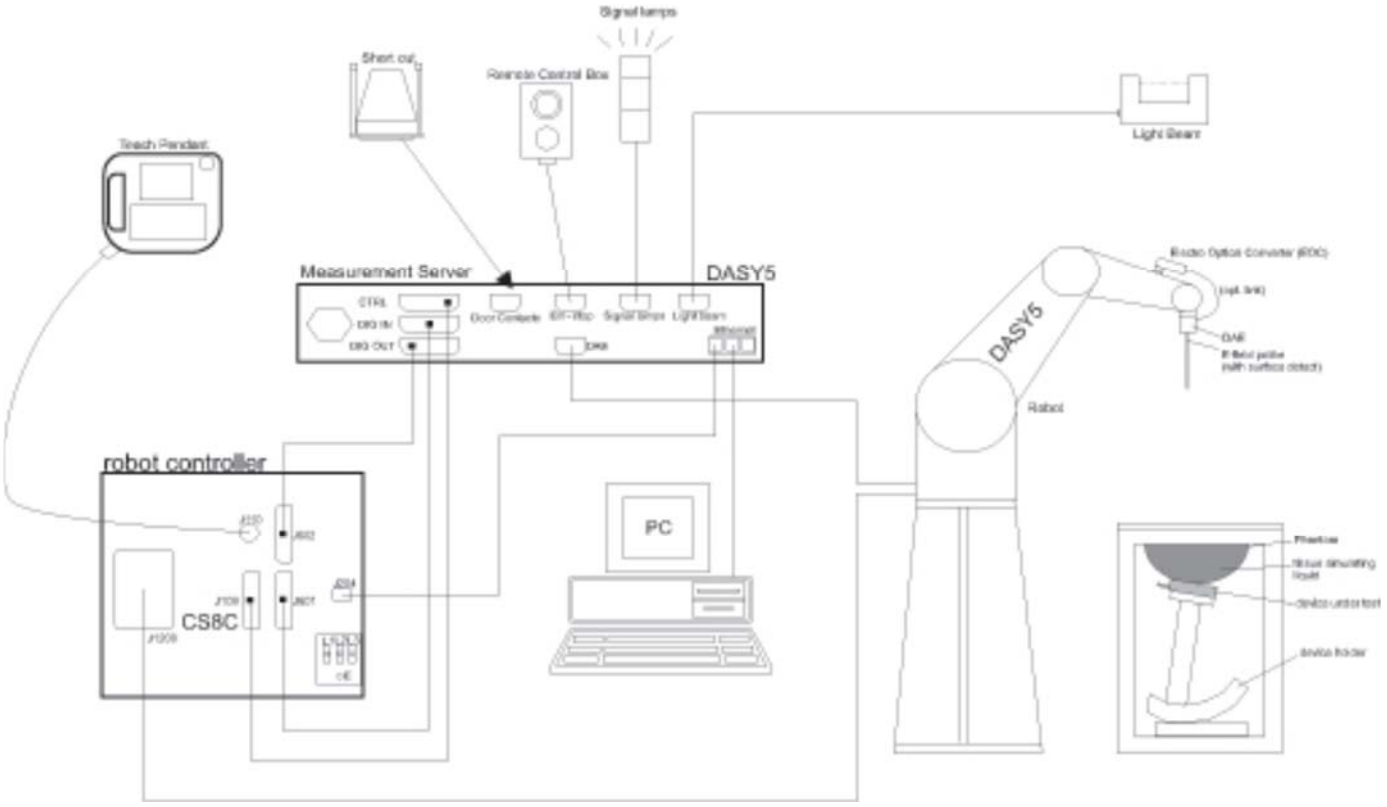
4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

The DASY5 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, AD-conversion, 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 WinXP or Win7 and the DASY5 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.

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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 IEEE Standard 1528 and IEC 62209 standards, 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

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	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 ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

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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

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

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 *reported* 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.

Step 5: Z-Scan (FCC only)

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation the extrapolated distance should not be larger than the step size in Z-direction.

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4.1. 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

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MNA-03	Vector Reflectometer	Copper Mountain Technologies	PLANAR R140	0030913	SAR	2020/04/22 * 12
MDPK-03	Dielectric assessment kit	Schmid&Partner Engineering AG	DAK-3.5	0008	SAR	2020/04/28 * 12
MOS-37	Digital thermometer	LKM electronic	DTM3000	-	SAR	2020/07/10 * 12
COTS-MSAR-04	Dielectric assessment software	Schmid&Partner Engineering AG	DAK	-	SAR	-

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System check

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MDA-07	Dipole Antenna	Schmid&Partner Engineering AG	D2450V2	713	SAR(D2450)	2019/09/09 * 24
MDA-08	Dipole Antenna	Schmid&Partner Engineering AG	D5GHzV2	1020	SAR(D5G)	2020/11/17 * 12
COTS-MSAR-03	Dasy5	Schmid&Partner Engineering AG	DASY5	-	SAR	-
MMBBL600-6000	Body Simulating Liquid	Schmid&Partner Engineering AG	SL AAB U16 BC	-	SAR	Pre Check
MDAE-03	Data Acquisition Electronics	Schmid&Partner Engineering AG	DAE4	1372	SAR	2020/08/12 * 12
MPB-09	Dosimetric E-Field Probe	Schmid&Partner Engineering AG	EX3DV4	3922	SAR	2020/08/17 * 12
MPF-02	2mm Oval Flat Phantom	Schmid&Partner Engineering AG	QDOVA001BB	1045	SAR	2020/05/21 * 12
MDH-01	Device holder	Schmid&Partner Engineering AG	Mounting device for transmitter	-	SAR	Pre Check
MOS-33	Thermo-Hygrometer	CUSTOM	CTH-201	3301	SAR	2020/07/10 * 12
MRBT-02	SAR robot	Schmid&Partner Engineering AG	TX60 Lspeag	F10/5E3LA1/A/01	SAR	2020/04/26 * 12
MPM-15	Power Meter	Keysight Technologies Inc	N1914A	MY53060017	SAR	2020/06/10 * 12
MPSE-20	Power sensor	Agilent	N8482H	MY53050001	SAR	2020/06/10 * 12
MRFA-24	Pre Amplifier	R&K	R&K CGA020M602-2633R	B30550	SAR	2020/06/10 * 12
MSG-10	Signal Generator	Agilent	N5181A	MY47421098	SAR	2020/11/17 * 12
MAT-78	Attenuator	Telegrartner	J01156A0011	0042294119	SAR	Pre Check
MPSE-24	Power sensor	Anritsu Limited	MA24106A	1026164	SAR	2020/08/19 * 12
MPSE-25	Power sensor	Anritsu Limited	MA24106A	1031504	SAR	2020/08/19 * 12
COTS-MPSE-02	Software for MA24106A	Anritsu Limited	Anritsu PowerXpert	-	SAR	-
MHDC-12	Dual Directional Coupler	Hewlett Packard	772D	2839A0016	SAR(2-18GHz)	Pre Check

Other

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAT-90	Attenuator	Weinschel Associates	WA56-10	56100306	Power	2020/05/25 * 12
MAT-91	Attenuator	Weinschel Associates	WA56-10	56100307	Power	2020/05/25 * 12
MPSE-22	Power sensor	Keysight Technologies Inc	N1923A	MY54070003	Power	2020/08/20 * 12
MPSE-23	Power sensor	Keysight Technologies Inc	N1923A	MY54070004	Power	2020/08/20 * 12
MPM-16	Power Meter	Keysight Technologies Inc	8990B	MY51000271	Power	2020/08/20 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

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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, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

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6. Device Under Test

Wireless Module (Tested inside of Panasonic Tablet PC FZ-G2) Model: WL20B	
Operating Configuration(s)	• Tablet mode and Laptop mode
Exposure Condition(s)	• The device is used in close proximity to the body. Specific details of the required test positions are provided in Section 7.3. Required Test Configurations.
Accessory	• None

6.1. Wireless Technologies

Wireless Mode and Frequency Bands	• 802.11a/b/g/n/ac/ax: 2412 - 2472 MHz, b / g / HT20 / HT40 / HE20 / HE40 5150 - 5250 MHz, a / HT20 / HT40 / VHT20 / VHT40 / VHT80 / VHT160 / HE20 / HE40 / HE80 / HE160 5250 - 5350 MHz, a / HT20 / HT40 / VHT20 / VHT40 / VHT80 / HE20 / HE40 /HE80 5500 - 5720 MHz, a / HT20 / HT40 / VHT20 / VHT40 / VHT80 / VHT160 / HE20 / HE40 /HE80 / HE160 5725 - 5850 MHz, a / HT20 / HT40 / VHT20 / VHT40 / VHT80 / HE20 / HE40 /HE80 • Bluetooth BR/EDR/LE: 2402 - 2480 MHz
Modulation	• 802.11a/b/g/n/ac/ax: BPSK, QPSK, CCK, 16-QAM, 64-QAM, 256-QAM and 1024-QAM • Bluetooth BR/EDR/LE: GFSK, DQPSK, 8-DPSK
Duty Cycle	• WLAN: 100% • Bluetooth 78.6%

6.2. Hotspot (Wireless Router) Exposure Condition

N/A

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6.3. Testing Rationale

Test selection was performed in accordance with KDB248227 D01.

The standalone (SISO) SAR results were considered acceptable for the MIMO simultaneous transmission analysis as the MIMO power does not exceed the SISO power.

The antenna separation distance will not be less than 50mm.

Bluetooth transmits using the WLAN Ant 2 Antenna. Bluetooth can transmit simultaneously with the WLAN Ant 1 Antenna. Bluetooth cannot transmit simultaneously with the WLAN Ant 2 Antenna in WLAN MIMO mode.

Supported Simultaneous Scenarios

Band	WLAN		Bluetooth
	Ant 1	Ant 2	Ant 2
2.4 GHz	✓	✓	
	✓		✓
5 GHz	✓	✓	
	✓		✓

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7. RF Exposure Conditions (Test Configurations)

Refer to Appendix B “Antenna Dimensions and Separation Distances” for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

7.1. Standalone SAR Test Exclusion Considerations

Summary of the distance between antenna and surface of EUT

Tablet mode

Test position	Distance [mm] WLAN Ant 1	Distance [mm] WLAN Ant 2
Front	2.9	18.5
Rear	21.1	5.5
Edge 1	3.8	9.2
Edge 2	214.8	58.7
Edge 3	181.3	181.3
Edge 4	29	191.7

Laptop mode

Test position	Distance [mm] WLAN Ant 1	Distance [mm] WLAN Ant 2
Bottom	227.5	227.5

*Details are shown in appendix B

Standalone SAR test exclusion was based upon the following criteria:

The following is based on KDB447498D01.

