



SAR EVALUATION REPORT

**FCC 47 CFR § 2.1093
IEEE Std. 1528-2013
RSS-102 Issue 5
IEC 62209-1528:2020**

**For
X2D 100C**

Model: X2D 100C

**FCC ID: 2AEFA-X2D100C2106
IC: 20193-X2D100C2106**

Report Number: 4790183964-SAR-1

Issue Date: January 27, 2022

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Revision History

Rev.	Date	Revisions	Revised By
V1.0	Jan 27, 2022	Initial Issue	\

Note:

1. The Measurement result for the sample received is<Pass> according to < IEEE Std. 1528-2013> when <Accuracy Method> decision rule is applied.
2. This report is only published to and used by the applicant, and it is not for evidence purpose in China.



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1. Attestation of Test Results

Applicant Name	Victor Hasselblad AB.	
Address	Utvecklingsgatan 2 SE-417 56 Gothenburg Sweden	
Manufacturer	Victor Hasselblad AB.	
Address	Utvecklingsgatan 2 SE-417 56 Gothenburg Sweden	
EUT Name	X2D 100C	
Model	X2D 100C	
Brand	HASSELBLAD	
Sample Status	Normal	
Sample Received Date	November 18, 2021	
Date of Tested	November 22, 2021 ~ November 23, 2021	
Applicable Standards	FCC 47 CFR § 2.1093 IEEE Std. 1528-2013 KDB publication RSS-102 Issue 5 IEC 62209-1528:2020	
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	Frequency Band	
	DTS	UNII
Head (1-g)	0.001	<0.001
Body worn (1-g)	0.078	0.449
Extremities (10-g)	0.041	0.189
Simultaneous Transmission (1-g)	Head	0.001
Simultaneous Transmission (1-g)	Body worn	0.817
Simultaneous Transmission (10-g)	Extremities	0.374
Test Results	Pass	
Prepared By: <i>Dean Hua</i> Dean Hua Engineer Project Associate	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 FCC 47 CFR § 2.1093, 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



