

SAR EVALUATION REPORT

FCC 47 CFR § 2.1093
IEEE Std 1528-2013

For
Daylight

FCC ID: 2BFTUDC1
Model Name: DC1

Report Number: 4791251583-US-S0-V0
Issue Date: 2024/7/4

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REVISION HISTORY

Rev.	Date	Revisions	Revised By
V0	2024/7/4	Initial Issue	Sally Lu

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1. Attestation of Test Results

Applicant Name	Daylight Computer Co.		
FCC ID	2BFTUDC1		
Model Name	DC1		
Exposure Category	General Population/Uncontrolled Exposure		
Applicable Standards	FCC 47 CFR 2.1093 IEEE Std 1528-2013 KDB 865664 D01 KDB 865664 D02 KDB 447498 D04 KDB 248227 D01 KDB 616217 D01		
Exposure Category	SAR Limits (W/Kg)		
	Peak spatial-average(1g of tissue)	Extremities (hands, wrists, ankles, etc.) (10g of tissue)	
General population/Uncontrolled exposure	1.6	4	
RF Exposure Conditions	Equipment Class - Highest Reported SAR (W/kg)		
	DTS	NII	DSS
Standalone	1.43	1.377	<0.1
Simultaneous TX	1.43	1.377	1.430
Date Tested	2024/4/23 ~ 2024/4/29		
Test Results	Pass		
Underwriters Laboratories Taiwan Co., Ltd. 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 Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. 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 Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of any government. This report is written to support regulatory compliance of the applicable standards stated above.			
Approved and Authorized By:		Prepared By:	
			
Kent Liu Senior Laboratory Engineer Underwriters Laboratories Taiwan Co., Ltd.		Sally Lu Project Handler Underwriters Laboratories Taiwan Co., Ltd.	

2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE STD 1528-2013, the following FCC Published RF exposure [KDB](#) procedures:

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

3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at

Underwriters Laboratories Taiwan Co., Ltd.,
SAR Room

Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398.

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	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5 \text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx _{Area} , Δy _{Area}	$\leq 2 \text{ GHz: } \leq 15 \text{ mm}$ $2 - 3 \text{ GHz: } \leq 12 \text{ mm}$	$3 - 4 \text{ GHz: } \leq 12 \text{ mm}$ $4 - 6 \text{ GHz: } \leq 10 \text{ mm}$
	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.	

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: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$			≤ 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: $\Delta z_{\text{Zoom}}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{\text{Zoom}}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{\text{Zoom}}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$	
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 <u>reported</u> SAR from the <i>area scan based 1-g SAR estimation</i> 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.

4.3. Test Equipment

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

Dielectric Property Measurements

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Date
Network Analyzer	Anritsu	MS46322B	1740002	2024/1/17
Dielectric Assessment Kit	SPEAG	DAK-3.5	1058	2023/9/19
Humidity/Temp meter	TECPEL	DTM-20	17020736	2023/5/3

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Date
EXG-B RF Vector Signal Generator	Keysight Technologies	N5172B	MY56200320	2023/12/22
Power Meter	Keysight Technologies	N1914A	MY56360007	2023/11/29
Power Sensor	Keysight Technologies	N8481H	MY56350009	2023/11/29
Power Meter	Anritsu	ML2495A	1645002	2023/12/11
Power Sensor	Anritsu	MA2411B	1531202	2023/12/11
Dosimetric E-Field Probe	SPEAG	EX3DV4	3898	2023/6/26
Data Acquisition Electronics	SPEAG	DAE3	360	2023/12/11
System Validation Dipole	SPEAG	D2450V2	988	2023/9/12
System Validation Dipole	SPEAG	D5GHzV2	1244	2023/6/19
Humidity/Temp meter	TECPEL	DTM-20	17020735	2024/4/2

UL Software

Software Version
DASY NEO52 D10.4 S14.6.14
SEMCAD-X-PostPro

5. Measurement Uncertainty

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

Therefore, the measurement uncertainty is not required.

