SAR EVALUATION REPORT

FCC 47 CFR § 2.1093
IEEE Std 1528-2013
(Class II Permissive Change)

For

Wireless Module
(Tested inside of Panasonic Tablet PC FZ-M1)

Model: WL16B
FCC ID: ACJ9TGWL16B

Report Number: 12048160H-A-R2
Issue Date: February 5, 2018
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Prepared for

PANASONIC CORPORATION OF NORTH AMERICA
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NVLAP LAB CODE: 200572-0

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	02/05/2018	Initial Issue	T. Shimada
1	02/13/2018	Correction of FCC ID	T. Shimada
1	02/13/2018	Correction of section 17 “Antenna Dimensions & separation Distance”	T. Shimada
2	02/14/2018	Correction of section 8 “Exposure Conditions”	T. Shimada

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1 Attestation of Test Results

Applicant	PANASONIC CORPORATION OF NORTH AMERICA
DUT description	Wireless Module (Tested inside of Panasonic Tablet PC FZ-M1)
Model	WL16B
Test device is	An identical prototype
Device category	Portable
Exposure category	General Population/Uncontrolled Exposure
Date tested	January 11 to 18, 2018

Applicable Standards	Test Results
FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013	Pass

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This report is a revised version of 12048160H-A-R1. 12048160H-A-R1 is replaced with this report.

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1.1 Summary of Highest 1-g SAR Results

Worst Case SAR data for each Frequency Band

RF Exposure Rule	Freq. Range	Highest Reported SAR	Limit
15.247	2400-2483.5 MHz	WLAN: 1.326 W/kg (Edge 3) Bluetooth: 0.333 W/kg (Edge 1)	1.6 W/kg
15.407	5150-5350 MHz	Body: 0.841 W/kg (Edge 1)	
	5470-5725 MHz	Body: 0.574 W/kg (Edge 3)	
	5725-5850 MHz	Body: 0.523 W/kg (Edge 3)	
Simultaneous Transmission Condition		1.326 W/kg (refer to Section 14) (The highest across exposure conditions)	

LEGEND:

- Edge 1 = Top Edge
- Edge 2 = Left Edge
- Edge 3 = Bottom Edge
- Edge 4 = Right Edge
- Bottom = Rear of display

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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, the following FCC Published RF exposure KDB procedures:

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

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.

UL Japan, Inc. is accredited by NVLAP, Laboratory Code 200572-0

The full scope of accreditation can be viewed at

http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

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4 Calibration and Uncertainty

4.1 Measuring Instrument Calibration

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	2017/04/22 * 12
MDPK-03	Dielectric assessment kit	Schmid&Partner Engineering AG	DAK-3.5	0008	SAR	2017/04/18 * 12
MOS-37	Digital thermometer	LKM electronic	DTM3000	-	SAR	2017/07/26 * 12
COTS-MSAR-04	Dielectric assessment software	Schmid&Partner Engineering AG	DAK	-	SAR	-

System check

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MDAE-03	Data Acquisition Electronics	Schmid&Partner Engineering AG	DAE4	1372	SAR	2017/06/13 * 12
MPB-09	Dosimetric E-Field Probe	Schmid&Partner Engineering AG	EX3DV4	3922	SAR	2017/11/15 * 12
MPF-04	2mm Oval Flat Phantom	Schmid&Partner Engineering AG	QDOVA001BB	1207	SAR	2017/05/17 * 12
MDH-03	Device holder	Schmid&Partner Engineering AG	Mounting device for transmitter	-	SAR	Pre Check
MOS-35	Digital thermometer	HANNA	Checktemp 4	-	SAR	2017/07/26 * 12
COTS-MSAR-03	Dasy5	Schmid&Partner Engineering AG	DASY5	-	SAR	-
MRBT-04	SAR robot	Schmid&Partner Engineering AG	TX60 Lspeag	F13/5PPLA1/A/01	SAR	2017/06/30 * 12
MPM-11	Dual Power Meter	Agilent	E4419B	MY45102060	SAR	2017/08/25 * 12
MPSE-15	Power sensor	Agilent	E9301A	MY41498311	SAR	2017/08/25 * 12
MPSE-16	Power sensor	Agilent	E9301A	MY41498313	SAR	2017/08/25 * 12
MRFA-24	Pre Amplifier	R&K	R&K CGA020M602-2633R	B30550	SAR	2017/06/12 * 12
MSG-10	Signal Generator	Agilent	N5181A	MY47421098	SAR	2017/11/29 * 12
MAT-78	Attenuator	Telegrartner	J01156A0011	0042294119	SAR	Pre Check
MPM-15	Power Meter	Agilent	N1914A	MY53060017	SAR	2017/06/21 * 12
MPSE-21	Power sensor	Agilent	N8482H	MY52460010	SAR	2017/06/21 * 12
MHDC-21	Dual Directional Coupler	Agilent	778D	MY52180243	SAR(0.1-2GHz)	Pre Check
MHDC-12	Dual Directional Coupler	Hewlett Packard	772D	2839A0016	SAR(2-18GHz)	Pre Check
MDA-07	Dipole Antenna	Schmid&Partner Engineering AG	D2450V2	713	SAR(D2450)	2016/09/13 * 24
MMSL2450	Tissue simulation liquid (Body)	Schmid&Partner Engineering AG	MSL2450V2	SL AA 245 BA	SAR*Daily Check Target Value ±5%	Pre Check
MRENT-S10	Dipole Antenna	Schmid&Partner Engineering AG	D5GHzV2	1092	SAR(D5G)	2017/10/16 * 12
MMBBL3.5-5.8	Tissue simulation liquid (Body)	Schmid&Partner Engineering AG	MBBL3500-5800V5	SL AAM 501 DA	SAR*Daily Check Target Value ±5%	Pre Check

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Other

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MPM-16	Power Meter	Agilent	8990B	MY51000271	AT	2017/04/28 * 12
MPSE-22	Power sensor	Agilent	N1923A	MY54070003	AT	2017/04/28 * 12
MPSE-23	Power sensor	Agilent	N1923A	MY54070004	AT	2017/04/28 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2017/03/21 * 12
MAT-23	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2017/03/21 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	AT	2017/01/20 * 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.