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR

1. The upper frequency of the frequency band was used in order to calculate standalone SAR test exclusion considerations.
2. Power and distance are rounded to the nearest mW and mm before calculation
3. The result is rounded to one decimal place for comparison
4. The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion. When the separation of antenna to EUT’s surfaces and edges are ≤ 50 mm, the separation distance used for the SAR exclusion calculations is 5 mm.
5. “N/A” displayed on below exclusion calculation means not applicable this formula since distance between antenna and surface is > 50 mm.

When the calculated threshold value by a numerical formula above-mentioned in the following table is 3.0 or less, SAR test is excluded.

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Tablet mode

SAR exclusion calculations for antenna <50mm from the user

Antenna	Tx Interface	Frequency (MHz)	Output Power		Calculated Threshold Value					
			dBm	mW	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4
Ant1	WLAN2.4GHz	2472	15.00	32	N/A	9.9 -MEASURE-	9.9 -MEASURE-	N/A	N/A	9.9 -MEASURE-
Ant1	WLAN5.2GHz	5240	13.50	22	N/A	10.2 -MEASURE-	10.2 -MEASURE-	N/A	N/A	10.2 -MEASURE-
Ant1	WLAN5.3GHz	5320	13.50	22	N/A	10.3 -MEASURE-	10.3 -MEASURE-	N/A	N/A	10.3 -MEASURE-
Ant1	WLAN5.6GHz	5720	13.50	22	N/A	10.7 -MEASURE-	10.7 -MEASURE-	N/A	N/A	10.7 -MEASURE-
Ant1	WLAN5.8GHz	5825	13.50	22	N/A	10.8 -MEASURE-	10.8 -MEASURE-	N/A	N/A	10.8 -MEASURE-
Ant2	WLAN2.4GHz	2472	15.00	32	N/A	9.9 -MEASURE-	9.9 -MEASURE-	N/A	N/A	N/A
Ant2	WLAN5.2GHz	5240	11.00	13	N/A	5.8 -MEASURE-	5.8 -MEASURE-	N/A	N/A	N/A
Ant2	WLAN5.3GHz	5320	11.00	13	N/A	5.8 -MEASURE-	5.8 -MEASURE-	N/A	N/A	N/A
Ant2	WLAN5.6GHz	5720	11.00	13	N/A	6 -MEASURE-	6 -MEASURE-	N/A	N/A	N/A
Ant2	WLAN5.8GHz	5825	10.50	11	N/A	5.4 -MEASURE-	5.4 -MEASURE-	N/A	N/A	N/A
Ant2	BT	2480	10.50	11	N/A	3.5 -MEASURE-	3.5 -MEASURE-	N/A	N/A	N/A

Laptop mode

SAR exclusion calculations for antenna <50mm from the user

Antenna	Tx Interface	Frequency (MHz)	Output Power		Calculated Threshold Value
			dBm	mW	Bottom
Ant1	WLAN2.4GHz	2472	21.00	126	N/A
Ant1	WLAN5.2GHz	5240	21.00	126	N/A
Ant1	WLAN5.3GHz	5320	21.50	141	N/A
Ant1	WLAN5.6GHz	5720	21.00	126	N/A
Ant1	WLAN5.8GHz	5825	21.00	126	N/A
Ant2	WLAN2.4GHz	2472	21.00	126	N/A
Ant2	WLAN5.2GHz	5240	21.00	126	N/A
Ant2	WLAN5.3GHz	5320	21.00	126	N/A
Ant2	WLAN5.6GHz	5720	20.00	100	N/A
Ant2	WLAN5.8GHz	5825	19.60	91	N/A
Ant2	BT	2480	10.50	11	N/A

Conservatively, the frequency of each Band in the table above is the highest frequency.

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SAR is not required as this is not a typical use scenario and also the front side SAR test is not required because of overall diagonal dimension >20cm based on KDB 616217D04.

2) At 100 MHz to 6 GHz and for test separation distances > 50 mm, the SAR test exclusion threshold is determined according to the following.
a) [(3·50)/(√f(GHz))) + (test separation distance - 50 mm)·(f(MHz)/150)] mW at > 100 MHz and ≤ 1500 MHz
b) [(3·50)/(√f(GHz))) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

1. The upper frequency of the frequency band was used in order to calculate standalone SAR test exclusion considerations.
2. Power and distance are rounded to the nearest mW and mm before calculation
3. "N/A" displayed on below exclusion calculation means not applicable this formula since distance between antenna and surface is < 50 mm.

When output power is less than the calculated threshold value by a numerical formula above-mentioned in the following table, SAR test is excluded.

Tablet mode

SAR exclusion calculations for antenna >50mm from the user

Antenna	Tx Interface	Frequency (MHz)	Output Power		Calculated Threshold Value					
			dBm	mW	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4
Ant1	WLAN2.4GHz	2472	15.00	32	N/A	N/A	N/A	1743.4 mW -EXEMPT-	1408.4 mW -EXEMPT-	N/A
Ant1	WLAN5.2GHz	5240	13.50	22	N/A	N/A	N/A	1713.5 mW -EXEMPT-	1378.5 mW -EXEMPT-	N/A
Ant1	WLAN5.3GHz	5320	13.50	22	N/A	N/A	N/A	1713 mW -EXEMPT-	1378 mW -EXEMPT-	N/A
Ant1	WLAN5.6GHz	5720	13.50	22	N/A	N/A	N/A	1710.7 mW -EXEMPT-	1375.7 mW -EXEMPT-	N/A
Ant1	WLAN5.8GHz	5825	13.50	22	N/A	N/A	N/A	1710.2 mW -EXEMPT-	1375.2 mW -EXEMPT-	N/A
Ant2	WLAN2.4GHz	2472	15.00	32	N/A	N/A	N/A	182.4 mW -EXEMPT-	1408.4 mW -EXEMPT-	1512.4 mW -EXEMPT-
Ant2	WLAN5.2GHz	5240	11.00	13	N/A	N/A	N/A	152.5 mW -EXEMPT-	1378.5 mW -EXEMPT-	1482.5 mW -EXEMPT-
Ant2	WLAN5.3GHz	5320	11.00	13	N/A	N/A	N/A	152 mW -EXEMPT-	1378 mW -EXEMPT-	1482 mW -EXEMPT-
Ant2	WLAN5.6GHz	5720	11.00	13	N/A	N/A	N/A	149.7 mW -EXEMPT-	1375.7 mW -EXEMPT-	1479.7 mW -EXEMPT-
Ant2	WLAN5.8GHz	5825	10.50	11	N/A	N/A	N/A	149.2 mW -EXEMPT-	1375.2 mW -EXEMPT-	1479.2 mW -EXEMPT-
Ant2	BT	2480	10.50	11	N/A	N/A	N/A	182.3 mW -EXEMPT-	1408.3 mW -EXEMPT-	1512.3 mW -EXEMPT-

Laptop mode

SAR exclusion calculations for antenna >50mm from the user

Antenna	Tx Interface	Frequency (MHz)	Output Power		Calculated Threshold Value
			dBm	mW	Bottom
Ant1	WLAN2.4GHz	2472	21.00	126	1870.4 mW -EXEMPT-
Ant1	WLAN5.2GHz	5240	21.00	126	1840.5 mW -EXEMPT-
Ant1	WLAN5.3GHz	5320	21.50	141	1840 mW -EXEMPT-
Ant1	WLAN5.6GHz	5720	21.00	126	1837.7 mW -EXEMPT-
Ant1	WLAN5.8GHz	5825	21.00	126	1837.2 mW -EXEMPT-
Ant2	WLAN2.4GHz	2472	21.00	126	1870.4 mW -EXEMPT-
Ant2	WLAN5.2GHz	5240	21.00	126	1840.5 mW -EXEMPT-
Ant2	WLAN5.3GHz	5320	21.00	126	1840 mW -EXEMPT-
Ant2	WLAN5.6GHz	5720	20.00	100	1837.7 mW -EXEMPT-
Ant2	WLAN5.8GHz	5825	19.60	91	1837.2 mW -EXEMPT-
Ant2	BT	2480	10.50	11	1870.3 mW -EXEMPT-

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7.2. Required Test Configurations

The table below identifies the standalone test configurations required for this device according to the findings in Section 7.1.

Test Configurations	Tablet							Laptop
	Rear	Edge 1 (Top Edge)	Edge 2 (Left Edge)	Edge 3 (Bottom Edge)	Edge 4 (Right Edge)	Rear tilt (Edge 4 side)	Rear tilt (Edge 1 side)	Bottom
WLAN Ant 1	Yes	Yes	No	No	Yes	Yes	Yes	No
WLAN Ant 2	Yes	Yes	No	No	Yes	Yes	Yes	No
BT	Yes	Yes	No	No	Yes	Yes	Yes	No

Note(s):

Yes = Testing is required.

No = Testing is not required.

SAR test of Edge 4 for WLAN Ant 2 and BT were measured for 11. Simultaneous Transmission SAR Analysis.

8. Summary of Required Test Modes

The initial test configuration for 2.4 GHz and 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance, in each standalone and aggregated frequency band. SAR for the initial test configuration is measured using the highest maximum output power channel determined by the default power measurement procedures. When multiple configurations in a frequency band have the same specified maximum output power, the initial test configuration is determined according to the following steps applied sequentially.

1) The largest channel bandwidth configuration is selected among the multiple configurations with the same specified maximum output power.
2) If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.
3) If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.
4) When multiple transmission modes (802.11a/g/n/ac/ax) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n.

