



SAR EVALUATION REPORT

FCC 47 CFR § 2.1093

IEEE Std. 1528-2013

For

Ronin RavenEye Image Transmission System

Model: WV-002

FCC ID: 2ANDR-WV0022022

Report Number: WV-002_FCC_SAR

Issue Date: May 20, 2022

Prepared for

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Revision History

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V0	5/20/2022	Initial Issue	

Note:

1. This test report is only published to and used by the applicant, and it is not for evidence purpose in China.
2. The measurement result for the sample received is <Pass> according to < IEEE Std. 1528, when <Accuracy Method> decision rule is applied.



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1. Attestation of Test Results

Applicant Name	SZ DJI Osmo Technology Co., Ltd.	
Address	4F, Jingkou Community Comprehensive Service Building, No. 83 Bishui Road North, Guangming Street, Guangming District, Shenzhen	
Manufacturer	SZ DJI Osmo Technology Co., Ltd.	
Address	4F, Jingkou Community Comprehensive Service Building, No. 83 Bishui Road North, Guangming Street, Guangming District, Shenzhen	
EUT Name	Ronin RavenEye Image Transmission System	
Model	WV-002	
Sample Status	Normal	
Sample Received Date	April 25, 2022	
Date of Tested	May 11- May 16, 2022	
Applicable Standards	FCC 47 CFR § 2.1093 IEEE Std. 1528-2013 KDB publication	
SAR Limits (W/Kg)		
Exposure Category	Peak spatial-average (1g of tissue)	Extremities (hands, wrists, ankles, etc.) (10g of tissue)
General population / Uncontrolled exposure	1.6	4
The Highest Reported SAR (W/kg)		
RF Exposure Conditions	Equipment Class	
	DTS	NII
Head & Body (1-g)	1.151	1.503
Test Results	Pass	
Prepared By: <i>Burt Hu</i> Burt Hu Laboratory Engineer	Reviewed By: <i>Shawn Wen</i> Shawn Wen Laboratory Leader	Approved By: <i>Stephen Guo</i> Stephen Guo Laboratory Manager



2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with IEEE Std.1528-2013, the following FCC Published RF exposure KDB procedures:

- 248227 D01 802.11 Wi-Fi SAR
- 447498 D01 General RF Exposure Guidance
- 690783 D01 SAR Listings on Grants
- 865664 D01 SAR measurement 100 MHz to 6 GHz
- 865664 D02 RF Exposure Reporting