4.2 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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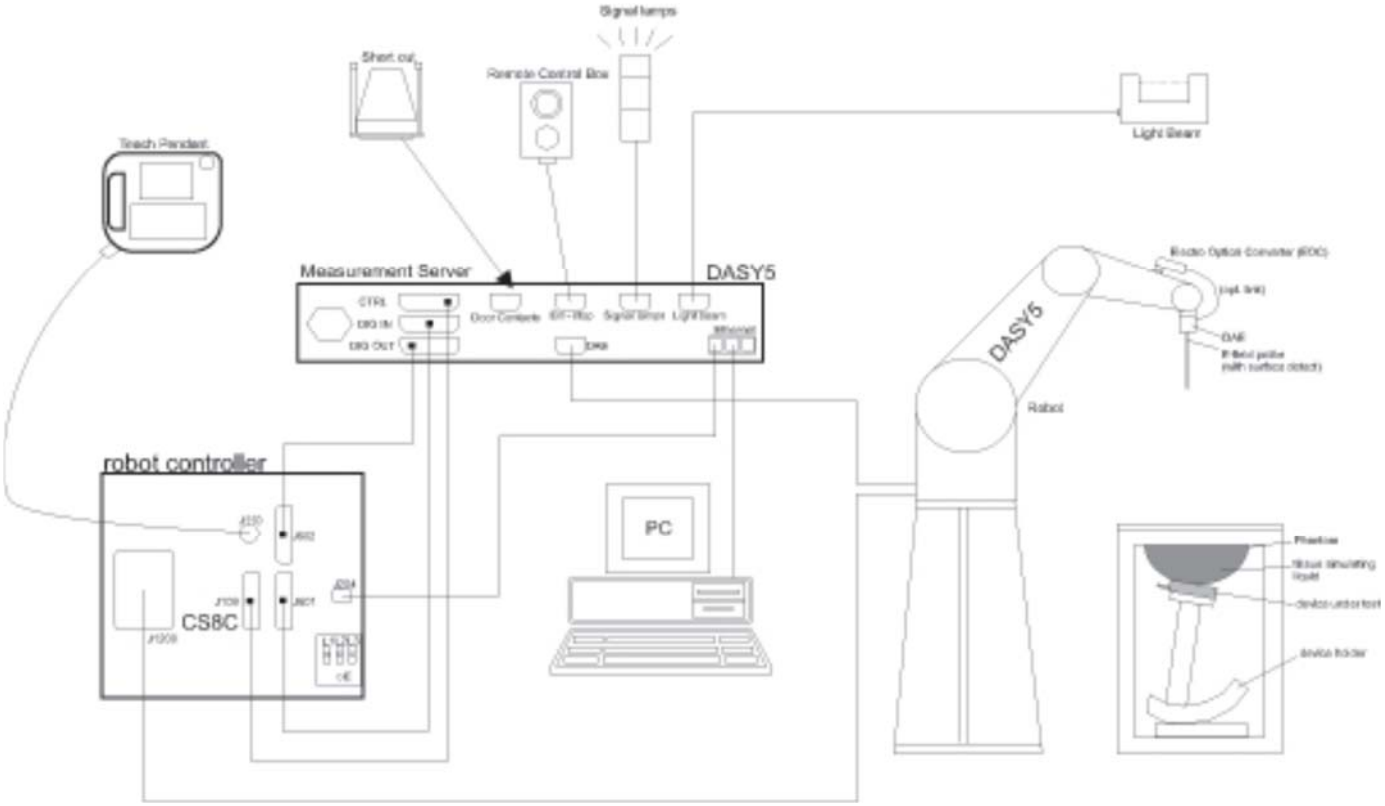
5 Measurement System Description and Setup

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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6 SAR Measurement Procedure

6.1 Normal SAR Measurement Procedure

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	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
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.

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6.2 Volume Scan Procedures

Step 1: Repeat Step 1-4 in Section 6.1

Step 2: Volume Scan

Volume Scans are used to assess peak SAR and averaged SAR measurements in largely extended 3-dimensional volumes within any phantom. This measurement does not need any previous area scan. The grid can be anchored to a user specific point or to the current probe location.

Step 3: 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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7 Device Under Test

Wireless Module (Tested inside of Panasonic Tablet PC FZ-M1) Model: WL16B	
Operating Configuration(s)	• Tablet modes
Exposure Condition(s)	• Specific details of the required test positions are provided in Section 8 "Exposure Conditions".
Accessory	• None

7.1 Band and Air Interfaces

Tx Frequency Bands	• 802.11a/b/g/n/ac: 2412 - 2472 MHz, b / g / HT20 / HT40 5180 - 5240 MHz, a / HT20 / HT40 / HT80 5260 - 5320 MHz, a / HT20 / HT40 / HT80 5500 - 5720 MHz, a / HT20 / HT40 / HT80 5745 - 5825 MHz, a / HT20 / HT40 / HT80 • Bluetooth: 2402 - 2480 MHz
Modulation	• 802.11a/b/g/n/ac : BPSK, QPSK, CCK, 16-QAM and 64-QAM and 256-QAM • Bluetooth 4.0+LE: GFSK, DQPSK, 8-DPSK
Duty Cycle	• WLAN: 100% • Bluetooth 79.8%

* Bluetooth duty cycle was measured with DH5 mode as this is highest duty cycle of this EUT.

7.2 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 Aux Antenna. Bluetooth can transmit simultaneously with the WLAN Main Antenna. Bluetooth cannot transmit simultaneously with the WLAN Aux Antenna in WLAN MIMO mode.

Supported Simultaneous Scenarios

Band	WLAN		Bluetooth
	Main Ant	Aux Ant	Aux Ant
2.4 GHz	✓	✓	
	✓		✓
5 GHz	✓	✓	
	✓		✓

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8 Exposure Conditions

Refer to Section 17 “Antenna Dimensions and Separation Distances” for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

8.1 Test Configurations for the Main Antenna, SISO and MIMO Modes

Tablet Mode

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Bottom	12.3 mm	Yes	Refer to section 12 for SAR exclusion justification.
Front	-	No	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.
Edge 1	122.6 mm	Yes	Refer to section 12 for SAR exclusion justification. Though SAR was not required for standalone, the test was performed for assuming that another module is installed. If there is a co-located and simultaneous transmission exists, the simultaneous transmission is evaluated in the report of the side being collocated.
Edge 2 Edge2(45deg)	162.2 mm	Yes	Refer to section 12 for SAR exclusion justification. Though SAR was not required for standalone, the test was performed for assuming that another module is installed. If there is a co-located and simultaneous transmission exists, the simultaneous transmission is evaluated in the report of the side being collocated.
Edge 3	3.3 mm	Yes	Refer to section 12 for SAR exclusion justification.
Edge 4	17.3 mm	Yes	Refer to section 12 for SAR exclusion justification.

8.2 Test Configurations for the Auxiliary Antenna, SISO and MIMO Modes

Tablet Mode

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Bottom	11.2 mm	Yes	Refer to section 12 for SAR exclusion justification.
Front	-	No	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.
Edge 1	4.1 mm	Yes	Refer to section 12 for SAR exclusion justification.
Edge 2 Edge2(45deg)	161.9 mm	Yes	Refer to section 12 for SAR exclusion justification. Though SAR was not required for standalone, the test was performed for assuming that another module is installed. If there is a co-located and simultaneous transmission exists, the simultaneous transmission is evaluated in the report of the side being collocated.
Edge 3	121.8 mm	Yes	Refer to section 12 for SAR exclusion justification. Though SAR was not required for standalone, the test was performed for assuming that another module is installed. If there is a co-located and simultaneous transmission exists, the simultaneous transmission is evaluated in the report of the side being collocated.
Edge 4	17.6 mm	Yes	Refer to section 12 for SAR exclusion justification.