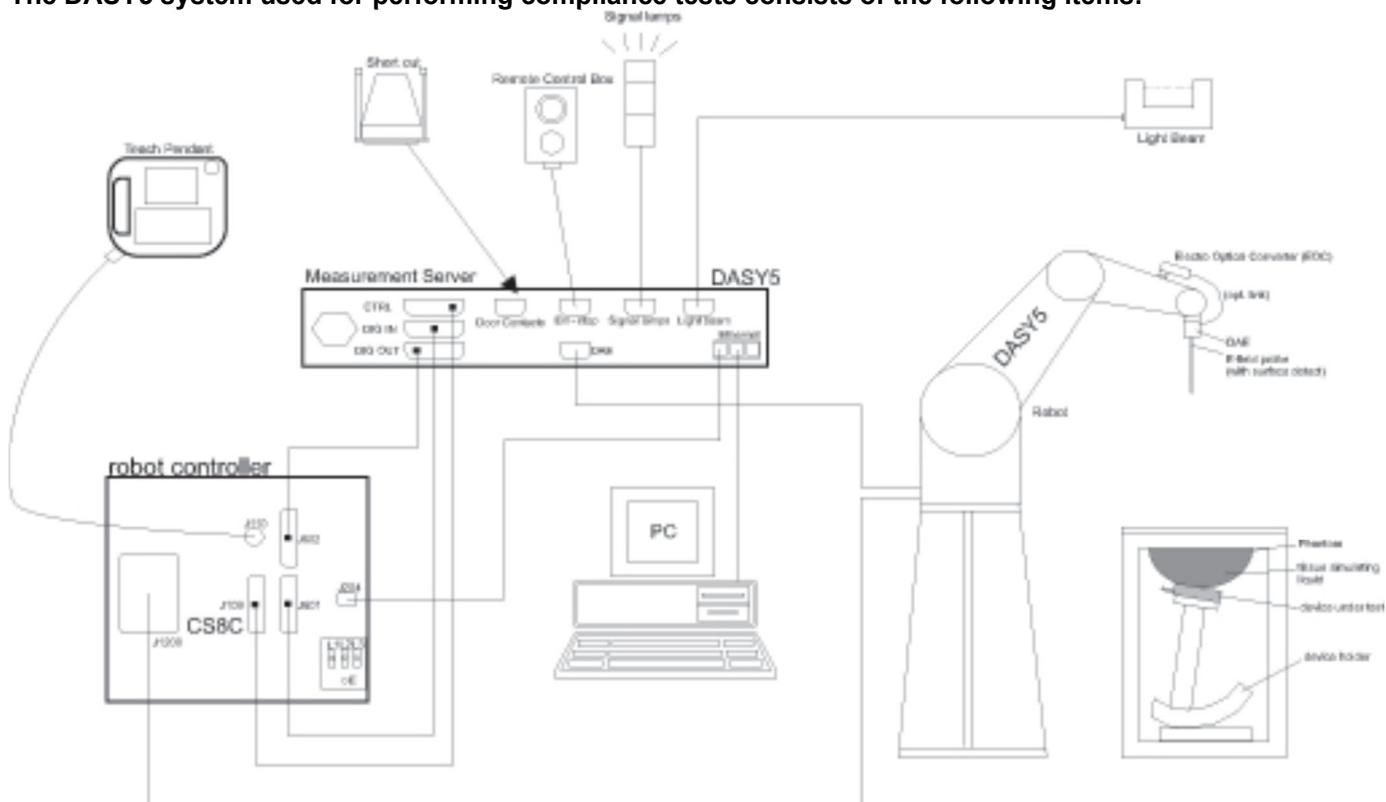
3. Facilities and Accreditation

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 in 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 be 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	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
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 \leq the corresponding x or y dimension of the test device with at least one measurement point on the test device.	



Step 3: Zoom Scan

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

Zoom Scan Parameters extracted from KDB 865664 D01 v01r04 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 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
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	2021.11.29
Data Acquisition Electronic	SPEAG	DAE3	427	2022.4.08
Dipole Kit 2450 MHz	SPEAG	D2450V2	977	2021.12.03
Dipole Kit 5 GHz	SPEAG	D5GHzV2	1231	2021.12.13
Software	SPEAG	DASY52	N/A	NCR
Twin Phantom	SPEAG	SAM V5.0	1805	NCR
ELI Phantom	SPEAG	ELI V5.0	1235	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.

- There is no physical damage on the dipole;
- System check with specific dipole is within 10% of calibrated value;
- The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement. Refer to App E dipole calibration record.
- The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the previous measurement. Refer to App E dipole calibration record.
- Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.



5. Measurement Uncertainty

5.1. Uncertainty budget list (30MHz to 3GHz).

Uncertainty component	Tol. (±%)	Prob. Dist.	Div.	C _i (1g)	C _i (10g)	U _i 1g (±%)	U _i 10g (±%)
Measurement system							
Probe Calibration	6.0	N	1	1	1	6.0	6.0
Axial Isotropy	4.7	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	1.9	1.9
Hemispherical Isotropy	9.6	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	3.9	3.9
Boundary Effects	1.0	R	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	R	$\sqrt{3}$	1	1	2.7	2.7
System Detection Limits	1.0	R	$\sqrt{3}$	1	1	0.6	0.6
Modulation Response ^m	2.4	R	$\sqrt{3}$	1	1	1.4	1.4
Readout Electronics	0.3	N	1	1	1	0.3	0.3
Response Time	0.8	R	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	2.6	R	$\sqrt{3}$	1	1	1.5	1.5
RF Ambient Noise	3.0	R	$\sqrt{3}$	1	1	1.7	1.7
RF Ambient Reflections	3.0	R	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner	0.4	R	$\sqrt{3}$	1	1	0.2	0.2
Probe Positioning	2.9	R	$\sqrt{3}$	1	1	1.7	1.7
Max. SAR Eval.	2.0	R	$\sqrt{3}$	1	1	1.2	1.2
Test sample related							
Device Positioning	2.9	N	1	1	1	2.9	2.9
Device Holder	3.6	N	1	1	1	3.6	3.6
Power Drift	5.0	R	$\sqrt{3}$	1	1	2.9	2.9
Power Scaling	0	R	$\sqrt{3}$	1	1		
Phantom and set-up							
Phantom Uncertainty	6.1	R	$\sqrt{3}$	1	1	3.5	3.5
SAR correction	1.9	R	$\sqrt{3}$	1	0.84	1.1	0.9
Liquid Conductivity (mea.)	2.5	R	$\sqrt{3}$	0.78	0.71	1.1	1.0
Liquid Permittivity (mea.)	2.5	R	$\sqrt{3}$	0.26	0.26	0.4	0.4
Temp. unc. - Conductivity	3.4	R	$\sqrt{3}$	0.23	0.26	0.5	0.5
Temp. unc. - Permittivity	0.4	R	$\sqrt{3}$	0.78	0.71	0.2	0.2
Combined standard uncertainty						10.58	10.54
Expanded uncertainty (95% confidence interval) k=2						21.16	21.08