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8.1. Wi-Fi 2.4GHz (DTS Band)

Tablet mode

SISO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)		Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2	WLAN Ant 1	WLAN Ant 2		
2.4	802.11b	1 Mbps	1	2412	14.58	14.57	15.0	15.0	Yes	1,3
			7	2442	14.51	14.31	15.0	15.0		
			13	2472	14.70	14.27	15.0	15.0		
	802.11g	6 Mbps	1	2412	Not Required	Not Required	15.0	15.0	No	1
			7	2442	Not Required	Not Required	15.0	15.0		
			12	2467	Not Required	Not Required	15.0	15.0		
			13	2472	Not Required	Not Required	1.5	2.0		
	802.11n (HT20)	6.5 Mbps	1	2412	Not Required	Not Required	15.0	15.0	No	1
			7	2442	Not Required	Not Required	15.0	15.0		
			12	2467	Not Required	Not Required	15.0	15.0		
			13	2472	Not Required	Not Required	1.5	2.0		
	802.11n (HT40)	13.5 Mbps	3	2422	Not Required	Not Required	15.0	15.0	No	1
			6	2437	Not Required	Not Required	15.0	15.0		
			9	2452	Not Required	Not Required	15.0	15.0		
			10	2457	Not Required	Not Required	12.5	12.5		
			11	2462	Not Required	Not Required	5.0	5.0		
	802.11ax (HE20)	8 Mbps	1	2412	Not Required	Not Required	15.0	15.0	No	1
			7	2442	Not Required	Not Required	15.0	15.0		
			12	2467	Not Required	Not Required	15.0	15.0		
			13	2472	Not Required	Not Required	1.5	2.0		
	802.11ax (HE40)	16 Mbps	3	2422	Not Required	Not Required	15.0	15.0	No	1
			6	2437	Not Required	Not Required	15.0	15.0		
			9	2452	Not Required	Not Required	15.0	15.0		
			10	2457	Not Required	Not Required	12.5	12.5		
			11	2462	Not Required	Not Required	4.5	5.5		

MIMO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2		
2.4GHz	802.11n (HT20)	6.5 Mbps	1	2412	14.0	14.0	No	2
			7	2442	14.0	14.0		
			11	2462	14.0	14.0		
			12	2467	12.5	12.5		
			13	2472	-1.0	-1.0		
	802.11n (HT40)	13.5 Mbps	3	2422	13.5	13.5	No	2
			6	2437	13.5	13.5		
			9	2452	13.5	13.5		
			10	2457	10.0	10.0		
			11	2462	3.0	3.0		
	802.11ax (HE20)	8 Mbps	1	2412	14.0	14.0	No	2
			7	2442	14.0	14.0		
			11	2462	14.0	14.0		
			12	2467	12.5	12.5		
			13	2472	-1.0	-1.0		
	802.11ax (HE40)	16 Mbps	3	2422	13.5	13.5	No	2
			6	2437	13.5	13.5		
			9	2452	13.5	13.5		
			10	2457	10.0	10.0		
			11	2462	3.0	3.0		

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Laptop mode

SISO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)		Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2	WLAN Ant 1	WLAN Ant 2		
2.4	802.11b	1 Mbps	1	2412	Not Required	Not Required	19.50	19.50	Yes	1,3
			2	2417	20.58	20.48	21.00	21.00		
			7	2442	20.61	20.36	21.00	21.00		
			10	2457	20.21	20.38	21.00	21.00		
			11	2462	Not Required	Not Required	20.00	20.00		
			12	2467	Not Required	Not Required	18.50	19.00		
			13	2472	Not Required	Not Required	15.50	15.50		
	802.11g	6 Mbps	1	2412	Not Required	Not Required	17.00	17.00	No	1
			2	2417	Not Required	Not Required	19.00	19.00		
			3	2422	Not Required	Not Required	20.25	20.25		
			7	2442	Not Required	Not Required	20.25	20.25		
			9	2452	Not Required	Not Required	20.25	20.25		
			10	2457	Not Required	Not Required	19.25	19.25		
			11	2462	Not Required	Not Required	17.00	16.75		
			12	2467	Not Required	Not Required	15.00	15.50		
			13	2472	Not Required	Not Required	1.50	2.00		
	802.11n (HT20)	6.5 Mbps	1	2412	Not Required	Not Required	17.00	17.00	No	1
			2	2417	Not Required	Not Required	20.50	20.50		
			7	2442	Not Required	Not Required	20.50	20.50		
			10	2457	Not Required	Not Required	20.50	20.50		
			11	2462	Not Required	Not Required	16.50	16.00		
			12	2467	Not Required	Not Required	15.00	15.50		
			13	2472	Not Required	Not Required	1.50	2.00		
	802.11n (HT40)	13.5 Mbps	3	2422	Not Required	Not Required	17.00	16.50	No	1
			4	2427	Not Required	Not Required	16.00	16.50		
			6	2437	Not Required	Not Required	16.00	16.50		
			7	2442	Not Required	Not Required	16.00	16.00		
			9	2452	Not Required	Not Required	16.00	16.00		
			10	2457	Not Required	Not Required	12.50	12.50		
			11	2462	Not Required	Not Required	5.00	5.00		
	802.11ax (HE20)	8 Mbps	1	2412	Not Required	Not Required	17.00	17.50	No	1
			2	2417	Not Required	Not Required	20.00	20.00		
			7	2442	Not Required	Not Required	20.00	20.00		
			10	2457	Not Required	Not Required	20.00	20.00		
			11	2462	Not Required	Not Required	16.00	16.00		
			12	2467	Not Required	Not Required	15.50	15.50		
			13	2472	Not Required	Not Required	1.50	2.00		
	802.11ax (HE40)	16 Mbps	3	2422	Not Required	Not Required	16.50	16.50	No	1
			4	2427	Not Required	Not Required	16.00	16.00		
			6	2437	Not Required	Not Required	16.00	16.00		
			7	2442	Not Required	Not Required	16.00	16.00		
			9	2452	Not Required	Not Required	16.00	16.00		
			10	2457	Not Required	Not Required	12.00	12.50		
			11	2462	Not Required	Not Required	4.50	5.50		

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Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2		
2.4	802.11n (HT20)	6.5 Mbps	1	2412	14.00	14.00	No	2
			2	2417	18.00	18.00		
			7	2442	18.00	18.00		
			10	2457	18.00	18.00		
			11	2462	14.50	14.50		
			12	2467	13.00	13.00		
			13	2472	-1.00	-1.00		
	802.11n (HT40)	13.5 Mbps	3	2422	14.50	14.50	No	2
			4	2427	14.00	14.00		
			6	2437	14.00	14.00		
			7	2442	13.50	13.50		
			9	2452	13.50	13.50		
			10	2457	10.00	10.00		
			11	2462	3.00	3.00		
	802.11ax (HE20)	8 Mbps	1	2412	14.00	14.00	No	2
			2	2417	17.00	17.00		
			7	2442	17.00	17.00		
			10	2457	17.00	17.00		
			11	2462	14.00	14.00		
			12	2467	12.50	12.50		
			13	2472	-1.00	-1.00		
	802.11ax (HE40)	16 Mbps	3	2422	14.00	14.00	No	2
			4	2427	14.50	14.50		
			6	2437	14.50	14.50		
			7	2442	13.50	13.50		
			9	2452	13.50	13.50		
			10	2457	10.50	10.50		
			11	2462	3.00	3.00		

Note(s):

1. According to KDB248227D01, SAR is not required for 802.11g/n HT20/HT40 channels 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 ≤ 1.2 W/kg.
2. The standalone (SISO) SAR results were considered acceptable for the MIMO simultaneous transmission analysis as the MIMO power does not exceed the SISO power. The antenna separation distance is not less than 50mm.
3. Initial SAR test channel was chosen according to KDB248227D01. (shaded blue frame)

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8.2. Wi-Fi 5GHz (U-NII-1 and U-NII-2A Bands)

Tablet mode

SISO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)		Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2	WLAN Ant 1	WLAN Ant 2		
5.2 (U-NII-1)	802.11a	6 Mbps	36	5180	Not Required	Not Required	13.5	11.0	No	2
			44	5220	Not Required	Not Required	13.5	11.0		
			48	5240	Not Required	Not Required	13.5	11.0		
	802.11n (HT20)	6.5 Mbps	36	5180	Not Required	Not Required	13.5	11.0	No	2
			44	5220	Not Required	Not Required	13.5	11.0		
			48	5240	Not Required	Not Required	13.5	11.0		
	802.11n (HT40)	13.5 Mbps	38	5190	Not Required	Not Required	13.5	11.0	No	2
			46	5230	Not Required	Not Required	13.5	11.0		
	802.11ac (VHT20)	6.5 Mbps	36	5180	Not Required	Not Required	13.5	11.0	No	2
			44	5220	Not Required	Not Required	13.5	11.0		
			48	5240	Not Required	Not Required	13.5	11.0		
	802.11ac (VHT40)	13.5 Mbps	38	5190	Not Required	Not Required	13.5	11.0	No	2
			46	5230	Not Required	Not Required	13.5	11.0		
	802.11ac (VHT80)	29.3 Mbps	42	5210	Not Required	Not Required	13.5	11.0	No	2
	802.11ac (VHT160)	58.5 Mbps	50	5250	Not Required	Not Required	13.5	11.0	No	2
	802.11ax (HE20)	8 Mbps	36	5180	Not Required	Not Required	13.5	11.0	No	2
			44	5220	Not Required	Not Required	13.5	11.0		
			48	5240	Not Required	Not Required	13.5	11.0		
	802.11ax (HE40)	16 Mbps	38	5190	Not Required	Not Required	13.5	11.0	No	2
			46	5230	Not Required	Not Required	13.5	11.0		
	802.11ax (HE80)	34 Mbps	42	5210	Not Required	Not Required	13.5	11.0	No	2
	802.11ax (HE160)	68 Mbps	50	5250	13.32	10.65	13.5	11.0	No	2
5.3 (U-NII-2A)	802.11a	6 Mbps	52	5260	Not Required	Not Required	13.5	11.0	No	1
			60	5300	Not Required	Not Required	13.5	11.0		
			64	5320	Not Required	Not Required	13.5	11.0		
	802.11n (HT20)	6.5 Mbps	52	5260	Not Required	Not Required	13.5	11.0	No	1
			60	5300	Not Required	Not Required	13.5	11.0		
			64	5320	Not Required	Not Required	13.5	11.0		
	802.11n (HT40)	13.5 Mbps	54	5270	Not Required	Not Required	13.5	11.0	No	1
			62	5310	Not Required	Not Required	13.5	11.0		
	802.11ac (VHT20)	6.5 Mbps	52	5260	Not Required	Not Required	13.5	11.0	No	1
			60	5300	Not Required	Not Required	13.5	11.0		
			64	5320	Not Required	Not Required	13.5	11.0		
	802.11ac (VHT40)	13.5 Mbps	54	5270	Not Required	Not Required	13.5	11.0	No	1
			62	5310	Not Required	Not Required	13.5	11.0		
	802.11ac (VHT80)	29.3 Mbps	58	5290	13.20	10.51	13.5	11.0	Yes	1,4
	802.11ax (HE20)	8 Mbps	52	5260	Not Required	Not Required	13.5	11.0	No	1
			60	5300	Not Required	Not Required	13.5	11.0		
			64	5320	Not Required	Not Required	13.5	11.0		
	802.11ax (HE40)	16 Mbps	54	5270	Not Required	Not Required	13.5	11.0	No	1
			62	5310	Not Required	Not Required	13.5	11.0		
	802.11ax (HE80)	34 Mbps	58	5290	Not Required	Not Required	13.5	11.0	No	1