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8.3 Test Configurations for the Auxiliary Antenna, Bluetooth

Tablet Mode

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Bottom	11.2 mm	Yes	Refer to section 12 for SAR exclusion justification.
Front	-	No	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.
Edge 1	4.1 mm	Yes	Refer to section 12 for SAR exclusion justification.
Edge 2 Edge2(45deg)	161.9 mm	Yes	Refer to section 12 for SAR exclusion justification. Though SAR was not required for standalone, the test was performed for assuming that another module is installed. If there is a co-located and simultaneous transmission exists, the simultaneous transmission is evaluated in the report of the side being collocated.
Edge 3	121.8 mm	Yes	Refer to section 12 for SAR exclusion justification. Though SAR was not required for standalone, the test was performed for assuming that another module is installed. If there is a co-located and simultaneous transmission exists, the simultaneous transmission is evaluated in the report of the side being collocated.
Edge 4	17.6 mm	Yes	Refer to section 12 for SAR exclusion justification.

LEGEND:

- Edge 1 = Top Edge
- Edge 2 = Left Edge
- Edge 3 = Bottom Edge
- Edge 4 = Right Edge
- Bottom = Rear of display

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9 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) 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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9.1 WLAN 2.4GHz (DTS Band)

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)
					Main Ant Tx	Sub Ant Tx	Main Ant Tx	Sub Ant Tx		
2.4	802.11b	1 Mbps	1	2412	14.98	14.90	15.0	15.0	Yes	1,3
			6	2437	14.99	14.91				
			11	2462	14.94	14.72				
			12	2467	14.87	14.68				
			13	2472	7.21	7.46	7.5	7.5		
	802.11g	6 Mbps	1	2412	Not Required	Not Required	15.0	15.0	No	1
			6	2437	Not Required	Not Required				
			11	2462	Not Required	Not Required				
			12	2467	Not Required	Not Required	9.5	9.5		
			13	2472	Not Required	Not Required	-3.5	-3.5		
	802.11n (HT20)	6.5 Mbps	1	2412	Not Required	Not Required	15.0	15.0	No	1
			6	2437	Not Required	Not Required				
			11	2462	Not Required	Not Required				
			12	2467	Not Required	Not Required	9.5	9.5		
			13	2472	Not Required	Not Required	-3.5	-3.5		
	802.11n (HT40)	13.5 Mbps	3	2422	14.81	14.94	15.0	15.0	No	1
			6	2437	14.50	14.78				
			9	2452	14.58	14.72				
			10	2457	11.17	11.30	11.5	11.5		
			11	2462	-3.76	-3.53	-3.5	-3.5		

MIMO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)	Tune-up upper Power (dBm)	Initial SAR Test (Yes/No)	Note(s)
					Main&Sub Ant Simultaneous Tx	Main&Sub Ant Simultaneous Tx		
2.4	802.11n (HT20)	13 Mbps	1	2412	Not Required	15.0	No	2
			2	2437	Not Required			
			11	2462	Not Required			
			12	2467	Not Required	9.0		
			13	2472	Not Required	-7.0		
	802.11n (HT40)	27 Mbps	3	2422	Not Required	15.0	No	2
			4	2427	Not Required	14.5		
			6	2437	Not Required	15.0		
			8	2447	Not Required	15.0		
			9	2452	Not Required	14.0		
			10	2457	Not Required	10.5		
			11	2462	Not Required	-5.5		

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 be less than 50mm.
3. Initial SAR test channel was chosen according to KDB248227D01. (shaded blue frame)

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9.2 WLAN 5GHz (U-NII-1 and U-NII-2A Bands)

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)
					Main Ant Tx	Sub Ant Tx	Main Ant Tx	Sub Ant Tx		
5.2 (U-NII-1)	802.11a	6 Mbps	36	5180	Not Required	Not Required	13.5	13.5	No	2
			40	5200	Not Required	Not Required				
			44	5220	Not Required	Not Required				
			48	5240	Not Required	Not Required				
	802.11n (HT20)	6.5 Mbps	36	5180	Not Required	Not Required	13.5	13.5	No	2
			40	5200	Not Required	Not Required				
			44	5220	Not Required	Not Required				
			48	5240	Not Required	Not Required				
	802.11n (HT40)	13.5 Mbps	38	5190	Not Required	Not Required	13.5	13.5	No	2
			46	5230	Not Required	Not Required				
	802.11ac (VHT20)	6.5 Mbps	36	5180	Not Required	Not Required	13.5	13.5	No	2
			40	5200	Not Required	Not Required				
			44	5220	Not Required	Not Required				
			48	5240	Not Required	Not Required				
	802.11ac (VHT40)	13.5 Mbps	38	5190	Not Required	Not Required	13.5	13.5	No	2
			46	5230	Not Required	Not Required				
	802.11ac (VHT80)	29.3 Mbps	42	5210	Not Required	Not Required	13.0	13.0	No	2
5.3 (U-NII-2A)	802.11a	6 Mbps	52	5260	Not Required	Not Required	13.5	13.5	No	1
			56	5280	Not Required	Not Required				
			60	5300	Not Required	Not Required				
			64	5320	Not Required	Not Required				
	802.11n (HT20)	6.5 Mbps	52	5260	Not Required	Not Required	13.5	13.5	No	1
			56	5280	Not Required	Not Required				
			60	5300	Not Required	Not Required				
			64	5320	Not Required	Not Required				
	802.11n (HT40)	13.5 Mbps	54	5270	13.45	13.37	13.5	13.5	Yes	1,4
			62	5310	13.47	13.49				
	802.11ac (VHT20)	6.5 Mbps	52	5260	Not Required	Not Required	13.5	13.5	No	1
			56	5280	Not Required	Not Required				
			60	5300	Not Required	Not Required				
			64	5320	Not Required	Not Required				
	802.11ac (VHT40)	13.5 Mbps	54	5270	Not Required	Not Required	13.5	13.5	No	1
			62	5310	Not Required	Not Required				
	802.11ac (VHT80)	29.3 Mbps	58	5290	Not Required	Not Required	11.0	11.0	No	1