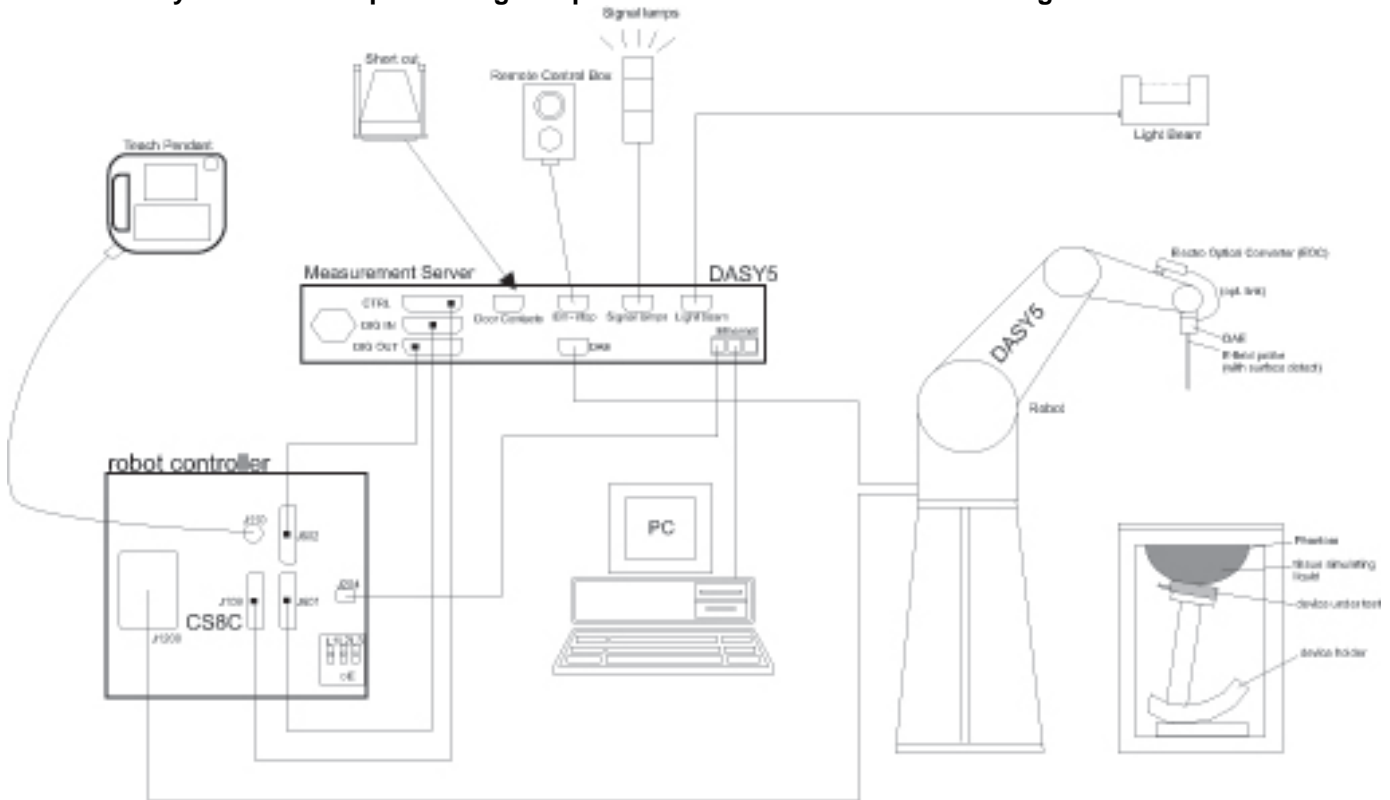
3. Facilities and Accreditation

Test Location	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.
Address	Building 10, Innovation Technology Park, Song Shan Lake Hi-tech Development Zone, Dongguan, 523808, China
Accreditation Certificate	<p>A2LA (Certificate No.: 4102.01) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch has been assessed and proved to be compliance with A2LA.</p> <p>FCC (FCC Recognized No.: CN1187) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch has been recognized to perform compliance testing on equipment subject to the Commission’s Declaration of Conformity (DoC) and Certification rules</p> <p>IC (Company No.: 21320) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch has been registered and fully described in a report filed with Industry Canada. The Company Number is 21320.</p> <p>VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch has been assessed and proved to in compliance with VCCI, the Membership No. is 3793. Facility Name: Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B , the VCCI registration No. is C-20012 and T-20011</p>
Description	All measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi-tech Development Zone, Dongguan, 523808, China

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

The DASY5 system used for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7 and the DASY52 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.



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 v01r04 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	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ 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.	



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 v01r04 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 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
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm	
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the <i>reported</i> SAR from the area scan based <i>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.

Step 5: Z-Scan (FCC only)

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



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.

Name of equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
ENA Network Analyzer	Keysight	E5080A	MY55100583	2022.10.29
Dielectric Probe kit	SPEAG	SM DAK 040 SA	1155	NCR
DC power supply	Keysight	E36103A	MY55350020	2022.10.29
Signal Generator	Rohde & Schwarz	SME06	837633\001	2022.10.29
BI-Directional Coupler	WERLATONE	C8060-102	3423	2022.10.29
Peak and Average Power Sensor	Keysight	E9323A	MY55440013	2022.10.29
Peak and Average Power Sensor	Keysight	E9323A	MY55420006	2022.10.29
Dual Channel PK Power Meter	Keysight	N1912A	MY55416024	2022.10.29
Amplifier	CORAD TECHNOLOGY LTD	AMF-4D-00400600-50-30P	1983561	NCR
Dosimetric E-Field Probe	SPEAG	EX3DV4	7383	2023.1.11
Data Acquisition Electronic	SPEAG	DAE3	427	2023.4.11
Dipole Kit 2450 MHz	SPEAG	D2450V2	977	2022.12.16
Dipole Kit 5 GHz	SPEAG	D5GHzV2	1231	2022.12.15
Software	SPEAG	DASY52	N/A	NCR
Twin Phantom	SPEAG	SAM V5.0	1805	NCR
Thermometer	/	GX-138	150709653	2022.10.29
Thermometer	VICTOR	ITHX-SD-5	18470005	2022.10.29

Note:

- 1) Per KDB865664D01 v01r04 requirements for dipole calibration, the test laboratory has adopted three-year extended calibration interval. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.
 - a) There is no physical damage on the dipole;
 - b) System check with specific dipole is within 10% of calibrated value;
 - c) The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement.
 - d) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the previous measurement.
- 2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.



5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std. 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.



6. Device Under Test (DUT) Information

6.1. DUT Description

The EUT is an image transmission system. EUT supports IEEE802.11b/g/n/a/ac/ax

EUT Dimension	Overall (Length x Width x Height): 80mm x 63 mm x 20.8mm
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6.2. Wireless Technology

Wireless technology	Frequency band
Wi-Fi	2.4 GHz
Wi-Fi	5.2 GHz
Wi-Fi	5.8 GHz

6.3. Antenna Gain

Antenna type	Band	Gain(dBi)
Ant 1	2.4G	2.5
	5.2G	2.5
	5.8G	2.5
Ant 2	2.4G	2.5
	5.2G	2.5
	5.8G	2.5



7. Conducted Output Power Measurement and tune-up tolerance

7.1. Power measurement result of 2.4GHz Wi-Fi.

Mode	Channel	Frequency (MHz)	Data Rate	ANT 1		ANT 2		SAR Test	Duty Cycle (%)
				Average Power (dBm)	Tune-up Limit (dBm)	Average Power (dBm)	Tune-up Limit (dBm)		
802.11b	1	2412	1Mbps	19.05	19.50	18.54	19.50	Required	98.97
	6	2437		19.31	19.50	19.10	19.50		
	11	2462		18.83	19.50	18.73	19.50		
802.11g	1	2412	6Mbps	Not Required	19.50	Not Required	18.50	Excluded	\
	6	2437			18.50		18.00		
	11	2462			14.00		14.00		

Mode	Channel	Frequency (MHz)	Data Rate	ANT1		ANT2		ANT1 + ANT2		SAR Test	Duty Cycle (%)
				Average Power (dBm)	Tune-up Limit (dBm)	Average Power (dBm)	Tune-up Limit (dBm)	Average Power (dBm)	Tune-up Limit (dBm)		
802.11n20	1	2412	MCS0	Not Required	17.00	Not Required	16.50	Not Required	19.8	Excluded	Not Required
	6	2437			18.50		18.00		21.3		
	11	2462			12.50		12.00		15.3		
802.11ax20	1	2412	MCS0	16.45	16.50	15.44	15.50	18.98	19.0	Required	91.23
	6	2437		18.58	19.00	17.78	18.00	21.21	21.5		
	11	2462		11.70	12.00	11.30	11.50	14.51	14.8		
802.11n40	3	2422	MCS0	Not Required	14.50	Not Required	13.00	Not Required	16.8	Excluded	Not Required
	6	2437			14.50		14.50		17.5		
	9	2452			8.50		7.00		10.8		
802.11ax40	3	2422	MCS0	Not Required	14.50	Not Required	12.00	Not Required	16.4	Excluded	Not Required
	6	2437			15.50		14.50		18.0		
	9	2452			10.00		9.00		12.5		

Note:

1. 802.11b/g mode support only SISO.
2. 802.11n/ax mode support only MIMO.
3. As per KDB 447498 D01 sec.4.1.d) at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.