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Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2		
5.2 (U-NII-1)	802.11n (HT20)	6.5 Mbps	36	5180	13.5	11.0	No	3
			44	5220	13.5	11.0		
			48	5240	13.5	11.0		
	802.11n (HT40)	13.5 Mbps	38	5190	13.5	11.0	No	3
			46	5230	13.5	11.0		
	802.11ac (VHT20)	6.5 Mbps	36	5180	13.5	11.0	No	3
			44	5220	13.5	11.0		
			48	5240	13.5	11.0		
	802.11ac (VHT40)	13.5 Mbps	38	5190	13.5	11.0	No	3
			46	5230	13.5	11.0		
	802.11ac (VHT80)	29.3 Mbps	42	5210	13.5	11.0	No	3
	802.11ac (VHT160)	58.5 Mbps	50	5250	13.0	11.0	No	3
	802.11ax (HE20)	8 Mbps	36	5180	13.5	11.0	No	3
			44	5220	13.5	11.0		
			48	5240	13.5	11.0		
	802.11ax (HE40)	16 Mbps	38	5190	13.5	11.0	No	3
			46	5230	13.5	11.0		
	802.11ax (HE80)	34 Mbps	42	5210	13.5	11.0	No	3
	802.11ax (HE160)	68 Mbps	50	5250	13.5	11.0	No	3
5.3 (U-NII-2A)	802.11n (HT20)	6.5 Mbps	52	5260	13.5	11.0	No	3
			60	5300	13.5	11.0		
			64	5320	13.5	11.0		
	802.11n (HT40)	13.5 Mbps	54	5270	13.5	11.0	No	3
			62	5310	13.5	11.0		
	802.11ac (VHT20)	6.5 Mbps	52	5260	13.5	11.0	No	3
			60	5300	13.5	11.0		
			64	5320	13.5	11.0		
	802.11ac (VHT40)	13.5 Mbps	54	5270	13.5	11.0	No	3
			62	5310	13.5	11.0		
	802.11ac (VHT80)	29.3 Mbps	58	5290	13.5	11.0	No	3
	802.11ax (HE20)	8 Mbps	52	5260	13.5	11.0	No	3
			60	5300	13.5	11.0		
			64	5320	13.5	11.0		
	802.11ax (HE40)	16 Mbps	54	5270	13.5	11.0	No	3
			62	5310	13.5	11.0		
	802.11ax (HE80)	34 Mbps	58	5290	13.5	11.0	No	3

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Laptop mode

SISO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)		Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2	WLAN Ant 1	WLAN Ant 2		
5.2 (U-NII-1)	802.11a	6 Mbps	36	5180	Not Required	Not Required	18.50	18.00	No	2
			40	5200	Not Required	Not Required	21.00	21.00		
			44	5220	Not Required	Not Required	21.00	21.00		
			48	5240	Not Required	Not Required	21.00	21.00		
	802.11n (HT20)	6.5 Mbps	36	5180	Not Required	Not Required	18.00	18.50	No	2
			40	5200	Not Required	Not Required	21.00	20.50		
			44	5220	Not Required	Not Required	21.00	20.50		
			48	5240	Not Required	Not Required	21.00	19.50		
	802.11n (HT40)	13.5 Mbps	38	5190	Not Required	Not Required	18.50	18.00	No	2
			46	5230	Not Required	Not Required	21.00	19.50		
	802.11ac (VHT20)	6.5 Mbps	36	5180	Not Required	Not Required	18.00	18.50	No	2
			40	5200	Not Required	Not Required	21.00	20.50		
			44	5220	Not Required	Not Required	21.00	20.50		
			48	5240	Not Required	Not Required	21.00	19.50		
	802.11ac (VHT40)	13.5 Mbps	38	5190	Not Required	Not Required	18.50	18.00	No	2
			46	5230	Not Required	Not Required	21.00	19.50		
	802.11ac (VHT80)	29.3 Mbps	42	5210	Not Required	Not Required	18.50	18.00	No	2
	802.11ac (VHT160)	58.5 Mbps	50	5220	Not Required	Not Required	15.00	15.00	No	2
	802.11ax (HE20)	8 Mbps	36	5180	Not Required	Not Required	18.00	18.00	No	2
			40	5200	Not Required	Not Required	21.00	20.50		
			44	5220	Not Required	Not Required	21.00	21.00		
			48	5240	Not Required	Not Required	21.00	21.00		
	802.11ax (HE40)	16 Mbps	38	5190	Not Required	Not Required	18.00	18.00	No	2
			46	5230	Not Required	Not Required	21.00	19.50		
	802.11ax (HE80)	34 Mbps	42	5210	Not Required	Not Required	18.50	18.00	No	2
	802.11ax (HE160)	68 Mbps	50	5220	Not Required	Not Required	15.00	15.00	No	2
5.3 (U-NII-2A)	802.11a	6 Mbps	52	5260	21.03	20.52	21.50	21.00	Yes	1,4
			56	5280	20.62	20.59	21.00	21.00		
			60	5300	20.69	20.52	21.00	21.00		
			64	5320	16.85	16.65	17.50	17.50		
	802.11n (HT20)	6.5 Mbps	52	5260	Not Required	Not Required	21.00	21.00	No	1
			56	5280	Not Required	Not Required	21.00	21.00		
			60	5300	Not Required	Not Required	21.00	21.00		
			64	5320	Not Required	Not Required	17.50	17.50		
	802.11n (HT40)	13.5 Mbps	54	5270	Not Required	Not Required	20.50	20.00	No	1
			62	5310	Not Required	Not Required	16.50	16.50		
	802.11ac (VHT20)	6.5 Mbps	52	5260	Not Required	Not Required	21.00	21.00	No	1
			56	5280	Not Required	Not Required	21.00	21.00		
			60	5300	Not Required	Not Required	21.00	21.00		
			64	5320	Not Required	Not Required	17.50	17.50		
	802.11ac (VHT40)	13.5 Mbps	54	5270	Not Required	Not Required	20.50	20.00	No	1
			62	5310	Not Required	Not Required	16.50	16.50		
	802.11ac (VHT80)	29.3 Mbps	58	5290	Not Required	Not Required	17.50	17.50	No	1
	802.11ax (HE20)	8 Mbps	52	5260	Not Required	Not Required	21.00	21.00	No	1
			56	5280	Not Required	Not Required	21.00	21.00		
			60	5300	Not Required	Not Required	21.00	21.00		
			64	5320	Not Required	Not Required	17.50	17.50		
	802.11ax (HE40)	16 Mbps	54	5270	Not Required	Not Required	20.50	20.00	No	1
			62	5310	Not Required	Not Required	16.50	16.50		
	802.11ax (HE80)	34 Mbps	58	5290	Not Required	Not Required	17.50	17.50	No	1

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MIMO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2		
5.2 (U-NII-1)	802.11n (HT20)	6.5 Mbps	36	5180	16.00	16.00	No	3
			40	5200	17.50	17.50		
			44	5220	17.50	17.50		
			48	5240	18.00	18.00		
	802.11n (HT40)	13.5 Mbps	38	5190	15.50	15.50	No	3
			46	5230	17.50	17.50		
	802.11ac (VHT20)	6.5 Mbps	36	5180	16.00	16.00	No	3
			40	5200	17.50	17.50		
			44	5220	17.50	17.50		
			48	5240	18.00	18.00		
	802.11ac (VHT40)	13.5 Mbps	38	5190	15.50	15.50	No	3
			46	5230	17.50	17.50		
	802.11ac (VHT80)	29.3 Mbps	42	5210	15.50	15.50	No	3
	802.11ac (VHT160)	58.5 Mbps	50	5220	12.00	12.00	No	3
	802.11ax (HE20)	8 Mbps	36	5180	16.00	16.00	No	3
			40	5200	18.00	18.00		
			44	5220	18.00	18.00		
			48	5240	18.00	18.00		
	802.11ax (HE40)	16 Mbps	38	5190	15.00	15.00	No	3
			46	5230	17.50	17.50		
	802.11ax (HE80)	34 Mbps	42	5210	15.50	15.50	No	3
	802.11ax (HE160)	68 Mbps	50	5220	12.50	12.50	No	3
5.3 (U-NII-2A)	802.11n (HT20)	6.5 Mbps	52	5260	18.00	18.00	No	3
			56	5280	18.00	18.00		
			60	5300	18.00	18.00		
			64	5320	13.50	13.50		
	802.11n (HT40)	13.5 Mbps	54	5270	16.50	16.50	No	3
			62	5310	13.00	13.00		
	802.11ac (VHT20)	6.5 Mbps	52	5260	18.00	18.00	No	3
			56	5280	18.00	18.00		
			60	5300	18.00	18.00		
			64	5320	13.50	13.50		
	802.11ac (VHT40)	13.5 Mbps	54	5270	16.50	16.50	No	3
			62	5310	13.00	13.00		
	802.11ac (VHT80)	29.3 Mbps	58	5290	14.00	14.00	No	3
	802.11ax (HE20)	8 Mbps	52	5260	18.00	18.00	No	3
			56	5280	18.00	18.00		
			60	5300	18.00	18.00		
			64	5320	13.50	13.50		
	802.11ax (HE40)	16 Mbps	54	5270	16.50	16.50	No	3
			62	5310	13.00	13.00		
	802.11ax (HE80)	34 Mbps	58	5290	14.00	14.00	No	3

Note(s):

1. 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 with the largest bandwidth and lowest data rate is selected.
2. a) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, each band is tested independently for SAR.
   b) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, each band is tested independently for SAR.
   c) The two U-NII bands may be aggregated to support a 160 MHz channel on channel number 50. Without additional testing, the maximum output power for this is limited to the lower of the maximum output power certified for the two bands. When SAR measurement is required for at least one of the bands and the highest reported SAR adjusted by the ratio of specified maximum output power of aggregated to standalone band is > 1.2 W/kg, SAR is required for the 160 MHz channel. This procedure does not apply to an aggregated band with maximum output higher than the standalone band(s); the aggregated band must be tested independently for SAR. SAR is not required when the 160 MHz channel is operating at a reduced maximum power and also qualifies for SAR test exclusion.
3. The standalone (SISO) SAR results were considered acceptable for the MIMO simultaneous transmission analysis as the MIMO power does not exceed the SISO power. The antenna separation distance will not be less than 50mm.
4. According to KDB248227D01, SAR test channel was chosen. (shaded blue frame)