5.2. Uncertainty budget list (3GHz to 6GHz).

Uncertainty component	Tol. (±%)	Prob. Dist.	Div.	C _i (1g)	C _i (10g)	U _i 1g (±%)	U _i 10g (±%)
Measurement system							
Probe Calibration	6.5	N	1	1	1	6.5	6.5
Axial Isotropy	4.7	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	1.9	1.9
Hemispherical Isotropy	9.6	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	3.9	3.9
Boundary Effects	1.0	R	$\sqrt{3}$	1	1	0.6	0.6
Linearity	4.7	R	$\sqrt{3}$	1	1	2.7	2.7
System Detection Limits	1.0	R	$\sqrt{3}$	1	1	0.6	0.6
Modulation Response	2.4	R	$\sqrt{3}$	1	1	1.4	1.4
Readout Electronics	0.3	N	1	1	1	0.3	0.3
Response Time	0.8	R	$\sqrt{3}$	1	1	0.5	0.5
Integration Time	2.6	R	$\sqrt{3}$	1	1	1.5	1.5
RF Ambient Noise	3.0	R	$\sqrt{3}$	1	1	1.7	1.7
RF Ambient Reflections	3.0	R	$\sqrt{3}$	1	1	1.7	1.7
Probe Positioner	0.4	R	$\sqrt{3}$	1	1	0.2	0.2
Probe Positioning	6.7	R	$\sqrt{3}$	1	1	3.9	3.9
Max. SAR Eval.	4.0	R	$\sqrt{3}$	1	1	2.3	2.3
Test sample related							
Device Positioning	2.9	N	1	1	1	2.9	2.9
Device Holder	3.6	N	1	1	1	3.6	3.6
Power Drift	5.0	R	$\sqrt{3}$	1	1	2.9	2.9
Power Scaling	0	R	$\sqrt{3}$	1	1	0.0	0.0
Phantom and set-up							
Phantom Uncertainty	6.1	R	$\sqrt{3}$	1	1	3.5	3.5
SAR correction	1.9	R	$\sqrt{3}$	1	0.84	1.1	0.9
Liquid Conductivity (mea.)	2.5	R	$\sqrt{3}$	0.78	0.71	1.1	1.0
Liquid Permittivity (mea.)	2.5	R	$\sqrt{3}$	0.26	0.26	0.4	0.4
Temp. unc. - Conductivity	3.4	R	$\sqrt{3}$	0.23	0.26	0.5	0.5
Temp. unc. - Permittivity	0.4	R	$\sqrt{3}$	0.78	0.71	0.2	0.2
Combined standard uncertainty						11.59	11.55
Expanded uncertainty (95% confidence interval) k=2						23.18	23.11



6. Device Under Test (DUT) Information

6.1. DUT Description

The EUT named HASSELBLAD™ X2D 100c is Hasselblad's next generation mirrorless medium format digital camera that allows users to achieve smarter and more stable shooting with face tracking, and 5-axis in body image stabilization (IBIS). The EUT supports IEEE802.11b/g/a/n/ac/ax and Bluetooth radio.