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MIMO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)	Tune-up upper Power (dBm)	Initial SAR Test (Yes/No)	Note(s)
					Main&Sub Ant Simultaneous Tx	Main&Sub Ant Simultaneous Tx		
5.2 (U-NII-1)	802.11n (HT20)	13 Mbps	36	5180	Not Required	13.5	No	3
			40	5200	Not Required			
			44	5220	Not Required			
			48	5240	Not Required			
	802.11n (HT40)	27 Mbps	38	5190	Not Required	13.5	No	3
			46	5230	Not Required			
	802.11ac (VHT20)	13 Mbps	36	5180	Not Required	13.5	No	3
			40	5200	Not Required			
			44	5220	Not Required			
			48	5240	Not Required			
	802.11ac (VHT40)	27 Mbps	38	5190	Not Required	13.5	No	3
			46	5230	Not Required			
	802.11ac (VHT80)	58.5 Mbps	42	5210	Not Required	11.0	No	3
5.3 (U-NII-2A)	802.11n (HT20)	13 Mbps	52	5260	Not Required	13.5	No	3
			56	5280	Not Required			
			60	5300	Not Required			
			64	5320	Not Required			
	802.11n (HT40)	27 Mbps	54	5270	Not Required	13.5	No	3
			62	5310	Not Required			
	802.11ac (VHT20)	13 Mbps	52	5260	Not Required	13.5	No	3
			56	5280	Not Required			
			60	5300	Not Required			
			64	5320	Not Required			
	802.11ac (VHT40)	27 Mbps	54	5270	Not Required	13.5	No	3
			62	5310	Not Required			
	802.11ac (VHT80)	58.5 Mbps	58	5290	Not Required	9.5	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 modes, the channel with the largest bandwidth and lowest data rate is selected (i.e. 802.11ac VHT80).
2. 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
   - o ≤ 1.2 W/kg, SAR is not required for UNII band I
   - o > 1.2 W/kg, both bands should be tested independently for SAR.
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 is not be less than 50mm.
4. Initial SAR test channel was chosen according to KDB248227D01. (shaded blue frame)

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9.3 WLAN 5GHz (U-NII-2C Band)

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)
					Main Ant Tx	Sub Ant Tx	Main Ant Tx	Sub Ant Tx		
5.5 (U-NII-2C)	802.11a	6 Mbps	100	5500	Not Required	Not Required	13.5	13.5	No	1
			116	5580	Not Required	Not Required				
			140	5700	Not Required	Not Required				
	802.11n (HT20)	6.5 Mbps	100	5500	Not Required	Not Required	13.5	13.5	No	1
			116	5580	Not Required	Not Required				
			140	5700	Not Required	Not Required				
	802.11n (HT40)	13.5 Mbps	102	5510	Not Required	Not Required	13.5	13.5	No	1
			110	5550	Not Required	Not Required				
			134	5670	Not Required	Not Required				
	802.11ac (VHT20)	6.5 Mbps	100	5500	Not Required	Not Required	13.5	13.5	No	1
			116	5580	Not Required	Not Required				
			140	5700	Not Required	Not Required				
			144	5720	Not Required	Not Required				
	802.11ac (VHT40)	13.5 Mbps	102	5510	Not Required	Not Required	13.5	13.5	No	1
			110	5550	Not Required	Not Required				
			134	5670	Not Required	Not Required				
			142	5710	Not Required	Not Required				
	802.11ac (VHT80)	29.3 Mbps	106	5530	12.31	12.45	12.5	12.5	Yes	1,3
			122	5610	13.33	13.39	13.5	13.5		
			138	5690	13.49	13.48				

MIMO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)	Tune-up upper Power (dBm)	Initial SAR Test (Yes/No)	Note(s)
					Main&Sub Ant Simultaneous Tx	Main&Sub Ant Simultaneous Tx		
5.5 (U-NII-2C)	802.11n (HT20)	13 Mbps	100	5500	Not Required	13.5	No	2
			116	5580	Not Required			
			140	5700	Not Required			
	802.11n (HT40)	27 Mbps	102	5510	Not Required	13.5	No	2
			110	5550	Not Required			
			134	5670	Not Required			
	802.11ac (VHT20)	13 Mbps	100	5500	Not Required	13.5	No	2
			116	5580	Not Required			
			140	5700	Not Required			
			144	5720	Not Required			
	802.11ac (VHT40)	27 Mbps	102	5510	Not Required	13.5	No	2
			110	5550	Not Required			
			134	5670	Not Required			
			142	5710	Not Required			
	802.11ac (VHT80)	58.5 Mbps	106	5530	Not Required	9.5	No	2
			122	5610	Not Required	13.5		
			138	5690	Not Required			

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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9.4 WLAN 5GHz (U-NII-3 Band)

SISO

Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)		Tune-up upper Power (dBm)		Initial SAR Test (Yes/No)	Note(s)
				Main Ant Tx	Sub Ant Tx	Main Ant Tx	Sub Ant Tx		
802.11a	6 Mbps	149	5745	Not Required	Not Required	13.5	13.5	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	13.5	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	13.5	No	1
		159	5795	Not Required	Not Required				
802.11ac (VHT20)	6.5 Mbps	149	5745	Not Required	Not Required	13.5	13.5	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	13.5	No	1
		159	5795	Not Required	Not Required				
802.11ac (VHT80)	29.3 Mbps	155	5775	13.43	13.45	13.5	13.5	Yes	1,3

MIMO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)	Tune-up upper Power (dBm)	Initial SAR Test (Yes/No)	Note(s)
					Main&Sub Ant Simultaneous Tx	Main&Sub Ant Simultaneous Tx		
5.8 (U-NII-3)	802.11n (HT20)	13 Mbps	149	5745	Not Required	13.5	No	2
			157	5785	Not Required	13.5		
			165	5825	Not Required	13.5		
	802.11n (HT40)	27 Mbps	151	5755	Not Required	13.5	No	2
			159	5795	Not Required	13.5		
	802.11ac (VHT20)	13 Mbps	149	5745	Not Required	13.5	No	2
			157	5785	Not Required	13.5		
			165	5825	Not Required	13.5		
	802.11ac (VHT40)	27 Mbps	151	5755	Not Required	13.5	No	2
			159	5795	Not Required	13.5		
	802.11ac (VHT80)	58.5 Mbps	155	5775	Not Required	13.5	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 (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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9.5 Bluetooth

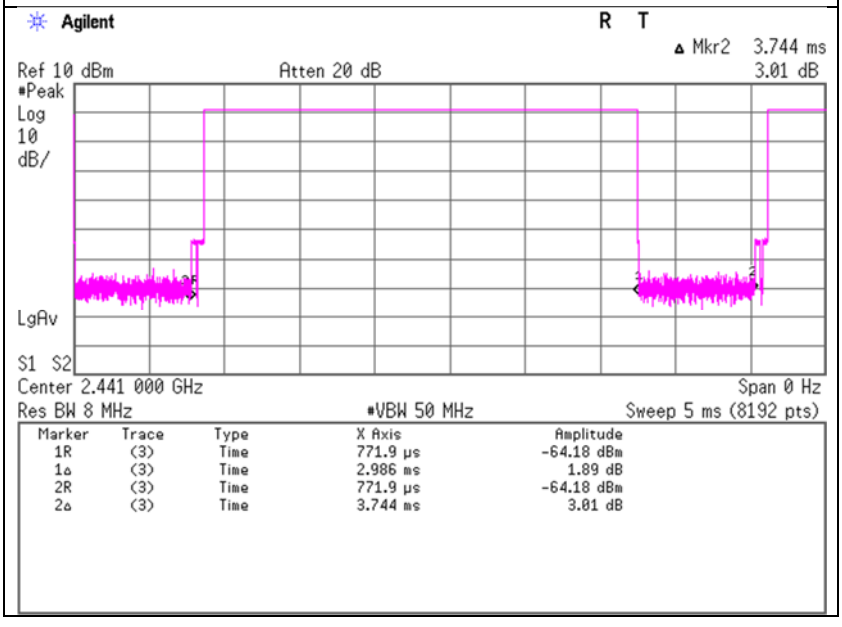
Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)		Tune-up upper Power (dBm)		SAR Test (Yes/No)	Note(s)
					Main Ant Tx	Sub Ant Tx	Main Ant Tx	Sub Ant Tx		
2.4	BDR	DH5	0	2402	-	8.68	-	10.50	Yes	2
			39	2441	-	10.46				
			78	2480	-	9.73				
	EDR	2DH5	0	2402	-	6.53	-	7.00	No	1
			39	2441	-	6.87				
			78	2480	-	6.95				
	EDR	3DH5	0	2402	-	5.65	-	6.00	No	1
			39	2441	-	5.75				
			78	2480	-	5.76				
	LE	-	0	2402	-	5.78	-	6.00	No	1
			40	2442	-	5.92				
			78	2480	-	5.81				