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8.3. Wi-Fi 5GHz (U-NII-2C Band)

Tablet mode

SISO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)		Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2	WLAN Ant 1	WLAN Ant 2		
5.5 (U-NII-2C)	802.11a	6 Mbps	100	5500	Not Required	Not Required	13.5	11.0	No	1
			116	5580	Not Required	Not Required	13.5	11.0		
			140	5700	Not Required	Not Required	13.5	11.0		
			144	5720	Not Required	Not Required	13.5	11.0		
	802.11n (HT20)	6.5 Mbps	100	5500	Not Required	Not Required	13.5	11.0	No	1
			116	5580	Not Required	Not Required	13.5	11.0		
			140	5700	Not Required	Not Required	13.5	11.0		
			144	5720	Not Required	Not Required	13.5	11.0		
	802.11n (HT40)	13.5 Mbps	102	5510	Not Required	Not Required	13.5	11.0	No	1
			110	5550	Not Required	Not Required	13.5	11.0		
			118	5590	Not Required	Not Required	13.5	11.0		
			126	5630	Not Required	Not Required	13.5	11.0		
			134	5670	Not Required	Not Required	13.5	11.0		
			142	5710	Not Required	Not Required	13.5	11.0		
	802.11ac (VHT20)	6.5 Mbps	100	5500	Not Required	Not Required	13.5	11.0	No	1
			116	5580	Not Required	Not Required	13.5	11.0		
			140	5700	Not Required	Not Required	13.5	11.0		
			144	5720	Not Required	Not Required	13.5	11.0		
	802.11ac (VHT40)	13.5 Mbps	102	5510	Not Required	Not Required	13.5	11.0	No	1
			110	5550	Not Required	Not Required	13.5	11.0		
			118	5590	Not Required	Not Required	13.5	11.0		
			126	5630	Not Required	Not Required	13.5	11.0		
			134	5670	Not Required	Not Required	13.5	11.0		
			142	5710	Not Required	Not Required	13.5	11.0		
	802.11ac (VHT80)	29.3 Mbps	106	5530	13.28	10.49	13.5	11.0	Yes	1,3
			122	5610	13.17	10.67	13.5	11.0		
			138	5690	13.31	10.78	13.5	11.0		
	802.11ac (VHT160)	117 Mbps	114	5570	Not Required	Not Required	13.4	10.9	No	4
	802.11ax (HE20)	8 Mbps	100	5500	Not Required	Not Required	13.5	11.0	No	1
			116	5580	Not Required	Not Required	13.5	11.0		
			140	5700	Not Required	Not Required	13.5	11.0		
			144	5720	Not Required	Not Required	13.5	11.0		
	802.11ax (HE40)	16 Mbps	102	5510	Not Required	Not Required	13.5	11.0	No	1
			110	5550	Not Required	Not Required	13.5	11.0		
			118	5590	Not Required	Not Required	13.5	11.0		
			126	5630	Not Required	Not Required	13.5	11.0		
			134	5670	Not Required	Not Required	13.5	11.0		
			142	5710	Not Required	Not Required	13.5	11.0		
	802.11ax (HE80)	34 Mbps	106	5530	Not Required	Not Required	13.5	11.0	No	1
			122	5610	Not Required	Not Required	13.5	11.0		
			138	5690	Not Required	Not Required	13.5	11.0		
	802.11ax (HE160))	68 Mbps	114	5570	Not Required	Not Required	13.4	10.9	No	1

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MIMO (continued)

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2		
5.5 (U-NII-2C)	802.11n (HT20)	6.5 Mbps	100	5500	13.5	11.0	No	2
			116	5580	13.5	11.0		
			140	5700	13.5	11.0		
			144	5720	13.5	11.0		
	802.11n (HT40)	13.5 Mbps	102	5510	13.5	11.0	No	2
			110	5550	13.5	11.0		
			118	5590	13.5	11.0		
			126	5630	13.5	11.0		
			134	5670	13.5	11.0		
			142	5710	13.5	11.0		
	802.11ac (VHT20)	6.5 Mbps	100	5500	13.5	11.0	No	2
			116	5580	13.5	11.0		
			140	5700	13.5	11.0		
			144	5720	13.5	11.0		
	802.11ac (VHT40)	13.5 Mbps	102	5510	13.5	11.0	No	2
			110	5550	13.5	11.0		
			118	5590	13.5	11.0		
			126	5630	13.5	11.0		
			134	5670	13.5	11.0		
			142	5710	13.5	11.0		
	802.11ac (VHT80)	29.3 Mbps	106	5530	13.5	11.0	No	2
			122	5610	13.5	11.0		
			138	5690	13.5	11.0		
	802.11ac (VHT160)	58.5 Mbps	114	5570	13.4	10.9	No	2
	802.11ax (HE20)	8 Mbps	100	5500	13.5	11.0	No	2
			116	5580	13.5	11.0		
			140	5700	13.5	11.0		
			144	5720	13.5	11.0		
	802.11ax (HE40)	16 Mbps	102	5510	13.5	11.0	No	2
			110	5550	13.5	11.0		
			118	5590	13.5	11.0		
			126	5630	13.5	11.0		
			134	5670	13.5	11.0		
			142	5710	13.5	11.0		
	802.11ax (HE80)	34 Mbps	106	5530	13.5	11.0	No	2
			122	5610	13.5	11.0		
			138	5690	13.5	11.0		
	802.11ax (HE160)	68 Mbps	114	5570	13.4	10.9	No	2

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Laptop mode

SISO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)		Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2	WLAN Ant 1	WLAN Ant 2		
5.5 (U-NII-2C)	802.11a	6 Mbps	100	5500	Not Required	Not Required	17.50	17.50	No	1
			104	5520	Not Required	Not Required	21.00	20.00		
			116	5580	Not Required	Not Required	21.00	20.00		
			132	5660	Not Required	Not Required	21.00	20.00		
			136	5680	Not Required	Not Required	21.00	20.00		
			140	5700	Not Required	Not Required	18.00	18.00		
	802.11n (HT20)	6.5 Mbps	100	5500	Not Required	Not Required	17.50	17.50	No	1
			104	5520	Not Required	Not Required	21.00	20.00		
			116	5580	Not Required	Not Required	21.00	20.00		
			132	5660	Not Required	Not Required	21.00	20.00		
			136	5680	Not Required	Not Required	21.00	20.00		
			140	5700	Not Required	Not Required	18.00	18.00		
			144	5720	Not Required	Not Required	20.50	20.00		
	802.11n (HT40)	13.5 Mbps	102	5510	Not Required	Not Required	17.50	18.00	No	1
			110	5550	Not Required	Not Required	20.50	20.00		
			118	5590	Not Required	Not Required	20.50	20.00		
			126	5630	Not Required	Not Required	20.50	20.00		
			134	5670	Not Required	Not Required	19.00	19.00		
			142	5710	Not Required	Not Required	20.50	20.00		
	802.11ac (VHT20)	6.5 Mbps	100	5500	Not Required	Not Required	17.50	17.50	No	1
			104	5520	Not Required	Not Required	21.00	20.00		
			116	5580	Not Required	Not Required	21.00	20.00		
			132	5660	Not Required	Not Required	21.00	20.00		
			136	5680	Not Required	Not Required	21.00	20.00		
			140	5700	Not Required	Not Required	18.00	18.00		
			144	5720	Not Required	Not Required	20.50	20.00		
	802.11ac (VHT40)	13.5 Mbps	102	5510	Not Required	Not Required	17.50	18.00	No	1
			110	5550	Not Required	Not Required	20.50	20.00		
			118	5590	Not Required	Not Required	20.50	20.00		
			126	5630	Not Required	Not Required	20.50	20.00		
			134	5670	Not Required	Not Required	19.00	19.00		
			142	5710	Not Required	Not Required	20.50	20.00		
	802.11ac (VHT80)	29.3 Mbps	106	5530	17.26	17.30	18.00	18.00	Yes	1,3
			122	5610	20.25	19.76	20.50	20.00		
			138	5690	20.34	19.85	21.00	20.00		
	802.11ac (VHT160)	58.5 Mbps	114	5570	Not Required	Not Required	14.50	15.00	No	1
	802.11ax (HE20)	8 Mbps	100	5500	Not Required	Not Required	17.50	17.50	No	1
			104	5520	Not Required	Not Required	21.00	20.00		
			116	5580	Not Required	Not Required	21.00	20.00		
			132	5660	Not Required	Not Required	21.00	20.00		
			136	5680	Not Required	Not Required	21.00	20.00		
			140	5700	Not Required	Not Required	17.50	18.00		
			144	5720	Not Required	Not Required	20.50	20.00		
	802.11ax (HE40)	16 Mbps	102	5510	Not Required	Not Required	17.50	18.00	No	1
			110	5550	Not Required	Not Required	20.50	20.00		
			118	5590	Not Required	Not Required	20.50	20.00		
			126	5630	Not Required	Not Required	20.50	20.00		
			134	5670	Not Required	Not Required	19.00	19.50		
			142	5710	Not Required	Not Required	21.00	20.00		
	802.11ax (HE80)	34 Mbps	106	5530	Not Required	Not Required	18.00	17.50	No	1
			122	5610	Not Required	Not Required	19.50	19.50		
			138	5690	Not Required	Not Required	21.00	20.00		
	802.11ax (HE160)	68 Mbps	114	5570	Not Required	Not Required	14.50	14.50	No	1