7.2. Power measurement result of 5GHz Wi-Fi (U-NII-1).

Mode	Channel	Frequency (MHz)	Data Rate	ANT 1		ANT 2		SAR Test	Duty Cycle (%)	
				Average Power (dBm)	Tune-up Limit (dBm)	Average Power (dBm)	Tune-up Limit (dBm)			
802.11a	36	5180	6Mbps	17.84	18.00	Not Required	18.00	Required	93.46	
	40	5200		17.61	18.00		18.00			
	48	5240		17.34	18.00		18.00			
802.11n-HT20	36	5180	MCS0	Not Required	16.5	Not Required	17.5	Excluded	\	
	40	5200			16.5		17.5			
	48	5240			16.5		17.5			
802.11ac-VHT20	36	5180	16.5		17.5					
	40	5200	16.5		17.5					
	48	5240	16.5		17.5					
802.11ax-HE20	36	5180	MCS0		17.50		18.21	18.50	Required	91.30
	40	5200			17.50		18.03	18.50		
	48	5240			17.50		17.84	18.50		
802.11n-HT40	38	5190	MCS0		13.00		Not Required	Not Required	13.5	Excluded
	46	5230		13.00	13.5					
802.11ac-VHT40	38	5190	MCS0	13.00	13.5					
	46	5230		13.00	13.5					
802.11ax-HE40	38	5190	MCS0	13.00	14.00					
	46	5230		13.00	14.00					
802.11ac-VHT80	42	5210	MCS0	13.50	14.00	Excluded				
802.11ax-HE80	42	5210	MCS0	13.00	13.50	Excluded				

Note:

1. 802.11a mode support only SISO.
2. 802.11ac/n/ax mode support only MIMO.
3. As per KDB 447498 D01 sec.4.1.d) at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.



7.4. Power measurement result of 5GHz Wi-Fi (U-NII-3).

Mode	Channel	Frequency (MHz)	Data Rate	Chain 1		SAR Test	Chain 2		SAR Test	Duty Cycle (%)				
				Average Power (dBm)	Tune-up Limit (dBm)		Average Power (dBm)	Tune-up Limit (dBm)						
802.11a	149	5745	6Mbps	17.58	18.00	Required		17.50	Required	93.46				
	153	5765		17.51	18.00			17.50						
	157	5785		17.52	18.00			17.50						
	161	5805		17.46	18.00			17.50						
	165	5825		18.00	18.00			17.50						
802.11n-HT20	149	5745	MCS0	Not Required	18.00	Excluded	Not Required	18.50	Excluded	\				
	153	5765			18.00			18.50						
	157	5785			18.00			18.50						
	161	5805			18.00			18.50						
	165	5825			18.00			18.50						
802.11ac-VHT20	149	5745	MCS0		18.00			18.50						
	153	5765			18.00			18.50						
	157	5785			18.00			18.50						
	161	5805			18.00			18.50						
802.11ax-HE20	149	5745	MCS0		17.50			17.50						
	153	5765			17.50			17.50						
	157	5785			17.50			17.50						
	161	5805			17.50			17.50						
802.11n-HT40	151	5755	MCS0		17.50			18.08			18.08	18.50	Required	92.70
	159	5795			17.50			17.77				18.50		
802.11ac-VHT40	151	5755	MCS0	17.50	Not Required	Not Required	18.50	Excluded	\					
	159	5795		17.50			18.50							
802.11ax-HE40	151	5755	MCS0	16.50			18.00							
	159	5795		16.50			18.00							
802.11ac-VHT80	155	5775	MCS0	15.00			16.00							
802.11ax-VHT80	155	5775	MCS0	12.00			13.50							

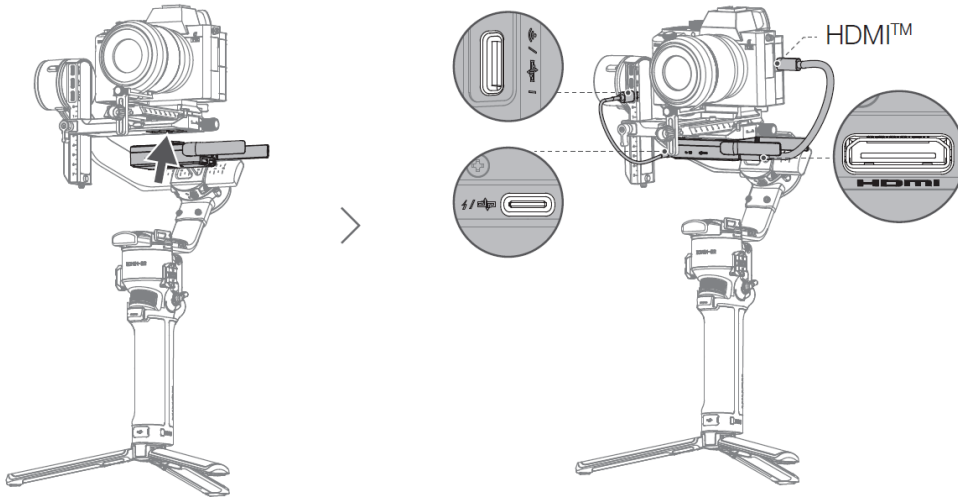
Note:

1. 802.11a mode support only SISO.
2. 802.11ac/n/ax mode support only MIMO.
3. As per KDB 447498 D01 sec.4.1.d) at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.

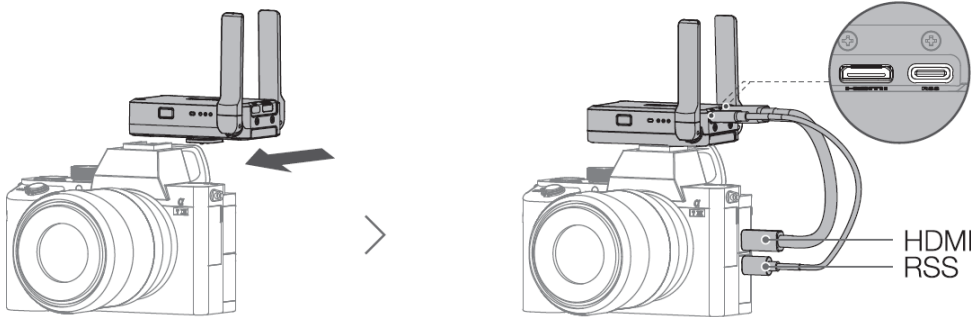
8. Evaluation scenario

According to the user manual, two working scenario is defined, the diagram is as below:

1. Antenna placed horizontal:



2. Antenna placed vertical:



This product may get close to the user's head and body, so SAR evaluation should both be considered for getting close to head and body using scenario, and a separation distance of 5mm is conservative enough for head and body SAR evaluation.