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. Initial SAR test channel was chosen according to KDB447498D01. (shaded blue frame)

BT DH5 duty cycle

Tx on / (Tx on + Tx off) = 0.798
Tx on / (Tx on + Tx off) * 100 = 79.8 %
Tx on = 2.986
Tx on + off = 3.744



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10 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.

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:

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.

Date	Freq. (MHz)	Liquid Parameters	Measured	Target	Delta (%)	Limit ±(%)
2018/1/11	Body 2400	Relative Permittivity (ϵ_r):	50.71	52.77	-3.91	5
		Conductivity (σ):	1.90	1.90	-0.05	5
	Body 2450	Relative Permittivity (ϵ_r):	50.49	52.70	-4.19	5
		Conductivity (σ):	1.97	1.95	0.82	5
	Body 2480	Relative Permittivity (ϵ_r):	50.38	52.66	-4.33	5
		Conductivity (σ):	2.01	1.99	0.74	5
2018/1/12	Body 2400	Relative Permittivity (ϵ_r):	51.26	52.77	-2.87	5
		Conductivity (σ):	1.95	1.90	2.58	5
	Body 2450	Relative Permittivity (ϵ_r):	51.06	52.70	-3.11	5
		Conductivity (σ):	2.02	1.95	3.33	5
	Body 2480	Relative Permittivity (ϵ_r):	50.94	52.66	-3.27	5
		Conductivity (σ):	2.06	1.99	3.20	5
2018/1/16	Body 5180	Relative Permittivity (ϵ_r):	48.12	49.05	-1.89	10
		Conductivity (σ):	5.27	5.27	-0.06	5
	Body 5250	Relative Permittivity (ϵ_r):	47.80	48.95	-2.35	10
		Conductivity (σ):	5.43	5.35	1.42	5
	Body 5350	Relative Permittivity (ϵ_r):	47.69	48.82	-2.31	10
		Conductivity (σ):	5.56	5.47	1.58	5
2018/1/17	Body 5400	Relative Permittivity (ϵ_r):	47.75	48.75	-2.05	10
		Conductivity (σ):	5.74	5.53	3.84	5
	Body 5600	Relative Permittivity (ϵ_r):	47.45	48.48	-2.12	10
		Conductivity (σ):	5.85	5.76	1.56	5
	Body 5750	Relative Permittivity (ϵ_r):	47.21	48.27	-2.21	10
		Conductivity (σ):	6.17	5.94	3.93	5
2018/1/18	Body 5745	Relative Permittivity (ϵ_r):	46.20	48.28	-4.31	10
		Conductivity (σ):	6.09	5.93	2.65	5
	Body 5750	Relative Permittivity (ϵ_r):	46.25	48.27	-4.19	10
		Conductivity (σ):	6.10	5.94	2.75	5
	Body 5825	Relative Permittivity (ϵ_r):	46.05	48.20	-4.46	10
		Conductivity (σ):	6.10	6.00	1.58	5
2018/1/18	Body 2400	Relative Permittivity (ϵ_r):	50.67	52.77	-3.98	5
		Conductivity (σ):	1.81	1.90	-4.58	5
	Body 2450	Relative Permittivity (ϵ_r):	50.46	52.70	-4.25	5
		Conductivity (σ):	1.88	1.95	-3.49	5
	Body 2480	Relative Permittivity (ϵ_r):	50.35	52.66	-4.39	5
		Conductivity (σ):	1.92	1.99	-3.62	5

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11 System Performance 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 remeasured 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 ± 0.5 cm for SAR measurements.
- 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 1GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 12 mm (1GHz to 3GHz) and15 mm (below 1GHz) 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 2 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 1.4 mm
- The dipole input power (forward power) was 100 mW(For 5GHz band) or 250 mW(For 2.4GHz band).
- The results are normalized to 1 W input power.

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Reference Target SAR Values

The target(reference) SAR values can be obtained from the calibration certificate of system validation dipoles(Section 15). The target SAR values are SAR measured value in the calibration certificate scaled to 1W.

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (mW/g)		
				1g/10g	Head	Body
D2450V2	713	09/13/2016	2450	1g	53.6	52.0
				10g	24.9	24.4
D5GHV2	1092	10/16/2017	5250	1g	80.0	77.1
				10g	23.0	21.6
			5600	1g	82.5	80.0
				10g	23.6	22.6
			5750	1g	78.2	77.8
				10g	22.3	21.7

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.

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %
	Type	Serial #			Zoom Scan	Normalize to 1 W		
1/11/2018	D2450V2 2.45GHz	713	Body	1g	12.40	49.6	52.0	-4.62
				10g	5.76	23.0	24.4	-5.73
1/12/2018	D2450V2 2.45GHz	713	Body	1g	12.50	50.0	52.0	-3.85
				10g	5.79	23.2	24.4	-5.24
1/16/2018	D5GHzV2 5.25 GHz	1092	Body	1g	7.17	71.7	77.1	-7.00
				10g	2.01	20.1	21.6	-6.94
1/17/2018	D5GHzV2 5.6 GHz	1092	Body	1g	7.70	77.0	80.0	-3.75
				10g	2.13	21.3	22.6	-5.75
1/18/2018	D5GHzV2 5.75 GHz	1092	Body	1g	7.31	73.1	77.8	-6.04
				10g	2.08	20.8	21.7	-4.15
1/18/2018	D2450V2 2.45GHz	713	Body	1g	12.50	50.0	52.0	-3.85
				10g	5.95	23.8	24.4	-2.62

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12 RF Exposure Conditions (Test Configurations)

Refer to Section 17 “Antenna Dimensions and Separation Distances” for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

12.1 Standalone SAR Test Exclusion Considerations

Standalone SAR test exclusion was based upon the following criteria:

1. According to KDB 447498D01 § 4.1 f) if the antenna is at close proximity to user then the outer surface of the DUT should be treated as the radiating surface. The test separation distance is then determined by the smallest distance between the outer surface of the device and the user. For the purposes of this report close proximity has been defined as closer than 50 mm. For antennas <50 mm from the Rear or edge the separation distance used for the SAR exclusion calculations is 5 mm.
2. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.
3. If the antenna to DUT adjacent Rear or edge separation distance is >50mm, the actual antenna to user separation distance is used to determine SAR exclusion and estimated SAR value.
4. Output power is the maximum rated power (including tune-up or manufacturing tolerances) and includes source-based averaging.