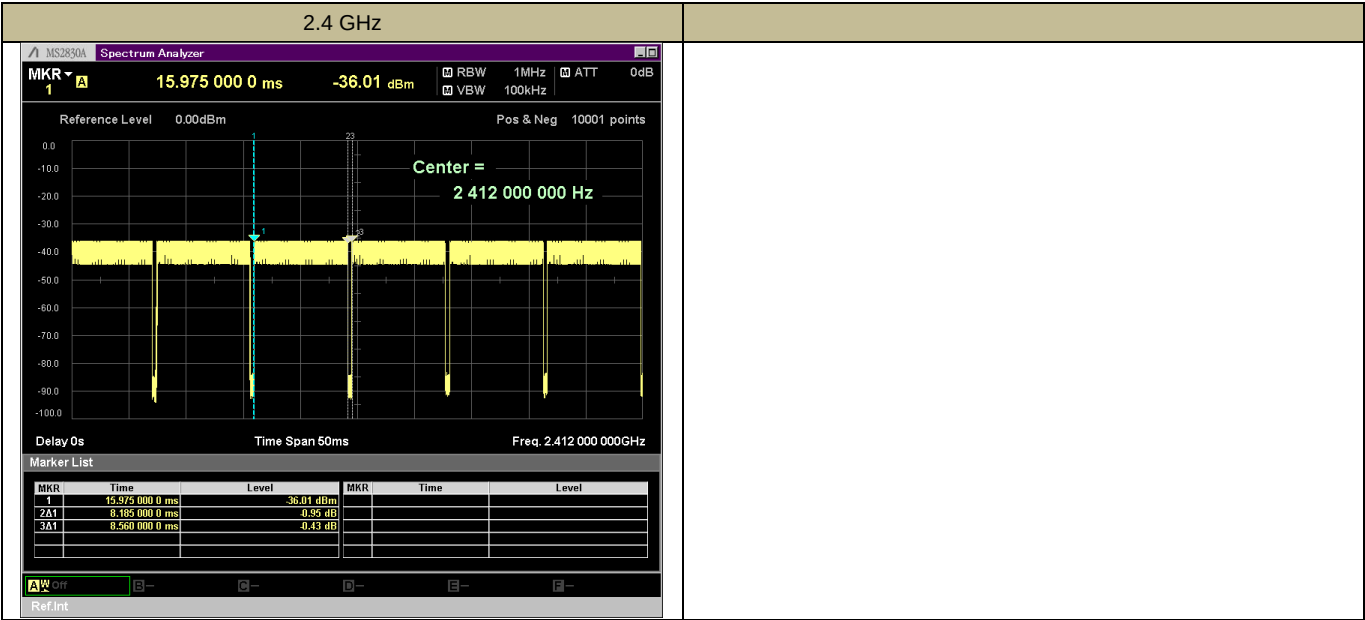
6. Device Under Test (DUT) Information

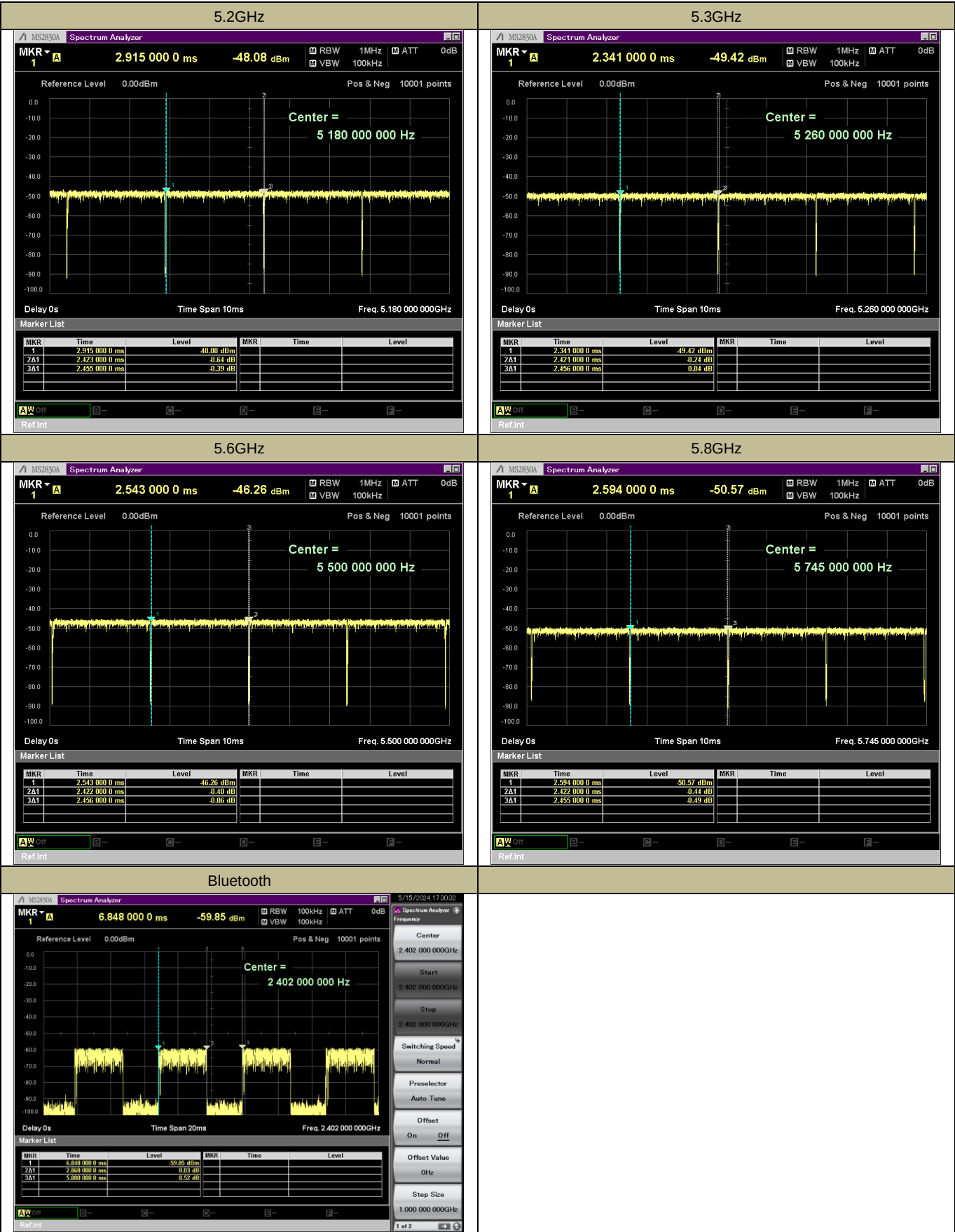
6.1. DUT Description

Product	Daylight
Brand Name	Daylight Computer Co.
Model Name	DC1
Operating Frequency	Wi-Fi 2.4GHz Band: 2412 ~ 2462MHz Wi-Fi 5GHz Band: 5180 ~ 5320MHz, 5500 ~ 5700MHz, 5745 ~ 5825MHz Bluetooth: 2402 ~ 2480MHz
Modulation	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM, 256QAM, 64QAM, 16QAM for OFDMA GFSK, $\pi/4$ -DQPSK, 8DPSK
Sample ID	7068146
Hardware Version	R004
Software Version	1177
Received Date	2024/3/29

6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode	Duty Cycle used for SAR testing
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20) 802.11n (HT40) 802.11ax (HE20) 802.11ax (HE40)	95.62% (802.11b)
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (VHT20) 802.11ac (VHT40) 802.11ac (VHT80) 802.11ac (VHT160) 802.11ax (HE20) 802.11ax (HE40) 802.11ax (HE80) 802.11ax (HE160)	5.2GHz: 98.70% (802.11a) 5.3GHz: 98.57% (802.11a) 5.6GHz: 98.62% (802.11a) 5.8GHz: 98.66% (802.11a)
	Does this device support bands 5.60 ~ 5.65 GHz? ☒ Yes ☐ No		
	Does this device support Band straddle channel? ☒ Yes ☐ No		
	Bluetooth	2.4 GHz	EDR / LE





7. RF Exposure Conditions (Test Configurations)

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

7.1. Standalone SAR Test Exclusion Considerations

Since the *Dedicated Host Approach* is applied, the standalone SAR test exclusion procedure in KDB 447498 § 4.3.1 (RSS-102 Issue 5 § 2.5.1) is applied in conjunction with KDB 616217 § 4.3 to determine the minimum test separation distance:

- When the separation distance from the antenna to an adjacent edge is ≤ 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.
- When the separation distance from the antenna to an adjacent edge is > 5 mm, the actual antenna-to-edge separation distance is applied to determine SAR test exclusion.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)									
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

SAR Test Exclusion Calculations for WLAN

Band	Test Position	Separation distance(mm)	Max. EIRP power(dBm)	Max. EIRP power(mW)	Exemption Limits	Test Require
Wi-Fi 2.4GHz	Back	5.00	15.60	36.3	3.0	Yes
	Edge 1	50.0			3.0	Yes
	Edge 2	158.00			219.0	No
	Edge 3	224.00			219.0	No
	Edge 4	5.00			3.0	Yes
Wi-Fi 5GHz U-NII I	Back	5.00	11.98	15.8	1.0	Yes
	Edge 1	50.0			1.0	Yes
	Edge 2	158.00			169.0	No
	Edge 3	224.00			169.0	No
	Edge 4	5.00			1.0	Yes
Wi-Fi 5GHz U-NII 2A	Back	5.00	11.98	15.8	1.0	Yes
	Edge 1	50.0			1.0	Yes
	Edge 2	158.00			169.0	No
	Edge 3	224.00			169.0	No
	Edge 4	5.00			1.0	Yes
Wi-Fi 5GHz U-NII 2C	Back	5.00	10.98	12.5	1.0	Yes
	Edge 1	50.0			1.0	Yes
	Edge 2	158.00			169.0	No
	Edge 3	224.00			169.0	No
	Edge 4	5.00			1.0	Yes
Wi-Fi 5GHz U-NII 3	Back	5.00	12.98	19.9	1.0	Yes
	Edge 1	50.0			1.0	Yes
	Edge 2	158.00			169.0	No
	Edge 3	224.00			169.0	No
	Edge 4	5.00			1.0	Yes
Bluetooth	Back	5.00	2.60	1.8	3.0	No
	Edge 1	5.00			3.0	No
	Edge 2	5.00			3.0	No
	Edge 3	220.00			219.0	No
	Edge 4	160.00			219.0	No