As to the back surface, there is a buckle on it for fixing onto the camera device, it impossible to get close to user, so SAR evaluation for back surface can be avoided.



9. Dielectric Property Measurements & System Check

9.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized.

The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series. Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

Tissue Dielectric Parameters

FCC KDB 865664 D01 v01r04 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 Dielectric Property Measurements Results:

Liquid	Freq.	Liquid Parameters				Delta(%)		Limit (%)	Temp. (°C)	Test Date
		Measured		Target		ϵ_r	σ			
		ϵ_r	σ	ϵ_r	σ					
Head 2450	2412	39.52	1.82	39.27	1.77	0.64	2.82	±5	21.6	2022.5.11
	2422	39.45	1.83	39.25	1.78	0.51	2.81			
	2437	39.41	1.81	39.22	1.79	0.48	1.12			
	2450	39.42	1.78	39.20	1.80	0.56	-1.11			
	2452	39.38	1.75	39.20	1.80	0.46	-2.78			
	2462	39.35	1.74	39.18	1.81	0.43	-3.87			
Head 5250	5180	36.36	4.67	36.01	4.63	0.97	0.86	±5	22.3	2022.5.14
	5200	36.41	4.69	35.99	4.66	1.17	0.64			
	5250	36.24	4.75	35.93	4.71	0.86	0.85			
Head 5750	5750	35.74	5.41	35.36	5.22	1.07	3.64	±5	22.1	2022.5.16
	5755	35.76	5.42	35.35	5.22	1.16	3.83			
	5795	35.68	5.39	35.31	5.26	1.05	2.47			
	5825	35.63	5.33	35.27	5.30	1.02	0.57			



9.2. System Check

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

System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ± 0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm for measurements > 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm (above 1GHz) and 15mm (below 1GHz) from dipole center to the simulating liquid surface.
- For area scan, standard grid spacing for head measurements is 15 mm in x- and y- dimension (≤ 2 GHz), 12 mm in x- and y-dimension (2-4 GHz) and 10mm in x- and y- dimension (4-6GHz).
- For zoom scan, $\Delta x_{zoom}, \Delta y_{zoom} \leq 2$ GHz - ≤ 8 mm, 2-4GHz - ≤ 5 mm and 4-6 GHz - ≤ 4 mm; $\Delta z_{zoom} \leq 3$ GHz - ≤ 5 mm, 3-4 GHz - ≤ 4 mm and 4-6GHz - ≤ 2 mm.
- Distance between probe sensors and phantom surface was set to 3 mm except for 5 GHz band. For 5GHz band, Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was set to 100 mW or 250 mW depend on the certificate of the dipoles.
- The results are normalized to 1 W input power.

System Check Results

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within 10% of the manufacturer calibrated dipole SAR target.

T.S. Liquid	Measured Results		Target (Ref. value)	Delta (%)	Limit (%)	Temp. (°C)	Test Date	
	Zoom Scan (W/Kg)	Normalize to 1W (W/Kg)						
Head 2450	1-g	12.500	50.00	53.20	-6.02	± 10	21.6	2022.5.11
	10-g	5.780	23.12	24.20	-4.46	± 10		
Head 2450	1-g	12.800	51.20	53.20	-3.76	± 10	21.8	2022.5.12
	10-g	5.920	23.68	24.20	-2.15	± 10		
Head 2450	1-g	12.800	51.20	53.20	-3.76	± 10	22.2	2022.5.13
	10-g	5.910	23.64	24.20	-2.31	± 10		
Head 5250	1-g	8.040	80.40	77.90	3.21	± 10	22.3	2022.5.14
	10-g	2.320	23.20	22.60	2.65	± 10		
Head 5750	1-g	7.740	77.40	78.30	-1.15	± 10	22.1	2022.5.16
	10-g	2.220	22.20	22.40	-0.89	± 10		



10. Measured and Reported (Scaled) SAR Results

As per KDB 447498 D01 sec.4.1.e), When SAR or MPE is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as reported.

Scaled SAR calculation formula:

Scaled SAR = Tune-up in mW / Conducted power in mW * Duty cycle (if available) * SAR value

SAR Test Reduction criteria are as follows:

KDB 447498 D01 General RF Exposure Guidance:

A) Per KDB447498 D01, all SAR measurement results are scaled to the maximum tune-up tolerance limit to demonstrate SAR compliance.

B) 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.

Per KDB865664 D01 v01r04:

For each frequency band, repeated SAR measurement is required only when the measured SAR is ≥ 0.8 W/Kg; if the deviation among the repeated measurement is $\leq 20\%$, and the measured SAR < 1.45 W/Kg, only one repeated measurement is required.

**KDB 248227 D01 v02r02 for Wi-Fi Devices:**

For Wi-Fi SAR testing, a communication link is set up with the testing software for Wi-Fi mode test. During the test, at each test frequency channel, the EUT is operated at the RF continuous emission mode. The RF signal utilized in SAR measurement has 100% duty cycle and its crest factor is 1. The test procedures in KDB 248227 D01 v02r02 are applied. (Refer to KDB 248227D01 v02r02 for more details)

Initial Test Position Procedure

For exposure condition with multiple test position, such as handsets operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all position in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is $\leq 0.4\text{W/kg}$, no additional testing for the remaining test position is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is $\leq 0.8\text{W/kg}$ or all test position are measured. For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is $> 0.8\text{W/kg}$, SAR is measured for these test positions /configurations on the subsequent next highest measured output power channel(s) until the reported SAR is $\leq 1.2\text{W/kg}$ or all required channels are tested.