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MIMO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2		
5.5 (U-NII-2C)	802.11n (HT20)	6.5 Mbps	100	5500	14.00	14.00	No	2
			104	5520	18.50	18.50		
			116	5580	18.50	18.50		
			132	5660	18.50	18.50		
			136	5680	18.50	18.50		
			140	5700	14.50	14.50		
			144	5720	18.00	18.00		
	802.11n (HT40)	13.5 Mbps	102	5510	14.00	14.00	No	2
			110	5550	18.00	18.00		
			118	5590	18.00	18.00		
			126	5630	18.00	18.00		
			134	5670	17.00	17.00		
			142	5710	18.50	18.50		
	802.11ac (VHT20)	6.5 Mbps	100	5500	14.00	14.00	No	2
			104	5520	18.50	18.50		
			116	5580	18.50	18.50		
			132	5660	18.50	18.50		
			136	5680	18.50	18.50		
			140	5700	14.50	14.50		
			144	5720	18.00	18.00		
	802.11ac (VHT40)	13.5 Mbps	102	5510	14.00	14.00	No	2
			110	5550	18.00	18.00		
			118	5590	18.00	18.00		
			126	5630	18.00	18.00		
			134	5670	17.00	17.00		
			142	5710	18.50	18.50		
	802.11ac (VHT80)	29.3 Mbps	106	5530	15.00	15.00	No	2
			122	5610	18.50	18.50		
			138	5690	19.00	19.00		
	802.11ac (VHT160)	58.5 Mbps	114	5570	12.00	12.00	No	1
	802.11ax (HE20)	8 Mbps	100	5500	14.00	14.00	No	2
			104	5520	18.50	18.50		
			116	5580	18.50	18.50		
			132	5660	18.50	18.50		
			136	5680	18.50	18.50		
			140	5700	14.00	14.00		
			144	5720	18.50	18.50		
	802.11ax (HE40)	16 Mbps	102	5510	14.00	14.00	No	2
			110	5550	18.00	18.00		
			118	5590	18.00	18.00		
			126	5630	18.00	18.00		
			134	5670	17.00	17.00		
			142	5710	18.50	18.50		
	802.11ax (HE80)	34 Mbps	106	5530	15.00	15.00	No	2
			122	5610	18.50	18.50		
			138	5690	19.00	19.00		
	802.11ax (HE160)	68 Mbps	114	5570	12.00	12.00	No	1

Note(s):

1. When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac modes, the channel with the largest bandwidth and lowest data rate is selected (i.e. 802.11ac VHT80).
2. The standalone (SISO) SAR results were considered acceptable for the MIMO simultaneous transmission analysis as the MIMO power does not exceed the SISO power. The antenna separation distance will not be less than 50mm.
3. Initial SAR test channel was chosen according to KDB248227D01. (shaded blue frame)

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8.4. Wi-Fi 5GHz (U-NII-3 Band)

Tablet mode

SISO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)		Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2	WLAN Ant 1	WLAN Ant 2		
5.8 (U-NII-3)	802.11a	6 Mbps	149	5745	Not Required	Not Required	13.5	10.5	No	1
			157	5785	Not Required	Not Required				
			165	5825	Not Required	Not Required				
	802.11n (HT20)	6.5 Mbps	149	5745	Not Required	Not Required	13.5	10.5	No	1
			157	5785	Not Required	Not Required				
			165	5825	Not Required	Not Required				
	802.11n (HT40)	13.5 Mbps	151	5755	Not Required	Not Required	13.5	10.5	No	1
			159	5795	Not Required	Not Required				
	802.11ac (VHT20)	6.5 Mbps	149	5745	Not Required	Not Required	13.5	10.5	No	1
			157	5785	Not Required	Not Required				
			165	5825	Not Required	Not Required				
	802.11ac (VHT40)	13.5 Mbps	151	5755	Not Required	Not Required	13.5	10.5	No	1
			159	5795	Not Required	Not Required				
	802.11ac (VHT80)	29.3 Mbps	155	5775	13.31	10.19	13.5	10.5	Yes	1,3
	802.11ax (HE20)	16 Mbps	149	5745	Not Required	Not Required	13.5	10.5	No	1
			157	5785	Not Required	Not Required				
			165	5825	Not Required	Not Required				
	802.11ax (HE40)	32 Mbps	151	5755	Not Required	Not Required	13.5	10.5	No	1
			159	5795	Not Required	Not Required				
	802.11ax (HE80)	68 Mbps	155	5775	Not Required	Not Required	13.5	10.5	No	1

MIMO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2		
5.8 (U-NII-3)	802.11n (HT20)	6.5 Mbps	149	5745	13.5	10.5	No	2
			157	5785				
			165	5825				
	802.11n (HT40)	13.5 Mbps	151	5755	13.5	10.5	No	2
			159	5795				
	802.11ac (VHT20)	6.5 Mbps	149	5745	13.5	10.5	No	2
			157	5785				
			165	5825				
	802.11ac (VHT40)	13.5 Mbps	151	5755	13.5	10.5	No	2
			159	5795				
	802.11ac (VHT80)	29.3 Mbps	155	5775	13.5	10.5	Yes	2
	802.11ax (HE20)	16 Mbps	149	5745	13.5	10.5	No	2
			157	5785				
			165	5825				
	802.11ax (HE40)	32 Mbps	151	5755	13.5	10.5	No	2
			159	5795				
	802.11ax (HE80)	68 Mbps	155	5775	13.5	10.5	No	2

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Laptop mode

SISO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)		Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2	WLAN Ant 1	WLAN Ant 2		
5.8 (U-NII-3)	802.11a	6 Mbps	149	5745	Not Required	Not Required	21.0	19.5	No	1
			157	5785	Not Required	Not Required				
			165	5825	Not Required	Not Required				
	802.11n (HT20)	6.5 Mbps	149	5745	Not Required	Not Required	21.0	19.5	No	1
			157	5785	Not Required	Not Required				
			165	5825	Not Required	Not Required				
	802.11n (HT40)	13.5 Mbps	151	5755	20.25	18.92	21.0	19.6	Yes	1,3
			159	5795	20.27	18.98				
	802.11ac (VHT20)	6.5 Mbps	149	5745	Not Required	Not Required	21.0	19.5	No	1
			157	5785	Not Required	Not Required				
			165	5825	Not Required	Not Required				
	802.11ac (VHT40)	13.5 Mbps	151	5755	Not Required	Not Required	21.0	19.6	No	1
			159	5795	Not Required	Not Required				
	802.11ac (VHT80)	29.3 Mbps	155	5775	Not Required	Not Required	19.5	19.5	No	1
	802.11ax (HE20)	8 Mbps	149	5745	Not Required	Not Required	21.0	19.5	No	1
			157	5785	Not Required	Not Required				
			165	5825	Not Required	Not Required				
	802.11ax (HE40)	16 Mbps	151	5755	Not Required	Not Required	21.0	19.5	No	1
			159	5795	Not Required	Not Required				
	802.11ax (HE80)	34 Mbps	155	5775	Not Required	Not Required	19.0	19.0	No	1

MIMO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
					WLAN Ant 1	WLAN Ant 2		
5.8 (U-NII-3)	802.11n (HT20)	6.5 Mbps	149	5745	18.0	18.0	No	2
			157	5785				
			165	5825				
	802.11n (HT40)	13.5 Mbps	151	5755	18.0	18.0	Yes	2
			159	5795				
	802.11ac (VHT20)	6.5 Mbps	149	5745	18.0	18.0	No	2
			157	5785				
			165	5825				
	802.11ac (VHT40)	13.5 Mbps	151	5755	18.0	18.0	No	2
			159	5795				
	802.11ac (VHT80)	29.3 Mbps	155	5775	16.5	16.5	No	2
	802.11ax (HE20)	8 Mbps	149	5745	17.5	17.5	No	2
			157	5785	18.0	18.0		
			165	5825	18.0	18.0		
	802.11ax (HE40)	16 Mbps	151	5755	18.0	18.0	No	2
			159	5795				
	802.11ax (HE80)	34 Mbps	155	5775	16.5	16.5	No	2

Note(s):

1. When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac modes, the channel with the largest bandwidth and lowest data rate is selected.
2. The standalone (SISO) SAR results were considered acceptable for the MIMO simultaneous transmission analysis as the MIMO power does not exceed the SISO power. The antenna separation distance will not be less than 50mm.
3. Initial SAR test channel was chosen according to KDB248227D01. (shaded blue frame)

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8.5. Bluetooth

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)	Tune-up upper Power (dBm)	SAR Test (Yes/No)	Note(s)
					BT	BT		
2.4	BDR	DH5	0	2402	9.65	10.5	Yes	2
			39	2441	10.12			
			78	2480	10.35			
	EDR	2DH5	0	2402	Not Required	7.0	No	1
			39	2441	Not Required			
			78	2480	Not Required			
	EDR	3DH5	0	2402	Not Required	7.0	No	1
			39	2441	Not Required			
			78	2480	Not Required			
	LE	-	0	2402	Not Required	7.0	No	1
			40	2442	Not Required			
			78	2480	Not Required			

Note(s):

1. SAR measurement is not required for EDR and LE when the specified tune-up tolerances for EDR and LE are lower than BDR.
2. SAR test channel was chosen. (shaded blue frame)

Duty confirmation

BT DH5 duty cycle

Tx on / (Tx on + Tx off) = 0.786
Tx on / (Tx on + Tx off) * 100 = 78.6 %

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9. Dielectric Property Measurements & System Check

9.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°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 ± 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 εr and σ may be relaxed to ± 10%. This is limited to frequencies ≤ 3 GHz.

Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5000	36.2	4.45	49.3	5.07
5100	36.1	4.55	49.1	5.18
5200	36.0	4.66	49.0	5.30
5300	35.9	4.76	48.9	5.42
5400	35.8	4.86	48.7	5.53
5500	35.6	4.96	48.6	5.65
5600	35.5	5.07	48.5	5.77
5700	35.4	5.17	48.3	5.88
5800	35.3	5.27	48.2	6.00

IEEE Std 1528-2013

Refer to Table 3 within the IEEE Std 1528-2013

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Dielectric Property Measurements Results:

Date	Band (MHz)	Tissue Type	Frequency (MHz)	Relative Permittivity (εr)			Conductivity (σ)		
				Measured	Target	Delta (%)	Measured	Target	Delta (%)
2021/2/15	2450	Body	2450	51.72	52.70	-1.86	2.00	1.95	2.56
			2400	51.65	52.77	-2.11	1.96	1.90	3.14
			2480	51.76	52.66	-1.72	2.03	1.99	1.93
2021/2/17	5300	Body	5250	46.73	48.95	-4.53	5.50	5.36	2.69
			5180	47.03	49.04	-4.10	5.33	5.28	1.04
			5320	46.67	48.85	-4.46	5.64	5.44	3.60
2021/2/22	5600	Body	5600	46.20	48.47	-4.69	5.92	5.77	2.66
			5500	46.53	48.61	-4.27	5.83	5.65	3.17
			5720	45.94	48.31	-4.90	6.20	5.91	4.95
2021/2/24	5800	Body	5800	45.86	48.20	-4.85	6.26	6.00	4.37
			5740	45.91	48.28	-4.90	6.22	5.93	4.82
			5830	46.73	48.95	-4.53	5.50	5.36	2.69

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9.2. 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 10 mm (above 1 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 100 mW.
- The results are normalized to 1 W input power.