Dimension	Overall (Length x Width x Height): 148.44 mm x 73.42 mm x 105.73 mm
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6.2. Wireless Technology

Wireless technology	Frequency band
Wi-Fi	2.4GHz
Wi-Fi	5GHz
BLE	2.4GHz

6.3. Antenna Gain

Antenna	Ant Type	Frequency(MHz)	Antenna Gain(dBi)
Ant 0	PIFA	2.4GHz~2.483GHz	2.5
		5.15GHz~5.25GHz	-3
		5.725GHz~5.85GHz	1
Ant 1	PIFA	2.4GHz~2.483GHz	2.5
		5.15GHz~5.25GHz	-3
		5.725GHz~5.85GHz	0



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	Antenna 1		Antenna 2		SAR Test	Duty Cycle (%)	
				Average Power (dBm)	Tune-up Limit (dBm)	Average Power (dBm)	Tune-up Limit (dBm)			
802.11b	1	2412	1Mbps	16.87	18.0	16.61	17.0	Required	99.88	
	6	2437		17.53	18.0	16.95	17.0			
	11	2462		17.07	18.0	16.96	17.0			
802.11g	1	2412	6Mbps	Not Required	17.0	Not Required	16.5	Excluded	\	
	6	2437			17.0		16.5			
	11	2462			17.0		16.5			
802.11n20	1	2412	HT0		13.5		13.5	Excluded		
	6	2437			13.5		13.5			
	11	2462			13.5		13.5			
802.11n40	3	2422			12.5		12.0	Excluded		
	6	2437			12.5		12.0			
	9	2452			12.5		12.0			
802.11ac20	1	2412			VHT0		13.5	13.5		Excluded
	6	2437					13.5	13.5		
	11	2462					13.5	13.5		
802.11ac40	3	2422	12.5				12.0	Excluded		
	6	2437	12.5				12.0			
	9	2452	12.5				12.0			
802.11ax20	1	2412	HE0				13.5	13.0		Excluded
	6	2437					13.5	13.0		
	11	2462					13.5	13.0		
802.11ax40	3	2422			12.5		12.0	Excluded		
	6	2437			12.5		12.0			
	9	2452			12.5		12.0			

Note:

- 1) As per KDB 447498 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	Antenna 1		Antenna 2		SAR Test	Duty Cycle (%)
				Average Power (dBm)	Tune-up Limit (dBm)	Average Power (dBm)	Tune-up Limit (dBm)		
802.11a	36	5180	6Mbps	17.06	17.5	16.77	17.0	Required	99.29
	40	5200		17.12	17.5	16.77	17.0		
	44	5220		17.10	17.5	16.53	17.0		
	48	5240		17.23	17.5	16.88	17.0		
802.11n20	36	5180	HT0	Not Required	16.0	Not Required	16.0	Excluded	\
	40	5200			16.0		16.0		
	44	5220			16.0		16.0		
	48	5240			16.0		16.0		
802.11ac20	36	5180	VHT0		16.0		16.0	Excluded	
	40	5200			16.0		16.0		
	44	5220			16.0		16.0		
	48	5240			16.0		16.0		
802.11ax20	36	5180	HE0		16.5		16.5	Excluded	
	40	5200			16.5		16.5		
	44	5220			16.5		16.5		
	48	5240			16.5		16.5		
802.11n40	38	5190	HT0		17.0		16.5	Excluded	
	46	5230			17.0		16.5		
802.11ac40	38	5190	VHT0		17.0		16.5	Excluded	
	46	5230			17.0		16.5		
802.11ax40	38	5190	HE0	17.0	16.5	Excluded			
	46	5230		17.0	16.5				
802.11ac80	42	5210	VHT0	17.0	16.5	Excluded			
802.11ax80	42	5210	HE0	17.0	16.5	Excluded			

Note:

- 1) As per KDB 447498 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.