Initial Test Configuration Procedure

An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. For configurations with the same specified or measured maximum output power, additional transmission mode and test channel selection procedures are required (see section 5.3.2 of KDB 248227D01 v02r02). SAR test reduction of subsequent highest output test channels is based on the reported SAR of the initial test configuration. For next to the ear, hotspot mode and UMC mini-tablet exposure configurations where multiple test positions are required, the initial test position procedure is applied to minimize the number of test positions required for SAR measurement using the initial test configuration transmission mode. For fixed exposure conditions that do not have multiple SAR test positions, SAR is measured in the transmission mode determined by the initial test configuration. When the reported SAR of the initial test configuration is $> 0.8\text{W/kg}$, SAR measurement is required for the subsequent next highest measured output power channel(s) in the initial test configuration until the reported SAR is $\leq 1.2\text{W/kg}$ or all required channels are tested.

Sub Test Configuration Procedure

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. When the highest reported SAR for the initial test configuration, according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is $\leq 1.2\text{W/kg}$, SAR is not required for that subsequent test configuration.

Note:

The same procedure is applied to extremity SAR evaluation, and the corresponding limitation is 2.5 times of 1-g SAR.



10.1. SAR Test Results of 2.4GHz Wi-Fi.

Test Position (Body 5mm)	Test Mode	Channel/Frequency	Power (dBm)		SAR Value	Power Drift	Duty Cycle (%)	Scaled 1g (W/Kg)
			Tune-up	Meas.	1g (W/Kg)			
Vertical								
Ant 1								
Front Surface	11b	2437	19.50	19.31	0.085	-0.01	98.97	0.089
Left Side	11b	2437	19.50	19.31	1.090	0.06	98.97	1.151
Right Side	11b	2437	19.50	19.31	0.125	-0.07	98.97	0.132
Top side	11b	2437	19.50	19.31	0.696	0.03	98.97	0.735
Bottom side	11b	2437	19.50	19.31	0.089	-0.07	98.97	0.094
Left Side	11b	2412	19.50	19.05	0.736	0.01	98.97	0.825
Left Side	11b	2462	19.50	18.83	0.900	0.03	98.97	1.061
Worst Case repeated								
Left Side	11b	2437	19.50	19.31	1.060	0.06	98.97	1.119
Ant 2								
Front Surface	11b	2437	19.50	19.10	0.076	-0.19	98.97	0.084
Left Side	11b	2437	19.50	19.10	0.031	-0.01	98.97	0.035
Right Side	11b	2437	19.50	19.10	1.020	-0.03	98.97	1.130
Top side	11b	2437	19.50	19.10	0.844	-0.05	98.97	0.935
Bottom side	11b	2437	19.50	19.10	0.060	-0.08	98.97	0.066
Right Side	11b	2412	19.50	18.54	0.855	-0.05	98.97	1.078
Right Side	11b	2462	19.50	18.73	0.817	-0.04	98.97	0.986
Worst Case repeated								
Right Side	11b	2437	19.50	19.10	0.876	-0.01	98.97	0.971
MIMO								
Front Surface	11ax20	2437	18.00	17.78	0.064	-0.16	91.23	0.074
Left Side*	11ax20	2437	19.00	18.58	0.633	-0.02	91.23	0.764
Right Side	11ax20	2437	18.00	17.78	0.783	0.02	91.23	0.903
Top side	11ax20	2437	18.00	17.78	0.625	-0.04	91.23	0.721
Bottom side	11ax20	2437	18.00	17.78	0.059	-0.09	91.23	0.068
Right Side	11ax20	2412	15.50	15.44	0.241	-0.09	91.23	0.268
Right Side	11ax20	2462	11.50	11.30	0.099	-0.03	91.23	0.113

Note:

*Due to the hot spots of the two antennas are separated, so the corresponding tune-up / measured power of the antenna with higher SAR should be selected to determine the scaling factor. For left side, the tune-up / measured power of ANT 1 is selected, for the rest test position, the tune-up / measured power of ANT 2 is selected.

Vertical OFDM mode SAR evaluation exclusion analysis(Ant 1)

Mode	Tune-up (dBm)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11b	19.5	1.151	\	\
802.11g	19.5	\	1.151	Excluded

Note:

The adjusted SAR of 802.11g is less than <1.2W/kg, so SAR test for 802.11g is not required.



Vertical OFDM mode SAR evaluation exclusion analysis(Ant 2)

Mode	Tune-up (dBm)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11b	19.5	1.130	\	\
802.11g	19.5	\	1.130	Excluded

Note:
The adjusted SAR of 802.11g is less than <1.2W/kg, so SAR test for 802.11g is not required.

Vertical SAR evaluation exclusion analysis (MIMO)

Mode	Tune-up (dBm)	Tune-up (mW)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11ax20	21.5	141.25	0.903	\	\
802.11n20	21.0	125.89	\	0.805	Excluded
802.11n40	17.5	56.23	\	0.359	Excluded
802.11ax40	17.5	56.23	\	0.359	Excluded

Note:
the mode with maximum tune-up in MIMO is selected to performance SAR evaluation, and the adjusted SAR of the rest MIMO mode is less than <1.2W/kg, so there is no need to test other MIMO modes.