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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 ±10% of the manufacturer calibrated dipole SAR target. Refer to Appendix B for the SAR System Check Plots.

Date Tested	Test Freq	Model,S/N	T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %
					Zoom Scan	Normalize to 1 W		
2021/2/15	2450	D2450,713	Body	1g	13.20	52.8	53.20	-0.8
				10g	6.06	24.2	24.72	-1.9
2021/2/17	5250	D5GHV2,1020	Body	1g	7.12	71.2	75.80	-6.1
				10g	2.00	20.00	21.60	-7.4
2021/2/22	5600	D5GHV2,1020	Body	1g	7.81	78.10	79.60	-1.9
				10g	2.14	21.40	22.50	-4.9
2021/2/24	5800	D5GHV2,1020	Body	1g	7.11	71.10	75.00	-5.2
				10g	1.96	19.60	21.10	-7.1

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10. Measured and Reported (Scaled) SAR Results

SAR WLAN Test Reduction criteria are as follows:

KDB 248227 D01 SAR meas for 802.11 v02:
SAR test reduction for 802.11 WLAN 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 *initial test position* to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the *reported* 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 *initial test position* and subsequent test positions, when the *reported* 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 *reported* 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*.

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SAR BT Test Reduction criteria are as follows:

According to KDB 447498 D01 General RF Exposure Guidance v05, 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

1. ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
2. ≤ 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
3. ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

According to Notice 2016-DRS001 based on the IEEE1528 and IEC 62209 requirements, the low, mid and high frequency channels for the configuration with the highest SAR value must be tested regardless of the SAR value measured.

Note: Measured value is rounded round off to three decimal places.

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10.1. WLAN 2.4 GHz Band

Ant 1

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		Power Scaled factor	Duty (%)	Duty Scaled factor	1-g SAR (W/kg)		Note	Plot No.
					Tune-up limit	Meas.				Meas.	Scaled		
Edge 1	0	11b	1	2412.0	15.00	14.58	1.10	100.0	1.00				
			7	2442.0	15.00	14.51	1.12	100.0	1.00				
			13	2472.0	15.00	14.70	1.07	100.0	1.00	0.431	0.462		1
Edge 4	0	11b	1	2412.0	15.00	14.58	1.10	100.0	1.00				
			7	2442.0	15.00	14.51	1.12	100.0	1.00				
			13	2472.0	15.00	14.70	1.07	100.0	1.00	0.079	0.084		
Rear	0	11b	1	2412.0	15.00	14.58	1.10	100.0	1.00				
			7	2442.0	15.00	14.51	1.12	100.0	1.00				
			13	2472.0	15.00	14.70	1.07	100.0	1.00	0.112	0.120		
Rear tilt (Edge 4 side)	0	11b	1	2412.0	15.00	14.58	1.10	100.0	1.00				
			7	2442.0	15.00	14.51	1.12	100.0	1.00				
			13	2472.0	15.00	14.70	1.07	100.0	1.00	0.052	0.055		
Rear tilt (Edge 1 side)	0	11b	1	2412.0	15.00	14.58	1.10	100.0	1.00				
			7	2442.0	15.00	14.51	1.12	100.0	1.00				
			13	2472.0	15.00	14.70	1.07	100.0	1.00	0.224	0.240		

Subsequent test configuration was excluded from the following table according to KDB248227D01

Maximum tune-up tolerance limit		Maximum tune-up tolerance limit		OFDM scaled factor	Position	DSSS Reported SAR value [W/kg]	OFDM Estimated SAR value [W/kg]	Exclusion limit [W/kg]	**Standalone SAR request**
DSSS		OFDM							
[dBm]	[mW]	[dBm]	[mW]						
15.00	31.62	15.00	31.62	1.000	Edge 1	0.462	0.462	< 1.2	**No**

Ant 2

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		Power Scaled factor	Duty (%)	Duty Scaled factor	1-g SAR (W/kg)		Note	Plot No.
					Tune-up limit	Meas.				Meas.	Scaled		
Edge 1	0	11b	1	2412.0	15.00	14.57	1.10	100.0	1.00	0.312	0.344		
			7	2442.0	15.00	14.31	1.17	100.0	1.00				
			13	2472.0	15.00	14.27	1.18	100.0	1.00				
Edge 4	0	11b	1	2412.0	15.00	14.57	1.10	100.0	1.00	0.009	0.010		
			7	2442.0	15.00	14.31	1.17	100.0	1.00				
			13	2472.0	15.00	14.27	1.18	100.0	1.00				
Rear	0	11b	1	2412.0	15.00	14.57	1.10	100.0	1.00	0.772	0.852		
			7	2442.0	15.00	14.31	1.17	100.0	1.00	0.714	0.837		
			13	2472.0	15.00	14.27	1.18	100.0	1.00	0.644	0.762		
Rear tilt (Edge 4 side)	0	11b	1	2412.0	15.00	14.57	1.10	100.0	1.00	0.004	0.005		
			7	2442.0	15.00	14.31	1.17	100.0	1.00				
			13	2472.0	15.00	14.27	1.18	100.0	1.00				
Rear tilt (Edge 1 side)	0	11b	1	2412.0	15.00	14.57	1.10	100.0	1.00	0.850	0.938		2
			7	2442.0	15.00	14.31	1.17	100.0	1.00	0.779	0.913		
			13	2472.0	15.00	14.27	1.18	100.0	1.00	0.728	0.861		

Subsequent test configuration was excluded from the following table according to KDB248227D01

Maximum tune-up tolerance limit		Maximum tune-up tolerance limit		OFDM scaled factor	Position	DSSS Reported SAR value [W/kg]	OFDM Estimated SAR value [W/kg]	Exclusion limit [W/kg]	**Standalone SAR request**
DSSS		OFDM							
[dBm]	[mW]	[dBm]	[mW]						
15.00	31.62	15.00	31.62	1.000	Rear tilt (Edg1 side)	0.938	0.938	< 1.2	**No**

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10.2. WLAN 5.3 GHz Band

Ant 1

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		Power Scaled factor	Duty (%)	Duty Scaled factor	1-g SAR (W/kg)		Note	Plot No.
					Tune-up limit	Meas.				Meas.	Scaled		
Edge 1	0	11ac80	58	5290.0	13.50	13.20	1.07	100.0	1.00	0.410	0.439		3
Edge 4	0	11ac80	58	5290.0	13.50	13.20	1.07	100.0	1.00	0.027	0.029		
Rear	0	11ac80	58	5290.0	13.50	13.20	1.07	100.0	1.00	0.114	0.122		
Rear tilt (Edge 4 side)	0	11ac80	58	5290.0	13.50	13.20	1.07	100.0	1.00	0.050	0.054		
Rear tilt (Edge 1 side)	0	11ac80	58	5290.0	13.50	13.20	1.07	100.0	1.00	0.222	0.238		

Ant 2

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		Power Scaled factor	Duty (%)	Duty Scaled factor	1-g SAR (W/kg)		Note	Plot No.
					Tune-up limit	Meas.				Meas.	Scaled		
Edge 1	0	11ac80	58	5290.0	11.00	10.51	1.12	100.0	1.00	0.108	0.121		
Edge 4	0	11ac80	58	5290.0	11.00	10.51	1.12	100.0	1.00	Not detect	-		
Rear	0	11ac80	58	5290.0	11.00	10.51	1.12	100.0	1.00	0.488	0.546		
Rear tilt (Edge 4 side)	0	11ac80	58	5290.0	11.00	10.51	1.12	100.0	1.00	0.017	0.019		
Rear tilt (Edge 1 side)	0	11ac80	58	5290.0	11.00	10.51	1.12	100.0	1.00	0.741	0.830		4

Not detect is no SAR peak.

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10.3. WLAN 5.5 GHz Band

Ant 1

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		Power Scaled factor	Duty (%)	Duty Scaled factor	1-g SAR (W/kg)		Note	Plot No.
					Tune-up limit	Meas.				Meas.	Scaled		
Edge 1	0	11ac80	106	5530.0	13.50	13.28	1.05	100.0	1.00				
			122	5610.0	13.50	13.17	1.08	100.0	1.00				
			138	5690.0	13.50	13.31	1.04	100.0	1.00	0.433	0.452		5
Edge 4	0	11ac80	106	5530.0	13.50	13.28	1.05	100.0	1.00				
			122	5610.0	13.50	13.17	1.08	100.0	1.00				
			138	5690.0	13.50	13.31	1.04	100.0	1.00	0.017	0.018		
Rear	0	11ac80	106	5530.0	13.50	13.28	1.05	100.0	1.00				
			122	5610.0	13.50	13.17	1.08	100.0	1.00				
			138	5690.0	13.50	13.31	1.04	100.0	1.00	0.190	0.198		
Rear tilt (Edge 4 side)	0	11ac80	106	5530.0	13.50	13.28	1.05	100.0	1.00				
			122	5610.0	13.50	13.17	1.08	100.0	1.00				
			138	5690.0	13.50	13.31	1.04	100.0	1.00	0.075	0.078		
Rear tilt (Edge 1 side)	0	11ac80	106	5530.0	13.50	13.28	1.05	100.0	1.00				
			122	5610.0	13.50	13.17	1.08	100.0	1.00				
			138	5690.0	13.50	13.31	1.04	100.0	1.00	0.300	0.313		

Ant 2

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		Power Scaled factor	Duty (%)	Duty Scaled factor	1-g SAR (W/kg)		Note	Plot No.
					Tune-up limit	Meas.				Meas.	Scaled		
Edge 1	0	11ac80	106	5530.0	11.00	10.49	1.12	100.0	1.00				
			122	5610.0	11.00	10.67	1.08	100.0	1.00				
			138	5690.0	11.00	10.78	1.05	100.0	1.00	0.159	0.167		
Edge 4	0	11ac80	106	5530.0	11.00	10.49	1.12	100.0	1.00				
			122	5610.0	11.00	10.67	1.08	100.0	1.00				
			138	5690.0	11.00	10.78	1.05	100.0	1.00	Not detect	-		
Rear	0	11ac80	106	5530.0	11.00	10.49	1.12	100.0	1.00				
			122	5610.0	11.00	10.67	1.08	100.0	1.00				
			138	5690.0	11.00	10.78	1.05	100.0	1.00	0.553	0.582		
Rear tilt (Edge 4 side)	0	11ac80	106	5530.0	11.00	10.49	1.12	100.0	1.00				
			122	5610.0	11.00	10.67	1.08	100.0	1.00				
			138	5690.0	11.00	10.78	1.05	100.0	1.00	0.024	0.025		
Rear tilt (Edge 1 side)	0	11ac80	106	5530.0	11.00	10.49	1.12	100.0	1.00	0.702	0.789		
			122	5610.0	11.00	10.67	1.08	100.0	1.00	0.738	0.796		
			138	5690.0	11.00	10.78	1.05	100.0	1.00	0.768	0.808		6

Not detect is no SAR peak.