8. Dielectric Property Measurements & System Check

8.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within $\pm 2^\circ\text{C}$ 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 (ϵ_r) and conductivity (σ) of typical tissue-equivalent media recipes are expected to be within $\pm 5\%$ of the required target values; but for SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEEE Std 1528-2013, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for ϵ_r and σ may be relaxed to $\pm 10\%$. This is limited to frequencies $\leq 3\text{ GHz}$.

Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

Target Frequency (MHz)	Head	
	ϵ_r	σ (S/m)
150	52.3	0.76
300	45.3	0.87
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
915	41.5	0.98
1450	40.5	1.20
1610	40.3	1.29
1800 – 2000	40.0	1.40
2450	39.2	1.80
3000	38.5	2.40
5000	36.2	4.45
5100	36.1	4.55
5200	36.0	4.66
5300	35.9	4.76
5400	35.8	4.86
5500	35.6	4.96
5600	35.5	5.07
5700	35.4	5.17
5800	35.3	5.27

IEEE Std 1528-2013

Refer to Table 3 within the IEEE Std 1528-2013

Dielectric Property Measurements Results:

Date	Tissue Type	Frequency (MHz)	Relative Permittivity (ϵ_r)			Conductivity (σ)		
			Measured	Target	Delta (%)	Measured	Target	Delta (%)
2024/4/27	Head	2412	38.55	39.26	-1.79	1.79	1.76	1.58
		2422	38.47	39.24	-1.96	1.80	1.77	1.61
		2437	38.51	39.22	-1.79	1.82	1.79	1.69
		2450	38.37	39.20	-2.11	1.80	1.80	0.15
		2452	38.41	39.20	-2.00	1.81	1.80	0.65
		2462	38.30	39.18	-2.25	1.82	1.81	0.49
2024/4/29	Head	2402	38.37	39.27	-2.29	1.76	1.76	0.43
		2440	38.41	39.21	-2.06	1.82	1.79	1.49
		2441	38.42	39.21	-2.01	1.80	1.79	0.35
		2450	38.33	39.20	-2.21	1.80	1.80	0.00
		2480	38.20	39.16	-2.45	1.84	1.83	0.54
2024/4/23	Head	5180	36.16	36.02	0.40	4.55	4.64	-1.86
		5190	36.05	36.01	0.10	4.58	4.65	-1.59
		5200	36.03	36.00	0.08	4.60	4.66	-1.28
		5210	36.06	35.99	0.21	4.61	4.67	-1.36
		5220	36.08	35.98	0.27	4.61	4.68	-1.57
		5230	36.02	35.97	0.15	4.62	4.69	-1.54
		5240	36.04	35.96	0.22	4.63	4.70	-1.57
		5250	35.97	35.95	0.07	4.62	4.71	-1.87
		5260	35.95	35.94	0.02	4.63	4.72	-1.90
		5270	36.00	35.93	0.19	4.66	4.73	-1.46
		5280	35.89	35.92	-0.09	4.67	4.74	-1.57
		5290	35.87	35.91	-0.12	4.69	4.75	-1.29
		5300	35.94	35.90	0.11	4.70	4.76	-1.24
		5310	35.84	35.89	-0.13	4.70	4.77	-1.39
		5320	35.84	35.88	-0.12	4.69	4.78	-1.86