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

Mode	Channel	Frequency (MHz)	Data Rate	Antenna 1		Antenna 2		SAR Test	Duty Cycle (%)
				Average Power (dBm)	Tune-up Limit (dBm)	Average Power (dBm)	Tune-up Limit (dBm)		
802.11a	149	5745	6Mbps	16.68	17.0	16.47	17.0	Required	99.29
	153	5765		16.53	17.0	16.62	17.0		
	157	5785		16.61	17.0	16.68	17.0		
	161	5805		16.45	17.0	16.51	17.0		
	165	5825		16.60	17.0	16.75	17.0		
802.11n20	149	5745	HT0	Not Required	16.5	Not Required	16.5	Excluded	\
	153	5765			16.5		16.5		
	157	5785			16.5		16.5		
	161	5805			16.5		16.5		
	165	5825			16.5		16.5		
802.11ac20	149	5745	VHT0		16.5		16.5	Excluded	
	153	5765			16.5		16.5		
	157	5785			16.5		16.5		
	161	5805			16.5		16.5		
	165	5825			16.5		16.5		
802.11ax20	149	5745	HE0		16.5		16.5	Excluded	
	153	5765			16.5		16.5		
	157	5785			16.5		16.5		
	161	5805			16.5		16.5		
	165	5825			16.5		16.5		
802.11n40	151	5755	HT0		16.5		16.5	Excluded	
	159	5795			16.5		16.5		
802.11ac40	151	5755	VHT0	16.5	16.5	Excluded			
	159	5795		16.5	16.5				
802.11ax40	151	5755	HE0	16.5	16.5	Excluded			
	159	5795		16.5	16.5				
802.11ac80	155	5775	VHT0	16.5	16.5	Excluded			
802.11ax80	155	5775	HE0	16.5	16.5	Excluded			

Note:

- 1) As per KDB 447498 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 Bluetooth.

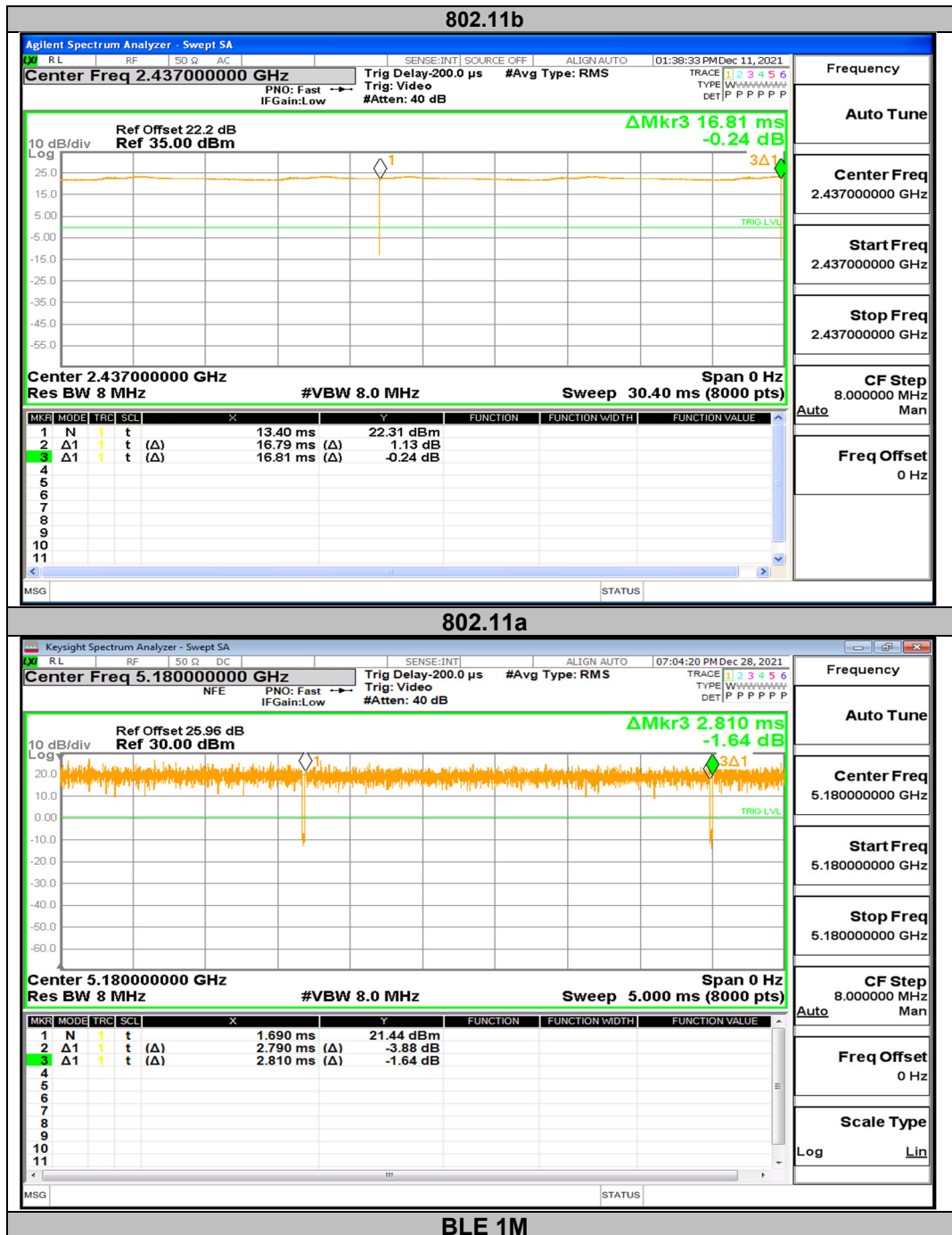
Band	Data Rate	Channel	Frequency (MHz)	Antenna 1		Duty Cycle (%)
				Average Power (dBm)	Tune-up Limit (dBm)	
2.4GHz	BLE 1M	0	2402	5.53	7.5	12.90
		19	2440	6.2		
		39	2480	7.11		
2.4GHz	BLE 2M	0	2402	5.65	7.5	\
		19	2440	6.15		
		39	2480	7.02		