Test Position (Body 5mm)	Test Mode	Channel/Frequency	Power (dBm)		SAR Value	Power Drift	Duty Cycle (%)	Scaled 1g (W/Kg)
			Tune-up	Meas.	1g (W/Kg)			
Horizontal								
Ant 1								
Front Surface	11b	2437	19.50	19.31	0.372	-0.03	98.97	0.393
Left Side	11b	2437	19.50	19.31	0.840	0.19	98.97	0.887
Right Side	11b	2437	19.50	19.31	0.193	0.06	98.97	0.204
Top side	11b	2437	19.50	19.31	0.089	0.18	98.97	0.094
Bottom side	11b	2437	19.50	19.31	0.041	-0.09	98.97	0.043
Left Side	11b	2412	19.50	19.05	0.684	-0.01	98.97	0.767
Left Side	11b	2462	19.50	18.83	0.689	-0.03	98.97	0.812
Worst Case repeated								
Right Side	11b	2437	19.50	19.31	0.896	-0.11	98.97	0.946
Ant 2								
Front Surface	11b	2437	19.50	19.10	0.341	0.00	98.97	0.378
Left Side	11b	2437	19.50	19.10	0.044	-0.08	98.97	0.049
Right Side	11b	2437	19.50	19.10	1.020	-0.04	98.97	1.130
Top side	11b	2437	19.50	19.10	0.059	0.07	98.97	0.065
Bottom side	11b	2437	19.50	19.10	0.097	-0.16	98.97	0.108
Right Side	11b	2412	19.50	18.54	0.823	-0.16	98.97	1.037
Right Side	11b	2462	19.50	18.73	0.822	-0.03	98.97	0.992
Worst Case repeated								
Right Side	11b	2437	19.50	19.10	1.020	-0.04	98.97	1.130
MIMO								
Front Surface	11ax20	2437	19.00	18.58	0.253	-0.18	91.23	0.305
Left Side	11ax20	2437	19.00	18.58	0.640	-0.09	91.23	0.773
Right Side*	11ax20	2437	18.00	17.78	0.624	-0.15	91.23	0.720
Top side	11ax20	2437	19.00	18.58	0.063	-0.20	91.23	0.076
Bottom side	11ax20	2437	19.00	18.58	0.058	0.07	91.23	0.070
Left Side	11ax20	2412	16.50	16.45	0.277	0.02	91.23	0.307
Left Side	11ax20	2462	12.00	11.70	0.088	-0.04	91.23	0.103

Note:

*Due to the hot spots of the two antennas are separated, so the corresponding tune-up / measured power of the antenna with higher SAR should be selected to determine the scaling factor. For right side, the tune-up / measured power of ANT 2 is selected, for the rest test position, the tune-up / measured power of ANT 1 is selected.

Horizontal OFDM mode SAR evaluation exclusion analysis(Ant 1)

Mode	Tune-up (dBm)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11b	19.5	0.887	\	\
802.11g	19.5	\	0.887	Excluded

Note:

The adjusted SAR of 802.11g is less than <1.2W/kg, so SAR test for 802.11g is not required.



Horizontal OFDM mode SAR evaluation exclusion analysis(Ant 2)

Mode	Tune-up (dBm)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11b	19.5	1.130	\	\
802.11g	19.5	\	1.130	Excluded

Note:
The adjusted SAR of 802.11g is less than $<1.2\text{W/kg}$, so SAR test for 802.11g is not required.

Horizontal SAR evaluation exclusion analysis(MIMO)

Mode	Tune-up (dBm)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11ax20	21.5	0.773	\	\
802.11n20	21.0	\	0.689	Excluded
802.11n40	17.5	\	0.308	Excluded
802.11ax40	17.5	\	0.308	Excluded

Note:
the mode with maximum tune-up in MIMO is selected to performance SAR evaluation, and the adjusted SAR of the rest MIMO mode is less than $<1.2\text{W/kg}$, so there is no need to test other MIMO modes.



10.2. SAR Test Results of 5GHz Wi-Fi.

Test Position (Body 5mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Cycle (%)	Scaled 1g (W/Kg)
			Tune-up	Meas.	1-g(W/Kg)			
Vertical								
Ant 1								
U-NII-1								
Front Surface	11a	5180	18.00	17.84	0.132	-0.04	93.46	0.147
Left Side	11a	5180	18.00	17.84	0.622	0.09	93.46	0.691
Right Side	11a	5180	18.00	17.84	0.080	-0.06	93.46	0.088
Top side	11a	5180	18.00	17.84	0.645	-0.04	93.46	0.716
Bottom side	11a	5180	18.00	17.84	0.025	-0.07	93.46	0.028
U-NII-3								
Front Surface	11a	5825	18.00	18.00	0.184	-0.06	93.46	0.197
Left Side	11a	5825	18.00	18.00	0.509	0.04	93.46	0.545
Right Side	11a	5825	18.00	18.00	0.054	-0.01	93.46	0.057
Top side	11a	5825	18.00	18.00	0.536	-0.02	93.46	0.574
Bottom side	11a	5825	18.00	18.00	0.049	-0.08	93.46	0.053
Ant 2								
U-NII-1								
Front Surface	11AX20	5180	18.50	18.21	0.128	0.20	91.30	0.150
Left Side	11AX20	5180	18.50	18.21	0.054	-0.01	91.30	0.064
Right Side	11AX20	5180	18.50	18.21	0.618	-0.02	91.30	0.724
Top side	11AX20	5180	18.50	18.21	0.672	-0.16	91.30	0.787
Bottom side	11AX20	5180	18.50	18.21	0.019	-0.05	91.30	0.023
U-NII-3								
Front Surface	11N40	5755	18.50	18.08	0.230	-0.09	92.70	0.273
Left Side	11N40	5755	18.50	18.08	0.123	-0.03	92.70	0.146
Right Side	11N40	5755	18.50	18.08	0.589	-0.07	92.70	0.700
Top side	11N40	5755	18.50	18.08	0.633	-0.07	92.70	0.752
Bottom side	11N40	5755	18.50	18.08	0.057	-0.15	92.70	0.067

Vertical Subsequent test configuration SAR evaluation exclusion analysis for U-NII-1 band (Ant 1)

Mode	Tune-up (dBm)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11a	18.0	0.716	\	\
802.11n 20M	16.5	\	0.507	Excluded
802.11ac 20M	16.5	\	0.507	Excluded
802.11ax 20M	17.5	\	0.638	Excluded
802.11n 40M	13.0	\	0.226	Excluded
802.11ac 40M	13.0	\	0.226	Excluded
802.11ax 40M	13.0	\	0.226	Excluded
802.11ac 80M	13.5	\	0.254	Excluded
802.11ax 80M	13.0	\	0.226	Excluded

Note:

- 1) The 802.11a mode is selected as Initial Test Configuration for SAR test according to the specified maximum output power. As the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.