Date	Tissue Type	Frequency (MHz)	Relative Permittivity (ϵ_r)			Conductivity (σ)		
			Measured	Target	Delta (%)	Measured	Target	Delta (%)
2024/4/24	Head	5500	35.51	35.65	-0.38	4.90	4.97	-1.35
		5510	35.51	35.63	-0.33	4.90	4.98	-1.58
		5530	35.42	35.60	-0.50	4.93	5.00	-1.29
		5550	35.33	35.57	-0.66	4.94	5.02	-1.64
		5580	35.37	35.52	-0.44	4.98	5.05	-1.45
		5600	35.29	35.50	-0.60	4.99	5.07	-1.53
		5610	35.35	35.49	-0.41	5.01	5.08	-1.36
		5620	35.26	35.48	-0.62	5.00	5.09	-1.81
		5630	35.28	35.47	-0.52	5.00	5.10	-1.89
		5660	35.17	35.44	-0.76	5.07	5.13	-1.15
		5670	35.28	35.43	-0.41	5.05	5.14	-1.83
		5690	35.25	35.41	-0.46	5.07	5.16	-1.71
		5700	35.20	35.40	-0.57	5.09	5.17	-1.49
		5710	35.24	35.39	-0.43	5.07	5.18	-2.15
		5720	35.23	35.38	-0.43	5.10	5.19	-1.78
2024/4/23	Head	5745	35.18	35.36	-0.51	5.14	5.21	-1.47
		5750	35.18	35.35	-0.47	5.15	5.22	-1.40
		5755	35.09	35.35	-0.71	5.16	5.22	-1.28
		5775	35.06	35.33	-0.76	5.18	5.24	-1.14
		5785	35.14	35.32	-0.48	5.19	5.25	-1.31
		5795	35.09	35.31	-0.61	5.21	5.26	-1.03
		5800	35.11	35.30	-0.54	5.20	5.27	-1.42
		5825	35.03	35.28	-0.71	5.23	5.30	-1.31

8.2. System Check

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

System 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	Tissue Type	Dipole S/N	Input Power (mW)	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Delta 1g ± 10 (%)	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Delta 10g ± 10 (%)	Plot No.
2024/4/27	Head	D2450V2-988	250	12.2	51.90	48.8	-5.97	5.55	24.60	22.2	-9.76	1
2024/4/29	Head	D2450V2-988	250	12.90	51.90	51.6	-0.58	5.90	24.60	23.6	-4.07	2
2024/4/23	Head	D5GHzV2-1244-5250	100	7.85	79.70	78.5	-1.51	2.19	22.80	21.9	-3.95	3
2024/4/24	Head	D5GHzV2-1244-5600	100	8.57	81.80	85.7	4.77	2.23	23.30	22.3	-4.29	4
2024/4/23	Head	D5GHzV2-1244-5750	100	8.24	79.30	82.4	3.91	2.26	22.50	22.6	0.44	5

9. Conducted Output Power Measurements

9.1. Wi-Fi 2.4GHz (DTS Band)

Measured Results

Band	Mode	Data Rate	Ch #	Freq. (MHz)	Meas. Avg Pwr (dBm)	Tune-up Limit (dBm)
2.4GHz (DTS)	802.11b	1 Mbps	1	2412	11.88	12
			6	2437	11.70	12
			11	2462	11.60	12
	802.11g	6 Mbps	1	2412	10.34	11
			6	2437	10.41	11
			11	2462	10.35	11
	802.11n (HT20)	MCS0	1	2412	10.21	11
			6	2437	10.19	11
			11	2462	10.19	11
	802.11n (HT40)	MCS0	3	2422	10.06	11
			6	2437	10.01	11
			9	2452	10.00	11
	802.11ax (HE20)	MCS0	1	2412	10.49	11
			6	2437	10.88	11
			11	2462	10.31	11
	802.11ax (HE40)	MCS0	3	2422	9.81	10
			6	2437	9.83	10
			9	2452	9.79	10

Note(s):

- SAR is not required for 802.11g/n modes when the adjusted SAR for 802.11b is < 1.2 W/kg.
- For "Not required", SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.
- Additionally, SAR is not required for Channels 12 and 13 because the tune-up limit and the measured output power for these two channels are no greater than those for the default test channels. Refer to §6.3.

9.2. Wi-Fi 5GHz (U-NII Bands)

Measured Results

Band	Mode	Data Rate	Ch #	Freq. (MHz)	Meas. Avg Pwr (dBm)	Tune-up Limit (dBm)
5.2GHz (U-NII 1)	802.11a	6 Mbps	36	5180	9.56	10.0
			40	5200	9.72	10.0
			44	5220	9.36	10.0
			48	5240	9.57	10.0
	802.11n (HT20)	MCS0	36	5180	8.73	9.0
			40	5200	8.92	9.0
			44	5220	8.46	9.0
			48	5240	8.58	9.0
	802.11n (HT40)	MCS0	38	5190	8.26	9.0
			46	5230	8.76	9.0
	802.11ac (VHT20)	MCS0	36	5180	8.81	9.0
			40	5200	9.00	9.0
			44	5220	8.51	9.0
			48	5240	8.63	9.0
	802.11ac (VHT40)	MCS0	38	5190	8.31	9.0
			46	5230	7.77	9.0
	802.11ac (VHT80)	MCS0	42	5210	8.93	9.0
	802.11ac (VHT160)	MCS0	50	5250	6.62	7.0
	802.11ax (HE20)	MCS0	36	5180	8.90	9.0
			40	5200	8.00	9.0
			44	5220	8.37	9.0
			48	5240	8.56	9.0
	802.11ax (HE40)	MCS0	38	5190	8.73	9.0
			46	5230	7.64	9.0
	802.11ax (HE80)	MCS0	42	5210	8.25	9.0
	802.11ax (HE160)	MCS0	50	5250	8.85	9.0