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12.2 SAR exclusion calculations for WLAN SISO (1 Tx) and Bluetooth for antenna <50mm from the user

SAR exclusion calculations for antenna <50mm from the user

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Edge1	Edge2	Edge3	Edge4	Bottom	Front	Edge1	Edge2	Edge3	Edge4	Bottom	Front
Main	WLAN	2472	15.00	32	123	162	3	17	12		> 50 mm	> 50 mm	10.1 -MEASURE-	10.1 -MEASURE-	10.1 -MEASURE-	
Main	WLAN	5240	13.50	22	123	162	3	17	12		> 50 mm	> 50 mm	10.1 -MEASURE-	10.1 -MEASURE-	10.1 -MEASURE-	
Main	WLAN	5320	13.50	22	123	162	3	17	12		> 50 mm	> 50 mm	10.1 -MEASURE-	10.1 -MEASURE-	10.1 -MEASURE-	
Main	WLAN	5720	13.50	22	123	162	3	17	12		> 50 mm	> 50 mm	10.5 -MEASURE-	10.5 -MEASURE-	10.5 -MEASURE-	
Main	WLAN	5825	13.50	22	123	162	3	17	12		> 50 mm	> 50 mm	10.6 -MEASURE-	10.6 -MEASURE-	10.6 -MEASURE-	

SAR exclusion calculations for antenna <50mm from the user

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Edge1	Edge2	Edge3	Edge4	Bottom	Front	Edge1	Edge2	Edge3	Edge4	Bottom	Front
Aux	WLAN	2472	15.00	32	4	162	122	18	11		10.1 -MEASURE-	> 50 mm	> 50 mm	10.1 -MEASURE-	10.1 -MEASURE-	
Aux	WLAN	5240	13.50	22	4	162	122	18	11		10.1 -MEASURE-	> 50 mm	> 50 mm	10.1 -MEASURE-	10.1 -MEASURE-	
Aux	WLAN	5320	13.50	22	4	162	122	18	11		10.1 -MEASURE-	> 50 mm	> 50 mm	10.1 -MEASURE-	10.1 -MEASURE-	
Aux	WLAN	5720	13.50	22	4	162	122	18	11		10.5 -MEASURE-	> 50 mm	> 50 mm	10.5 -MEASURE-	10.5 -MEASURE-	
Aux	WLAN	5825	13.50	22	4	162	122	18	11		10.6 -MEASURE-	> 50 mm	> 50 mm	10.6 -MEASURE-	10.6 -MEASURE-	
Aux	BT	2480	10.50	11	4	162	122	18	11		3.5 -MEASURE-	> 50 mm	> 50 mm	3.5 -MEASURE-	3.5 -MEASURE-	

Note(s):

1. According to KDB 447498D01, if the calculated threshold value is >3 then SAR testing is required.
2. SAR exclusion was not assessed for 2 Tx (MIMO) as the higher 1 Tx (SISO) SAR values were used for simultaneous transmission analysis.
3. The separation distances from antennas to the Bottom or the edge were input. For antennas <50 mm from the Bottom or edges the separation distance used for the SAR exclusion calculations is 5 mm.

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12.3 SAR exclusion calculations for WLAN SISO (1 Tx) and Bluetooth for antenna >50mm from the user

SAR exclusion calculations for antenna >50mm from the user

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Edge1	Edge2	Edge3	Edge4	Bottom	Front	Edge1	Edge2	Edge3	Edge4	Bottom	Front
Main	WLAN	2472	15.00	32	123	162	3	17	12		821.4 mW -EXEMPT-	1217.4 mW -EXEMPT-	< 50 mm	< 50 mm	< 50 mm	
Main	WLAN	5240	13.50	22	123	162	3	17	12		791.5 mW -EXEMPT-	1187.5 mW -EXEMPT-	< 50 mm	< 50 mm	< 50 mm	
Main	WLAN	5320	13.50	22	123	162	3	17	12		791 mW -EXEMPT-	1187 mW -EXEMPT-	< 50 mm	< 50 mm	< 50 mm	
Main	WLAN	5720	13.50	22	123	162	3	17	12		788.7 mW -EXEMPT-	1184.7 mW -EXEMPT-	< 50 mm	< 50 mm	< 50 mm	
Main	WLAN	5825	13.50	22	123	162	3	17	12		788.2 mW -EXEMPT-	1184.2 mW -EXEMPT-	< 50 mm	< 50 mm	< 50 mm	

SAR exclusion calculations for antenna >50mm from the user

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Edge1	Edge2	Edge3	Edge4	Bottom	Front	Edge1	Edge2	Edge3	Edge4	Bottom	Front
Aux	WLAN	2472	15.00	32	4	162	122	18	11		< 50 mm	1214.4 mW -EXEMPT-	813.4 mW -EXEMPT-	< 50 mm	< 50 mm	
Aux	WLAN	5240	13.50	22	4	162	122	18	11		< 50 mm	1184.5 mW -EXEMPT-	783.5 mW -EXEMPT-	< 50 mm	< 50 mm	
Aux	WLAN	5320	13.50	22	4	162	122	18	11		< 50 mm	1184 mW -EXEMPT-	783 mW -EXEMPT-	< 50 mm	< 50 mm	
Aux	WLAN	5720	13.50	22	4	162	122	18	11		< 50 mm	1181.7 mW -EXEMPT-	780.7 mW -EXEMPT-	< 50 mm	< 50 mm	
Aux	WLAN	5825	13.50	22	4	162	122	18	11		< 50 mm	1181.2 mW -EXEMPT-	780.2 mW -EXEMPT-	< 50 mm	< 50 mm	
Aux	BT	2480	10.50	11	4	162	122	18	11		< 50 mm	1214.3 mW -EXEMPT-	813.3 mW -EXEMPT-	< 50 mm	< 50 mm	

Note(s):

1. According to KDB 447498D01, if the calculated Power threshold is less than the output power then SAR testing is required.
2. SAR exclusion was not assessed for 2 Tx (MIMO) as the higher 1 Tx (SISO) SAR values were used for simultaneous transmission analysis.
3. The separation distances from antennas to the Bottom or the edge were input. For antennas <50 mm from the Bottom or edges the separation distance used for the SAR exclusion calculations is 5 mm.

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13 Measured and Reported (Scaled) SAR Results

SAR WLAN Test Reduction criteria (WLAN) 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*.