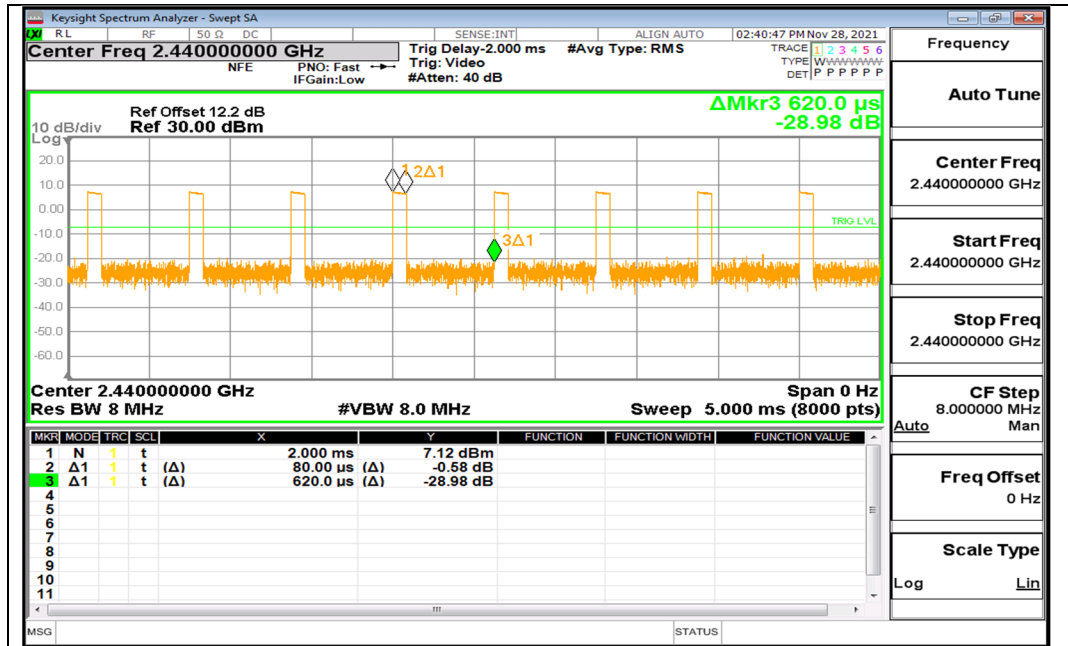
Note:

- 1) As per KDB 447498 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.