Band	Mode	Data Rate	Ch #	Freq. (MHz)	Meas. Avg Pwr (dBm)	Tune-up Limit (dBm)
5.3GHz (U-NII 2A)	802.11a	6 Mbps	52	5260	9.67	10.0
			56	5280	9.89	10.0
			60	5300	9.61	10.0
			64	5320	9.74	10.0
	802.11n (HT20)	MCS0	52	5260	8.72	9.0
			56	5280	8.77	9.0
			60	5300	8.51	9.0
			64	5320	8.66	9.0
	802.11n (HT40)	MCS0	54	5270	8.97	9.0
			62	5310	8.95	9.0
	802.11ac (VHT20)	MCS0	52	5260	8.71	9.0
			56	5280	8.81	9.0
			60	5300	8.60	9.0
			64	5320	8.58	9.0
	802.11ac (VHT40)	MCS0	54	5270	7.93	9.0
			62	5310	7.95	9.0
	802.11ac (VHT80)	MCS0	58	5290	8.39	9.0
	802.11ax (HE20)	MCS0	52	5260	8.62	9.0
			56	5280	8.75	9.0
			60	5300	8.67	9.0
			64	5320	8.75	9.0
	802.11ax (HE40)	MCS0	54	5270	8.91	9.0
			62	5310	8.95	9.0
	802.11ax (HE80)	MCS0	58	5290	8.75	9.0

Band	Mode	Data Rate	Ch #	Freq. (MHz)	Meas. Avg Pwr (dBm)	Tune-up Limit (dBm)
5.5GHz (U-NII 2C)	802.11a	6 Mbps	100	5500	8.93	9.0
			116	5580	8.75	9.0
			124	5620	8.82	9.0
			132	5660	8.57	9.0
			140	5700	8.43	9.0
			144	5720	8.95	9.0
	802.11n (HT20)	MCS0	100	5500	7.90	8.0
			116	5580	7.76	8.0
			124	5620	7.96	8.0
			132	5660	7.64	8.0
			140	5700	7.63	8.0
			144	5720	7.98	8.0
	802.11n (HT40)	MCS0	102	5510	7.33	8.0
			110	5550	7.58	8.0
			126	5630	7.21	8.0
			134	5670	7.83	8.0
			142	5710	7.05	8.0
	802.11ac (VHT20)	MCS0	100	5500	7.92	8.0
			116	5580	7.83	8.0
			124	5620	7.96	8.0
			132	5660	7.66	8.0
			140	5700	7.55	8.0
			144	5720	7.98	8.0
	802.11ac (VHT40)	MCS0	102	5510	7.33	8.0
			110	5550	7.61	8.0
			126	5630	7.27	8.0
			134	5670	7.85	8.0
	802.11ac (VHT80)	MCS0	106	5530	7.95	8.0
			122	5610	7.74	8.0
			138	5690	7.67	8.0
	802.11ac (VHT160)	MCS0	114	5570	5.85	6.0
	802.11ax (HE20)	MCS0	100	5500	7.02	8.0
			116	5580	7.67	8.0
			124	5620	7.91	8.0
			132	5660	7.60	8.0
			140	5700	7.73	8.0
			144	5720	7.91	8.0
	802.11ax (HE40)	MCS0	102	5510	7.78	8.0
			110	5550	8.00	8.0
			126	5630	7.70	8.0
			134	5670	7.28	8.0
			142	5710	7.55	8.0
	802.11ax (HE80)	MCS0	106	5530	7.32	8.0
			122	5610	7.02	8.0
			138	5690	7.94	8.0
	802.11ax (HE160)	MCS0	114	5570	7.27	8.0