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

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13.1 WLAN 2.4 GHz Band

Main Antenna

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Edge1	802.11b	0	1	2412	15.00	14.98				
			6	2437	15.00	14.99	0.000	0.000		
			11	2462	15.00	14.94				
			12	2467	15.00	14.87				
			13	2472	7.50	7.21				
Edge2 45deg	802.11b	0	1	2412	15.00	14.98				
			6	2437	15.00	14.99	0.000	0.000		
			11	2462	15.00	14.94				
			12	2467	15.00	14.87				
			13	2472	7.50	7.21				
Edge2	802.11b	0	1	2412	15.00	14.98				
			6	2437	15.00	14.99	0.033	0.033		
			11	2462	15.00	14.94				
			12	2467	15.00	14.87				
			13	2472	7.50	7.21				
Edge3	802.11b	0	1	2412	15.00	14.98	1.320	1.326	1	
			6	2437	15.00	14.99	1.140	1.143		
			11	2462	15.00	14.94	1.190	1.207		
			12	2467	15.00	14.87	1.140	1.175		
			13	2472	7.50	7.21				
Edge3	802.11n40	0	3	2422	15.00	14.81	1.010	1.055		
			6	2437	15.00	14.50				
			9	2452	15.00	14.58	1.040	1.146		
			10	2457	11.50	11.17				
			11	2462	-3.50	-3.76				
Edge4	802.11b	0	1	2412	15.00	14.98				
			6	2437	15.00	14.99	0.135	0.135		
			11	2462	15.00	14.94				
			12	2467	15.00	14.87				
			13	2472	7.50	7.21				
Bottom	802.11b	0	1	2412	15.00	14.98				
			6	2437	15.00	14.99	0.335	0.336		
			11	2462	15.00	14.94				
			12	2467	15.00	14.87				
			13	2472	7.50	7.21				

Subsequent test configuration was not 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	Edge3	1.326	1.326	< 1.2	**Yes**

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Auxiliary Antenna

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Edge1	802.11b	0	1	2412	15.00	14.90	1.030	1.054		
			6	2437	15.00	14.91	1.050	1.072	2	
			11	2462	15.00	14.72				
			12	2467	15.00	14.68				
			13	2472	7.50	7.46				
Edge2 45deg	802.11b	0	1	2412	15.00	14.90				
			6	2437	15.00	14.91	0.035	0.036		
			11	2462	15.00	14.72				
			12	2467	15.00	14.68				
			13	2472	7.50	7.46				
Edge2	802.11b	0	1	2412	15.00	14.90				
			6	2437	15.00	14.91	0.025	0.026		
			11	2462	15.00	14.72				
			12	2467	15.00	14.68				
			13	2472	7.50	7.46				
Edge3	802.11b	0	1	2412	15.00	14.90				
			6	2437	15.00	14.91	0.000	0.000		
			11	2462	15.00	14.72				
			12	2467	15.00	14.68				
			13	2472	7.50	7.46				
Edge4	802.11b	0	1	2412	15.00	14.90				
			6	2437	15.00	14.91	0.124	0.127		
			11	2462	15.00	14.72				
			12	2467	15.00	14.68				
			13	2472	7.50	7.46				
Bottom	802.11b	0	1	2412	15.00	14.90				
			6	2437	15.00	14.91	0.162	0.165		
			11	2462	15.00	14.72				
			12	2467	15.00	14.68				
			13	2472	7.50	7.46				

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	Edge1	1.072	1.072	< 1.2	**No**

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13.2 WLAN 5.2/5.3 GHz Band

Main Antenna

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Edge 1	802.11n40	0	54	5270	13.50	13.45				
			62	5310	13.50	13.47	0.000	0.000		
Edge 2 45deg	802.11n40	0	54	5270	13.50	13.45				
			62	5310	13.50	13.47	0.000	0.000		
Edge 2	802.11n40	0	54	5270	13.50	13.45				
			62	5310	13.50	13.47	0.011	0.011		
Edge 3	802.11n40	0	54	5270	13.50	13.45				
			62	5310	13.50	13.47	0.392	0.395	3	
Edge 4	802.11n40	0	54	5270	13.50	13.45				
			62	5310	13.50	13.47	0.025	0.025		
Bottom	802.11n40	0	54	5270	13.50	13.45				
			62	5310	13.50	13.47	0.100	0.101		

Auxiliary Antenna

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Edge 1	802.11n40	0	54	5270	13.50	13.37	0.610	0.629		
			62	5310	13.50	13.49	0.839	0.841	4	
Edge 2 45deg	802.11n40	0	54	5270	13.50	13.37				
			62	5310	13.50	13.49	0.033	0.033		
Edge 2	802.11n40	0	54	5270	13.50	13.37				
			62	5310	13.50	13.49	0.025	0.025		
Edge 3	802.11n40	0	54	5270	13.50	13.37				
			62	5310	13.50	13.49	0.000	0.000		
Edge 4	802.11n40	0	54	5270	13.50	13.37				
			62	5310	13.50	13.49	0.062	0.062		
Bottom	802.11n40	0	54	5270	13.50	13.37				
			62	5310	13.50	13.49	0.266	0.267		

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13.3 WLAN 5.5 GHz Band

Main Antenna

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Edge 1	802.11ac80	0	106	5530	12.50	12.31				
			122	5610	13.50	13.33				
			138	5690	13.50	13.49	0.000	0.000		
Edge 2 45deg	802.11ac80	0	106	5530	12.50	12.31				
			122	5610	13.50	13.33				
			138	5690	13.50	13.49	0.000	0.000		
Edge 2	802.11ac80	0	106	5530	12.50	12.31				
			122	5610	13.50	13.33				
			138	5690	13.50	13.49	0.023	0.023		
Edge 3	802.11ac80	0	106	5530	12.50	12.31				
			122	5610	13.50	13.33				
			138	5690	13.50	13.49	0.573	0.574	5	
Edge 4	802.11ac80	0	106	5530	12.50	12.31				
			122	5610	13.50	13.33				
			138	5690	13.50	13.49	0.029	0.029		
Bottom	802.11ac80	0	106	5530	12.50	12.31				
			122	5610	13.50	13.33				
			138	5690	13.50	13.49	0.232	0.233		

Auxiliary Antenna

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Edge 1	802.11ac80	0	106	5530	12.50	12.45				
			122	5610	13.50	13.39				
			138	5690	13.50	13.48	0.400	0.402	6	
Edge 2 45deg	802.11ac80	0	106	5530	12.50	12.45				
			122	5610	13.50	13.39				
			138	5690	13.50	13.48	0.000	0.000		
Edge 2	802.11ac80	0	106	5530	12.50	12.45				
			122	5610	13.50	13.39				
			138	5690	13.50	13.48	0.003	0.003		1
Edge 3	802.11ac80	0	106	5530	12.50	12.45				
			122	5610	13.50	13.39				
			138	5690	13.50	13.48	0.000	0.000		
Edge 4	802.11ac80	0	106	5530	12.50	12.45				
			122	5610	13.50	13.39				
			138	5690	13.50	13.48	0.000	0.000		
Bottom	802.11ac80	0	106	5530	12.50	12.45				
			122	5610	13.50	13.39				
			138	5690	13.50	13.48	0.032	0.032		

Note1: measured SAR value is below 0.003W/kg so this SAR value is roundup to 0.003 W/kg.