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10.4. WLAN 5.8 GHz Band

Ant 1

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		Power Scaled factor	Duty (%)	Duty Scaled factor	1-g SAR (W/kg)		Note	Plot No.
					Tune-up limit	Meas.				Meas.	Scaled		
Edge 1	0	11ac80	155	5775.0	13.50	13.31	1.04	100.0	1.00	0.507	0.530		7
Edge 4	0	11ac80	155	5775.0	13.50	13.31	1.04	100.0	1.00	0.022	0.023		
Rear	0	11ac80	155	5775.0	13.50	13.31	1.04	100.0	1.00	0.234	0.244		
Rear tilt (Edge 4 side)	0	11ac80	155	5775.0	13.50	13.31	1.04	100.0	1.00	0.094	0.098		
Rear tilt (Edge 1 side)	0	11ac80	155	5775.0	13.50	13.31	1.04	100.0	1.00	0.322	0.336		

Ant 2

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		Power Scaled factor	Duty (%)	Duty Scaled factor	1-g SAR (W/kg)		Note	Plot No.
					Tune-up limit	Meas.				Meas.	Scaled		
Edge 1	0	11ac80	155	5775.0	10.50	10.19	1.07	100.0	1.00	0.190	0.204		
Edge 4	0	11ac80	155	5775.0	10.50	10.19	1.07	100.0	1.00	Not detect	-		
Rear	0	11ac80	155	5775.0	10.50	10.19	1.07	100.0	1.00	0.545	0.585		
Rear tilt (Edge 4 side)	0	11ac80	155	5775.0	10.50	10.19	1.07	100.0	1.00	0.020	0.021		
Rear tilt (Edge 1 side)	0	11ac80	155	5775.0	10.50	10.19	1.07	100.0	1.00	0.679	0.729		8

Not detect is no SAR peak.

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10.5. Bluetooth

Ant 2

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		Power Scaled factor	Duty (%)	Duty Scaled factor	1-g SAR (W/kg)		Note	Plot No.
					Tune-up limit	Meas.				Meas.	Scaled		
Edge 1	0	DH5	0	2402.0	10.50	9.65	1.22	100.0	1.00				
			39	2441.0	10.50	10.12	1.09	100.0	1.00				
			78	2480.0	10.50	10.35	1.04	100.0	1.00	0.076	0.079		
Edge 4	0	DH5	0	2402.0	10.50	9.65	1.22	100.0	1.00				
			39	2441.0	10.50	10.12	1.09	100.0	1.00		-		
			78	2480.0	10.50	10.35	1.04	100.0	1.00	0.004	0.004		
Rear	0	DH5	0	2402.0	10.50	9.65	1.22	100.0	1.00				
			39	2441.0	10.50	10.12	1.09	100.0	1.00				
			78	2480.0	10.50	10.35	1.04	100.0	1.00	0.236	0.244		
Rear tilt (Edge 4 side)	0	DH5	0	2402.0	10.50	9.65	1.22	100.0	1.00				
			39	2441.0	10.50	10.12	1.09	100.0	1.00				
			78	2480.0	10.50	10.35	1.04	100.0	1.00	0.002	0.002		
Rear tilt (Edge 1 side)	0	DH5	0	2402.0	10.50	9.65	1.22	100.0	1.00				
			39	2441.0	10.50	10.12	1.09	100.0	1.00				
			78	2480.0	10.50	10.35	1.04	100.0	1.00	0.257	0.266		9

10.6. Summary of Highest SAR Values

Technology/ Band	Test configuration			Mode	Dist. (mm)	Freq. (MHz)	Power (dBm)	1g SAR (W/kg)
	Transmit Antenna	Exposure	Position					
WLAN 2.4 GHz	Ant 2	Body	Rear tilt (Edge 1 side)	11b	0	2412	14.57	0.938
WLAN 5.3 GHz	Ant 2	Body	Rear tilt (Edge 1 side)	11ac80	0	5290	10.51	0.830
WLAN 5.5 GHz	Ant 2	Body	Rear tilt (Edge 1 side)	11ac80	0	5690	10.78	0.808
WLAN 5.8 GHz	Ant 2	Body	Rear tilt (Edge 1 side)	11ac80	0	5775	10.19	0.729
Bluetooth	Ant 2	Body	Rear tilt (Edge 1 side)	DH5	0	2480	10.35	0.266

Results for the highest scaled SAR values in each frequency band and mode

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10.7. SAR Measurement Variability and Uncertainty

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz v01. 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 < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, 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 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Repeated measurement was not performed since the original highest measured SAR is < 0.80 W/kg

Wireless Technologies	Test Configuration				Mode	Ch #.	Freq. (MHz)	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio	Plot No.
	Transmit Antenna	Exposure	Position	Dist. (mm)				Original	Repeated		
WLAN 2.4 GHz	Ant 2	Body	Rear tilt (Edge 1 side)	0	11b	1	2412	0.850	0.807	1.053	1
WLAN 5.3 GHz	Ant 2	Body	Rear tilt (Edge 1 side)	0	11ac80	58	5290	0.741	N/A	N/A	-
WLAN 5.5 GHz	Ant 2	Body	Rear tilt (Edge 1 side)	0	11ac80	138	5690	0.768	N/A	N/A	-
WLAN 5.8 GHz	Ant 2	Body	Rear tilt (Edge 1 side)	0	11ac80	155	5775	0.679	N/A	N/A	-
Bluetooth	Ant 2	Body	Rear tilt (Edge 1 side)	0	DH5	78	2480	0.257	N/A	N/A	-

Note(s):

Repeated Measurement is not required since the original highest measured SAR for all band is < 0.80 W/kg.

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11. Simultaneous Transmission SAR Analysis

Test Position	WLAN 2.4 GHz Ant 1	WLAN 2.4 GHz Ant 2	Bluetooth	Σ 1-g SAR (W/kg)
Edge 1 WLAN 1 Tx	0.462		0.079	0.541
Edge 1 WLAN 2 Tx	0.462	0.344		0.806
Edge 4 WLAN 1 Tx	0.084		0.004	0.088
Edge 4 WLAN 2 Tx	0.084	0.010		0.094
Rear WLAN 1 Tx	0.120		0.244	0.364
Rear WLAN 2 Tx	0.120	0.852		0.972
Rear tilt (Edge 4 side)	0.055		0.002	0.057
Rear tilt (Edge 4 side)	0.055	0.005		0.060
Rear tilt (Edge 1 side)	0.240		0.266	0.506
Rear tilt (Edge 1 side)	0.240	0.938		1.178

Test Position	WLAN 5.2/5.3 GHz Ant 1	WLAN 5.2/5.3 GHz Ant 2	Bluetooth	Σ 1-g SAR (W/kg)
Edge 1 WLAN 1 Tx	0.439		0.079	0.518
Edge 1 WLAN 2 Tx	0.439	0.121		0.560
Edge 4 WLAN 1 Tx	0.029		0.004	0.033
Edge 4 WLAN 2 Tx	0.029	0.000		0.029
Rear WLAN 1 Tx	0.122		0.244	0.366
Rear WLAN 2 Tx	0.122	0.546		0.668
Rear tilt (Edge 4 side)	0.054		0.002	0.056
Rear tilt (Edge 4 side)	0.054	0.019		0.073
Rear tilt (Edge 1 side)	0.238		0.266	0.504
Rear tilt (Edge 1 side)	0.238	0.830		1.068

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Test Position	WLAN 5.5 GHz Ant 1	WLAN 5.5 GHz Ant 2	Bluetooth	Σ 1-g SAR (W/kg)
Edge 1 WLAN 1 Tx	0.452		0.079	0.531
Edge 1 WLAN 2 Tx	0.452	0.167		0.619
Edge 4 WLAN 1 Tx	0.018		0.004	0.022
Edge 4 WLAN 2 Tx	0.018	0.000		0.018
Rear WLAN 1 Tx	0.198		0.244	0.442
Rear WLAN 2 Tx	0.198	0.582		0.780
Rear tilt (Edge 4 side)	0.078		0.002	0.080
Rear tilt (Edge 4 side)	0.078	0.025		0.103
Rear tilt (Edge 1 side)	0.313		0.266	0.579
Rear tilt (Edge 1 side)	0.313	0.808		1.121

Test Position	WLAN 5.8 GHz Ant 1	WLAN 5.8 GHz Ant 2	Bluetooth	Σ 1-g SAR (W/kg)
Edge 1 WLAN 1 Tx	0.530		0.079	0.609
Edge 1 WLAN 2 Tx	0.530	0.204		0.734
Edge 4 WLAN 1 Tx	0.023		0.004	0.027
Edge 4 WLAN 2 Tx	0.023	0.000		0.023
Rear WLAN 1 Tx	0.244		0.244	0.488
Rear WLAN 2 Tx	0.244	0.585		0.829
Rear tilt (Edge 4 side)	0.098		0.002	0.100
Rear tilt (Edge 4 side)	0.098	0.021		0.119
Rear tilt (Edge 1 side)	0.336		0.266	0.602
Rear tilt (Edge 1 side)	0.336	0.729		1.065

Note(s):

1. Bluetooth and WLAN Ant 2 cannot simultaneously transmit.

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2. Edge 2 and Edge 3 weren't required stand-alone SAR test. Therefore, the Simultaneous Transmission SAR Analysis wasn't considered.

Conclusion:

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

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Appendixes

Refer to separated files for the following appendixes.

13489132H for SAR Appendix A: DUT and SAR Setup Photos

13489132H for SAR Appendix B: Antenna Dimensions and Separation Distances

13489132H for SAR Appendix C: SAR System Check Plots

13489132H for SAR Appendix D: Highest SAR Test Plots

13489132H for SAR Appendix E: SAR Test Plots for Repeat Measurement

13489132H for SAR Appendix F: SAR Probe Calibration Certificates

13489132H for SAR Appendix G: SAR Dipole Calibration Certificates

13489132H for SAR Appendix H: SAR Liquid Tissue Ingredients

END OF REPORT

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