Vertical test configuration SAR evaluation exclusion analysis for U-NII-1 band (Ant 2)

Mode	Tune-up (dBm)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11ax 20M	18.5	0.787	\	\
802.11a	18.0	\	0.701	Excluded
802.11n 20M	17.5	\	0.625	Excluded
802.11ac 20M	17.5	\	0.625	Excluded
802.11n 40M	13.5	\	0.249	Excluded
802.11ac 40M	13.5	\	0.249	Excluded
802.11ax 40M	14.0	\	0.279	Excluded
802.11ac 80M	14.0	\	0.279	Excluded
802.11ax 80M	13.5	\	0.249	Excluded

Note:

The 802.11ax20M mode is selected as Initial Test Configuration for SAR test according to the specified maximum output power. As the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.

Vertical Subsequent test configuration SAR evaluation exclusion analysis for U-NII-3 band (Ant 1)

Mode	Tune-up (dBm)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11a	18.0	0.574	\	\
802.11n 20M	18.0	\	0.574	Excluded
802.11ac 20M	18.0	\	0.574	Excluded
802.11ax 20M	17.5	\	0.512	Excluded
802.11n 40M	17.5	\	0.512	Excluded
802.11ac 40M	17.5	\	0.512	Excluded
802.11ax 40M	16.5	\	0.406	Excluded
802.11ac 80M	15.0	\	0.288	Excluded
802.11ax 80M	12.0	\	0.144	Excluded

Note:

The 802.11a mode is selected as Initial Test Configuration for SAR test according to the specified maximum output power. As the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.



Vertical Subsequent test configuration SAR evaluation exclusion analysis for U-NII-3 band (Ant 2)

Mode	Tune-up (dBm)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11n 40M	18.5	0.752	\	\
802.11a	17.5	\	0.597	Excluded
802.11n 20M	18.5	\	0.752	Excluded
802.11ac 20M	18.5	\	0.752	Excluded
802.11ax 20M	18.5	\	0.597	Excluded
802.11ac 40M	18.5	\	0.752	Excluded
802.11ax 40M	18.0	\	0.670	Excluded
802.11ac 80M	16.0	\	0.423	Excluded
802.11ax 80M	13.5	\	0.238	Excluded

Note:

The 802.11n40M mode is selected as Initial Test Configuration for SAR test according to the specified maximum output power. As the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.



Test Position (Body 5mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Cycle (%)	Scaled 1g (W/Kg)
			Tune-up	Meas.	1-g(W/Kg)			
Horizontal								
Ant 1								
U-NII-1								
Front Surface	11a	5180	18.00	17.84	0.296	0.00	93.46	0.329
Left Side	11a	5180	18.00	17.84	0.562	0.02	93.46	0.624
Right Side	11a	5180	18.00	17.84	0.048	-0.03	93.46	0.053
Top side	11a	5180	18.00	17.84	0.131	0.00	93.46	0.145
Bottom side	11a	5180	18.00	17.84	<0.001	0.00	93.46	<0.001
U-NII-3								
Front Surface	11a	5825	18.00	18.00	0.345	0.00	93.46	0.369
Left Side	11a	5825	18.00	18.00	0.466	-0.03	93.46	0.499
Right Side	11a	5825	18.00	18.00	0.035	0.08	93.46	0.037
Top side	11a	5825	18.00	18.00	0.101	-0.08	93.46	0.108
Bottom side	11a	5825	18.00	18.00	<0.001	0.00	93.46	<0.001
Ant 2								
U-NII-1								
Front Surface	11AX20	5180	18.50	18.21	0.247	0.00	91.30	0.289
Left Side	11AX20	5180	18.50	18.21	0.045	-0.04	91.30	0.052
Right Side	11AX20	5180	18.50	18.21	0.535	-0.08	91.30	0.626
Top side	11AX20	5180	18.50	18.21	0.093	-0.06	91.30	0.109
Bottom side	11AX20	5180	18.50	18.21	<0.001	0.00	91.30	<0.001
U-NII-3								
Front Surface	11N40	5755	18.50	18.08	0.373	0.00	92.70	0.443
Left Side	11N40	5755	18.50	18.08	0.038	-0.04	92.70	0.045
Right Side	11N40	5755	18.50	18.08	0.468	-0.17	92.70	0.556
Top side	11N40	5755	18.50	18.08	0.112	-0.10	92.70	0.133
Bottom side	11N40	5755	18.50	18.08	<0.001	0.00	92.70	<0.001

Note:

When the reported SAR of the initial test configuration is >0.8W/kg, SAR measurement is required for subsequent next highest measured output power channel(s) in the initial test configuration until reported SAR is ≤1.2 W/kg or all required channels are tested.



Horizontal Subsequent test configuration SAR evaluation exclusion analysis for U-NII-1 band (Ant 1)

Mode	Tune-up (dBm)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11a	18.0	0.624	\	\
802.11n 20M	16.5	\	0.442	Excluded
802.11ac 20M	16.5	\	0.442	Excluded
802.11ax 20M	17.5	\	0.556	Excluded
802.11n 40M	13.0	\	0.197	Excluded
802.11ac 40M	13.0	\	0.197	Excluded
802.11ax 40M	13.0	\	0.197	Excluded
802.11ac 80M	13.5	\	0.221	Excluded
802.11ax 80M	13.3	\	0.211	Excluded

Note:

The 802.11a mode is selected as Initial Test Configuration for SAR test according to the specified maximum output power. As the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.