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13.4 WLAN 5.8 GHz Band

Main Antenna

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Edge 1	802.11ac80	0	155	5775	13.50	13.43	0.000	0.000		
Edge 2 45deg	802.11ac80	0	155	5775	13.50	13.43	0.000	0.000		
Edge 2	802.11ac80	0	155	5775	13.50	13.43	0.016	0.016		
Edge 3	802.11ac80	0	155	5775	13.50	13.43	0.515	0.523	7	
Edge 4	802.11ac80	0	155	5775	13.50	13.43	0.022	0.022		
Bottom	802.11ac80	0	155	5775	13.50	13.43	0.235	0.239		

Auxiliary Antenna

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Edge 1	802.11ac80	0	155	5775	13.50	13.45	0.339	0.343	8	
Edge 2 45deg	802.11ac80	0	155	5775	13.50	13.45	0.001	0.001		1
Edge 2	802.11ac80	0	155	5775	13.50	13.45	0.000	0.000		
Edge 3	802.11ac80	0	155	5775	13.50	13.45	0.000	0.000		
Edge 4	802.11ac80	0	155	5775	13.50	13.45	0.000	0.000		
Bottom	802.11ac80	0	155	5775	13.50	13.45	0.026	0.026		

Note1: measured SAR value is below 0.001W/kg so this SAR value is roundup to 0.001 W/kg.

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13.5 Bluetooth

Auxiliary Antenna

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.	Note
					Tune-up limit	Meas.	Meas.	Scaled		
Edge1	DH5	0	0	2402	10.50	8.68				
			39	2441	10.50	10.46	0.330	0.333	9	
			78	2480	10.50	9.73				
Edge2 45deg	DH5	0	0	2402	10.50	8.68				
			39	2441	10.50	10.46	0.000	0.000		
			78	2480	10.50	9.73				
Edge2	DH5	0	0	2402	10.50	8.68				
			39	2441	10.50	10.46	0.008	0.008		1
			78	2480	10.50	9.73				
Edge3	DH5	0	0	2402	10.50	8.68				
			39	2441	10.50	10.46	0.000	0.000		
			78	2480	10.50	9.73				
Edge4	DH5	0	0	2402	10.50	8.68				
			39	2441	10.50	10.46	0.047	0.047		
			78	2480	10.50	9.73				
Bottom	DH5	0	0	2402	10.50	8.68				
			39	2441	10.50	10.46	0.102	0.103		
			78	2480	10.50	9.73				

Note: 1

Measured SAR value is below 0.008W/kg so this SAR value is roundup to 0.008w/kg.

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13.6 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	Main	Body	Edge 3	802.11b	0	2412	14.98	1.326
WLAN 5.2/5.3 GHz	Aux	Body	Edge 1	802.11n40	0	5310	13.49	0.841
WLAN 5.5 GHz	Main	Body	Edge 3	802.11ac80	0	5690	13.49	0.574
WLAN 5.8 GHz	Main	Body	Edge 3	802.11ac80	0	5775	13.43	0.523
Bluetooth	Aux	Body	Edge 1	DH5	0	2441	10.41	0.333

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

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13.7 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 when the original highest measured SAR is < 0.80 W/kg

Wireless Technologies	Test Configuration			Mode	Dist. (mm)	Freq. (MHz)	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio	Plot No.
	Transmit Antenna	Exposure	Position				Original	Repeated		
WLAN 2.4 GHz	Main	Body	Edge 3	802.11b	0	2412	1.320	1.320	1.000	1
WLAN 5.2/5.3 GHz	Aux	Body	Edge 1	802.11n40	0	5310	0.839	0.827	1.015	2
WLAN 5.5 GHz	Main	Body	Edge 3	802.11ac80	0	5690	0.573	N/A	N/A	-
WLAN 5.8 GHz	Main	Body	Edge 3	802.11ac80	0	5775	0.515	N/A	N/A	-
Bluetooth	Aux	Body	Edge 1	DH5	0	2441	0.330	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 not > 1.20.

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14 Simultaneous Transmission SAR Analysis

1. Bluetooth and WLAN Aux cannot simultaneously transmit.

Test Position	WLAN 2.4 GHz Main	WLAN 2.4 GHz Aux	Bluetooth	∑ 1-g SAR (mW/g)
Edge1	0.000		0.333	0.333
	0.000	1.072		1.072
Edge2 45deg	0.000		0.000	0.000
	0.000	0.036		0.036
Edge2	0.033		0.008	0.041
	0.033	0.026		0.059
Edge3	1.326		0.000	1.326
	1.326	0.000		1.326
Edge4	0.135		0.047	0.182
	0.135	0.127		0.262
Bottom	0.336		0.103	0.439
	0.336	0.165		0.501

Test Position	WLAN 5.3 GHz Main	WLAN 5.3 GHz Aux	Bluetooth	∑ 1-g SAR (mW/g)
Edge1	0.000		0.333	0.333
	0.000	0.841		0.841
Edge2 45deg	0.000		0.000	0.000
	0.000	0.033		0.033
Edge2	0.011		0.008	0.019
	0.011	0.025		0.036
Edge3	0.395		0.000	0.395
	0.395	0.000		0.395
Edge4	0.025		0.047	0.072
	0.025	0.062		0.087
Bottom	0.101		0.103	0.204
	0.101	0.267		0.368

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Test Position	WLAN 5.5 GHz Main	WLAN 5.5 GHz Aux	Bluetooth	∑ 1-g SAR (mW/g)
Edge1	0.000		0.333	0.333
	0.000	0.402		0.402
Edge2 45deg	0.000		0.000	0.000
	0.000	0.000		0.000
Edge2	0.023		0.008	0.031
	0.023	0.003		0.026
Edge3	0.574		0.000	0.574
	0.574	0.000		0.574
Edge4	0.029		0.047	0.076
	0.029	0.000		0.029
Bottom	0.233		0.103	0.336
	0.233	0.032		0.265

Test Position	WLAN 5.8 GHz Main	WLAN 5.8 GHz Aux	Bluetooth	∑ 1-g SAR (mW/g)
Edge1	0.000		0.333	0.333
	0.000	0.343		0.343
Edge2 45deg	0.000		0.000	0.000
	0.000	0.001		0.001
Edge2	0.016		0.008	0.024
	0.016	0.000		0.016
Edge3	0.523		0.000	0.523
	0.523	0.000		0.523
Edge4	0.022		0.047	0.069
	0.022	0.000		0.022
Bottom	0.239		0.103	0.342
	0.239	0.026		0.265

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15 Appendixes

Refer to separated files for the following appendixes.

15.1 System Performance Check Plots

15.2 SAR Test Plots

15.3 SAR Test Plots for Repeat Measurement

15.4 Calibration Certificate for E-Field Probe EX3DV4 - SN 3922

15.5 Calibration Certificate for D2450V2 - SN 713

15.6 Calibration Certificate for D5GHzV2 - SN 1092

15.7 SAR Tissue Ingredients

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