7.5. Duty Cycle.

Test Mode	Channel	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
802.11b	2437	16.79	16.81	99.88
802.11a	5180	2.79	2.81	99.29
BLE 1M	2440	0.08	0.62	12.90





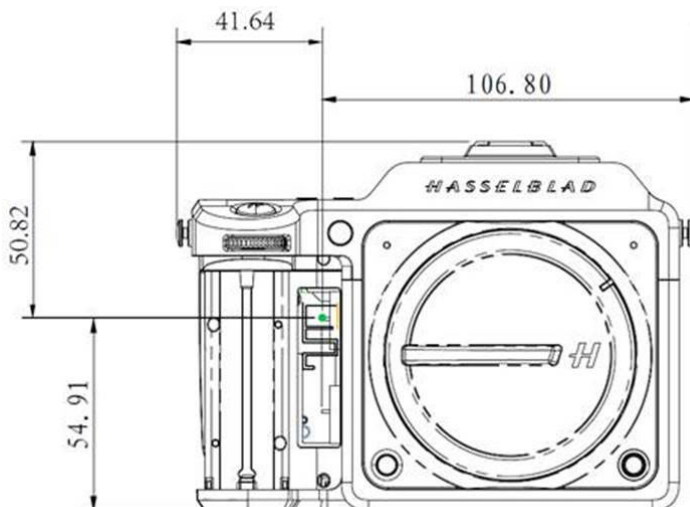
8. RF Exposure Conditions

The EUT named HASSELBLAD™ X2D 100c is Hasselblad's next generation mirrorless medium format digital camera that allows users to achieve smarter and more stable shooting with face tracking, and 5-axis in body image stabilization (IBIS).

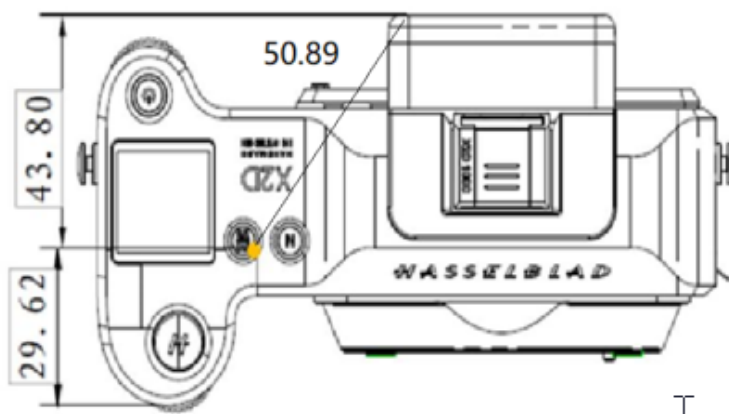
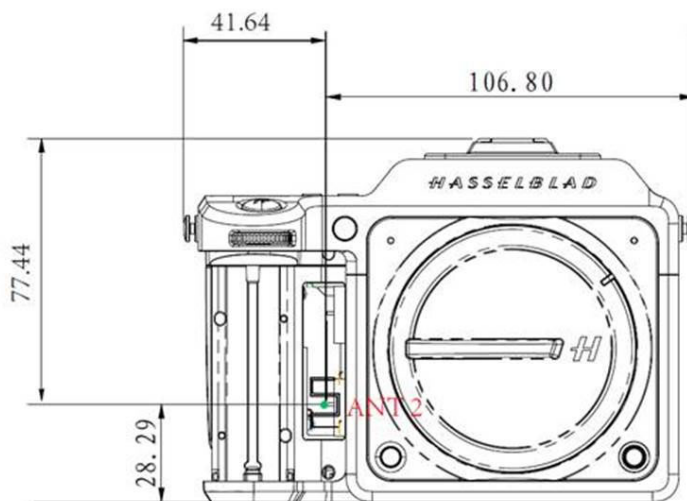
According to the description of the user manual, when operating the equipment, the hand will grasp the side of the equipment and the head will be close to the screen of the equipment for shooting; When the EUT is not in use, the equipment can be hung on the body through accessories.