Horizontal test configuration SAR evaluation exclusion analysis for U-NII-1 band (Ant 2)

Mode	Tune-up (dBm)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11ax 20M	18.5	0.626	\	\
802.11a	18.0	\	0.558	Excluded
802.11n 20M	17.5	\	0.497	Excluded
802.11ac 20M	17.5	\	0.497	Excluded
802.11n 40M	13.5	\	0.198	Excluded
802.11ac 40M	13.5	\	0.198	Excluded
802.11ax 40M	14.0	\	0.222	Excluded
802.11ac 80M	14.0	\	0.222	Excluded
802.11ax 80M	13.5	\	0.198	Excluded

Note:

The 802.11ax20M mode is selected as Initial Test Configuration for SAR test according to the specified maximum output power. As the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.



Horizontal Subsequent test configuration SAR evaluation exclusion analysis for U-NII-3 band (Ant 1)

Mode	Tune-up (dBm)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11a	18.0	0.499	\	\
802.11n 20M	18.0	\	0.499	Excluded
802.11ac 20M	18.0	\	0.499	Excluded
802.11ax 20M	17.5	\	0.445	Excluded
802.11n 40M	17.5	\	0.445	Excluded
802.11ac 40M	17.5	\	0.445	Excluded
802.11ax 40M	16.5	\	0.353	Excluded
802.11ac 80M	15.0	\	0.250	Excluded
802.11ax 80M	12.0	\	0.125	Excluded

Note:

The 802.11a mode is selected as Initial Test Configuration for SAR test according to the specified maximum output power. As the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.

Horizontal Subsequent test configuration SAR evaluation exclusion analysis for U-NII-3 band (Ant 2)

Mode	Tune-up (dBm)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11n 40M	18.5	0.556	\	\
802.11a	17.5	\	0.442	Excluded
802.11n 20M	18.5	\	0.556	Excluded
802.11ac 20M	18.5	\	0.556	Excluded
802.11ax 20M	18.5	\	0.442	Excluded
802.11ac 40M	18.5	\	0.556	Excluded
802.11ax 40M	18.0	\	0.496	Excluded
802.11ac 80M	16.0	\	0.313	Excluded
802.11ax 80M	13.5	\	0.176	Excluded

Note:

The 802.11n40M mode is selected as Initial Test Configuration for SAR test according to the specified maximum output power. As the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR test for the other 802.11 modes are not required.



11. Multiple Transmission SAR Analysis

NO.	Combination
1	Ant1 2.4g Wifi+ Ant2 2.4g Wifi
2	Ant1 5g Wifi+ Ant2 5g Wifi

For SAR evaluation for 5GHz WiFi MIMO mode, the highest standalone SAR of each corresponding antenna is selected to be summed up to represented the SAR value of MIMO.

U-NII-1	Antenna placed vertical				
	Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)
		5G Wi-Fi Ant 1	5G Wi-Fi Ant 2		
Front Surface	Simultaneous Tx Antenna Combination(W/kg)		0.297	1.6	
	0.147	0.150			
Left Side	Simultaneous Tx Antenna Combination(W/kg)		0.755	1.6	
	0.691	0.064			
Right Side	Simultaneous Tx Antenna Combination(W/kg)		0.812	1.6	
	0.088	0.724			
Top side	Simultaneous Tx Antenna Combination(W/kg)		1.503	1.6	
	0.716	0.787			
Bottom side	Simultaneous Tx Antenna Combination(W/kg)		0.051	1.6	
	0.028	0.023			

Note:

Because summed SAR is less than 1.6W/kg no further evaluation is required.



Antenna placed vertical				
Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)
	5G Wi-Fi Ant 1	5G Wi-Fi Ant 2		
Front Surface	0.197	0.273	0.470	1.6
Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)
	5G Wi-Fi Ant 1	5G Wi-Fi Ant 2		
Left Side	0.545	0.146	0.691	1.6
Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)
	5G Wi-Fi Ant 1	5G Wi-Fi Ant 2		
Right Side	0.057	0.700	0.757	1.6
Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)
	5G Wi-Fi Ant 1	5G Wi-Fi Ant 2		
Top side	0.574	0.752	1.326	1.6
Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)
	5G Wi-Fi Ant 1	5G Wi-Fi Ant 2		
Bottom side	0.053	0.067	0.120	1.6

Antenna placed horizontal				
Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)
	5G Wi-Fi Ant 1	5G Wi-Fi Ant 2		
Front Surface	0.329	0.289	0.618	1.6
Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)
	5G Wi-Fi Ant 1	5G Wi-Fi Ant 2		
Left Side	0.624	0.052	0.676	1.6
Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)
	5G Wi-Fi Ant 1	5G Wi-Fi Ant 2		
Right Side	0.053	0.626	0.679	1.6
Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)
	5G Wi-Fi Ant 1	5G Wi-Fi Ant 2		
Top side	0.145	0.109	0.254	1.6
Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)
	5G Wi-Fi Ant 1	5G Wi-Fi Ant 2		
Bottom side	<0.001	<0.001	<0.001	1.6



U-NII-3	Antenna placed horizontal				
	Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)
		5G Wi-Fi Ant 1	5G Wi-Fi Ant 2		
	Front Surface	0.369	0.443	0.812	1.6
	Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)
		5G Wi-Fi Ant 1	5G Wi-Fi Ant 2		
	Left Side	0.499	0.045	0.544	1.6
	Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)
		5G Wi-Fi Ant 1	5G Wi-Fi Ant 2		
	Right Side	0.037	0.556	0.593	1.6
Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)	
	5G Wi-Fi Ant 1	5G Wi-Fi Ant 2			
Top side	0.108	0.133	0.241	1.6	
Test Position	Simultaneous Tx Antenna Combination(W/kg)		Σ SAR 1g (W/kg)	Limit(W/kg)	
	5G Wi-Fi Ant 1	5G Wi-Fi Ant 2			
Bottom side	<0.001	<0.001	<0.001	1.6	

Note:
Because summed SAR is less than 1.6W/kg no further evaluation is required.

Appendixes
Refer to separated files for the following appendixes.

- WV-002_FCC_SAR App A Photo
- WV-002_FCC_SAR App B System Check Plots
- WV-002_FCC_SAR App C Highest Test Plots
- WV-002_FCC_SAR App D Cal. Certificates

-----End of Report-----