Band	Mode	Data Rate	Ch #	Freq. (MHz)	Meas. Avg Pwr (dBm)	Tune-up Limit (dBm)
5.8GHz (U-NII 3)	802.11a	6 Mbps	149	5745	10.15	11.0
			157	5785	10.66	11.0
			165	5825	10.59	11.0
	802.11n (HT20)	MCS0	149	5745	9.91	10.0
			157	5785	9.29	10.0
			165	5825	9.68	10.0
	802.11n (HT40)	MCS0	151	5755	9.30	10.0
			159	5795	9.58	10.0
	802.11ac (VHT20)	MCS0	149	5745	9.02	10.0
			157	5785	9.33	10.0
			165	5825	9.63	10.0
	802.11ac (VHT40)	MCS0	151	5755	9.31	10.0
			159	5795	9.59	10.0
	802.11ac (VHT80)	MCS0	155	5775	9.12	10.0
	802.11ax (HE20)	MCS0	149	5745	7.98	9.0
			157	5785	8.17	9.0
			165	5825	8.72	9.0
	802.11ax (HE40)	MCS0	151	5755	9.78	10.0
			159	5795	8.44	10.0
	802.11ax (HE80)	MCS0	155	5775	9.33	10.0

Note(s):

- For “Not required”, SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.
- When the 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 in the lower order/sequence 802.11 mode (i.e. a, g, n then ac) is selected.
- When the specified maximum output power is the same for both UNII band I and UNII band 2A, begin SAR measurement in UNII band 2A; and if the highest reported SAR for UNII band 2A is
 - ≤ 1.2 W/kg, SAR is not required for UNII band I
 - > 1.2 W/kg, both bands should be tested independently for SAR.

9.3. Bluetooth

Average Power Measured Results

Band	Mode	Data Rate	Ch #	Freq. (MHz)	Meas. Avg Pwr (dBm)	Tune-up Limit (dBm)
Bluetooth	BR	1 Mbps	0	2402	-1.57	-1.0
			39	2441	-1.76	-1.0
			78	2480	-1.82	-1.0
	EDR	2 Mbps	0	2402	-4.09	-4.0
			39	2441	-4.14	-4.0
			78	2480	-4.25	-4.0
	EDR	3 Mbps	0	2402	-4.11	-4.0
			39	2441	-4.17	-4.0
			78	2480	-4.26	-4.0
	BLE	1 Mbps	0	2402	-2.14	-2.0
			19	2440	-2.07	-2.0
			39	2480	-2.06	-2.0
	BLE	2 Mbps	0	2402	-3.75	-3.0
			19	2440	-3.71	-3.0
			39	2480	-3.74	-3.0

10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

KDB 447498 D01 General RF Exposure Guidance:

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

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

KDB 248227 D01 SAR meas for 802.11:

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

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

- ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- > 0.4 W/kg, SAR is repeated using the same wireless mode test configuration tested in the 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.

10.1. Test Condition

Test Item	Test Site No.	Test Date	Tested by
SAR	SAR1	2024/4/23 ~ 2024/4/29	Edison Hu

10.2. Wi-Fi (DTS Band)

Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Power Drift	Power Setting	Plot No.
						Tune-up Limit	Meas.	Meas.	Scaled			
802.11b (1Mbps)	0	Back	1	2412	95.62%	12.0	11.88	1.330	1.430	-0.2	12	1
802.11b (1Mbps)	0	Back	6	2437	95.62%	12.0	11.70	1.250	1.401	-0.18	12	
802.11b (1Mbps)	0	Back	11	2462	95.62%	12.0	11.60	1.060	1.216	-0.16	12	
802.11b (1Mbps)	0	Edge 1	1	2412	95.62%	12.0	11.88	0.180	0.194	0.2	12	
802.11b (1Mbps)	0	Edge 4	1	2412	95.62%	12.0	11.88	0.252	0.271	-0.09	12	

10.3. Wi-Fi (U-NII Band)

Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Power Drift	Plot No.
						Tune-up Limit	Meas.	Meas.	Scaled		
802.11a (6Mbps)	0	Back	36	5180	98.70%	10.00	9.56	1.180	1.323	-0.16	2
802.11a (6Mbps)	0	Back	40	5200	98.70%	10.00	9.72	1.080	1.167	-0.11	
802.11a (6Mbps)	0	Back	44	5220	98.70%	10.00	9.36	0.893	1.048	-0.09	
802.11a (6Mbps)	0	Back	48	5240	98.70%	10.00	9.57	0.857	0.959	-0.10	
802.11a (6Mbps)	0	Edge 1	40	5200	98.70%	10.00	9.56	0.019	0.021	0.20	
802.11a (6Mbps)	0	Edge 4	40	5200	98.70%	10.00	9.56	0.071	0.079	0.06	
802.11a (6Mbps)	0	Back	56	5280	98.57%	10.00	9.89	0.938	0.976	-0.19	
802.11a (6Mbps)	0	Back	52	5260	98.57%	10.00	9.67	1.060	1.160	-0.17	3
802.11a (6Mbps)	0	Back	60	5300	98.57%	10.00	9.61	0.991	1.100	-0.19	
802.11a (6Mbps)	0	Back	64	5320	98.57%	10.00	9.74	1.060	1.142	-0.15	
802.11a (6Mbps)	0	Edge 1	56	5280	98.57%	10.00	9.89	0.023	0.024	0.16	
802.11a (6Mbps)	0	Edge 4	56	5280	98.57%	10.00	9.89	0.107	0.111	-0.17	
802.11a (6Mbps)	0	Back	144	5720	98.62%	9.0	8.95	1.230	1.262	0.18	
802.11a (6Mbps)	0	Back	100	5500	98.62%	9.0	8.93	0.786	0.810	0.18	
802.11a (6Mbps)	0	Back	116	5580	98.62%	9.0	8.75	0.911	0.978	0.17	
802.11a (6Mbps)	0	Back	124	5620	98.62%	9.0	8.82	1.180	1.247	0.20	
802.11a (6Mbps)	0	Back	132	5660	98.62%	9.0	8.57	1.230	1.377	0.11	4
802.11a (6Mbps)	0	Back	140	5700	98.62%	9.0	8.43	1.180	1.364	0.19	
802.11a (6Mbps)	0	Edge 1	144	5720	98.62%	9.0	8.95	0.057	0.058	0.10	
802.11a (6Mbps)	0	Edge 4	144	5720	98.62%	9.0	8.95	0.175	0.180	-0.17	
802.11a (6Mbps)	0	Back	149	5745	98.66%	11.0	10.15	1.110	1.368	-0.07	5
802.11a (6Mbps)	0	Back	157	5785	98.66%	11.0	10.66	1.240	1.359	-0.20	
802.11a (6Mbps)	0	Back	165	5825	98.66%	11.0	10.59	1.120	1.248	0.06	
802.11a (6Mbps)	0	Edge 1	157	5785	98.66%	11.0	10.66	0.037	0.041	0.03	
802.11a (6Mbps)	0	Edge 4	157	5785	98.66%	11.0	10.66	0.133	0.146	-0.10	

10.4. Bluetooth

Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Power Drift	Power Setting	Plot No.
						Tune-up Limit	Meas.	Meas.	Scaled			
Bluetooth	0	Back	0	2402	57.36%	-1.0	-1.57	<0.1	<0.1	0.14	7	
Bluetooth	0	Back	39	2441	57.36%	-1.0	-1.76	<0.1	<0.1	-0.16	7	
Bluetooth	0	Back	78	2480	57.36%	-1.0	-1.82	<0.1	<0.1	0.03	7	
Bluetooth	0	Edge 1	0	2402	57.36%	-1.0	-1.57	<0.1	<0.1	-	7	
Bluetooth	0	Edge 4	0	2402	57.36%	-1.0	-1.57	<0.1	<0.1	-	7	

11. SAR Measurement Variability

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

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

Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio
						Original	Repeated once	
802.11b (1Mbps)	0	Back	1	2412	95.62%	1.330	1.310	1.02
802.11a (6Mbps)	0	Back	36	5180	98.70%	1.180	1.160	1.02
802.11a (6Mbps)	0	Back	52	5260	98.57%	1.060	1.090	1.03
802.11a (6Mbps)	0	Back	132	5660	98.62%	1.230	1.280	1.04
802.11a (6Mbps)	0	Back	157	5785	98.66%	1.240	1.250	1.01

Note(s):

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

12. Simultaneous Transmission SAR Analysis

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

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

Where:

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

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

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

In order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR > 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

$$(SAR_1 + SAR_2)^{1.5} / Ri \leq 0.04$$

Simultaneous Transmission Condition

RF Exposure Condition	Item	Capable Transmit Configurations		
Standalone	1	DTS	+	BT
	2	U-NII	+	BT

12.1. Sum of the SAR for Wi-Fi & BT

Test Position	Standalone SAR (W/kg)			Σ 1-g SAR (W/kg)	
	① WLAN 2.4 GHz	② WLAN 5 GHz	③ Bluetooth	①+③	②+③
Back	1.430	1.377	<0.1	1.430	1.377
Edge 1	0.194	0.058	<0.1	0.194	0.058
Edge 4	0.271	0.180	<0.1	0.271	0.180

Appendixes

Refer to separated files for the following appendixes.

4791251583-US-S0-V0_Appendix A: SAR Setup Photos

4791251583-US-S0-V0_Appendix B: Antenna Dimensions and Separation Distances

4791251583-US-S0-V0_Appendix C: SAR System Check Plots

4791251583-US-S0-V0_Appendix D: Highest SAR Test Plots

4791251583-US-S0-V0_Appendix E: SAR Probe and Dipole Calibration Certificates

END OF REPORT