Please refer to the figure below for the location of the antenna.

ANT 1



ANT2



T



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 $\pm 2^\circ\text{C}$ 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.

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				Deviation(%)		Limit (%)	Temp. (°C)	Test Date
		Measured		Target						
		ϵ _r	σ	ϵ _r	σ	ϵ _r	σ			
Head 2450	2400	40.13	1.81	39.29	1.76	2.14	3.10	±5	21.6	2021.11.22
	2450	40.21	1.84	39.2	1.8	2.58	2.22			
	2500	40.59	1.87	39.14	1.85	3.71	0.83			
Head 5250	5100	36.71	4.72	36.10	4.55	1.69	3.68	±5	21.6	2021.11.22
	5250	36.52	4.78	35.93	4.71	1.65	1.57			
	5400	36.42	4.91	35.76	4.86	1.85	1.03			
Head 5750	5650	36.55	5.31	35.47	5.12	3.04	3.79	±5	21.1	2021.11.23
	5750	36.72	5.41	35.36	5.22	3.85	3.66			
	5850	36.40	5.42	35.25	5.27	3.26	2.80			



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 \pm 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 \geq 15.0 cm for SAR measurements \leq 3 GHz and \geq 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(\leq 2GHz), 12 mm in x- and y-dimension(2-4 GHz) and 10mm in x- and y- dimension(4-6GHz).
- For zoom scan, ΔX_{zoom} , $\Delta Y_{zoom} \leq$ 2GHz - \leq 8mm, 2-4GHz - \leq 5 mm and 4-6 GHz- \leq 4mm; $\Delta Z_{zoom} \leq$ 3GHz - \leq 5 mm, 3-4 GHz- \leq 4mm and 4-6GHz- \leq 2mm.
- 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	12.5	50.00	53.7	-6.89	\pm 10	21.6	2021.11.22
	10-g	5.8	23.20	25	-7.20	\pm 10		
Head 5250	10-g	7.47	74.70	78.6	-4.96	\pm 10	21.6	2021.11.22
	10-g	2.26	22.60	22.5	0.44	\pm 10		
Head 5750	1-g	8.03	80.30	80	0.37	\pm 10	21.1	2021.11.23
	10-g	2.35	23.50	22.8	3.07	\pm 10		



10. Measured and Reported (Scaled) SAR Results

As per KDB 447498 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 v06, 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.

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.

Head SAR								
Test Position and Distance (0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/kg)			
ANT1								
Front Surface	802.11b	2437	18.0	17.53	<0.001	0.00	99.88	<0.001
ANT2								
Front Surface	802.11b	2462	17.0	16.96	0.001	0.00	99.88	0.001

Note:

- 1) The output power of the device was set to transmit at maximum power for all tests.

Body SAR								
Test Position and Distance (0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/kg)			
ANT1								
Back Surface	802.11b	2437	18.0	17.53	0.064	-0.05	99.88	0.071
Front Surface	802.11b	2437	18.0	17.53	<0.001	0.00	99.88	<0.001
Right Edge	802.11b	2437	18.0	17.53	0.022	0.00	99.88	0.024
Left Edge	802.11b	2437	18.0	17.53	<0.001	0.00	99.88	<0.001
Top Edge	802.11b	2437	18.0	17.53	<0.001	0.00	99.88	<0.001
Bottom Edge	802.11b	2437	18.0	17.53	<0.001	0.00	99.88	<0.001
ANT2								
Back Surface	802.11b	2462	17.0	16.96	0.077	-0.04	99.88	0.078
Front Surface	802.11b	2462	17.0	16.96	0.001	0.00	99.88	0.001
Right Edge	802.11b	2462	17.0	16.96	0.038	-0.02	99.88	0.039
Left Edge	802.11b	2462	17.0	16.96	<0.001	0.00	99.88	<0.001
Top Edge	802.11b	2462	17.0	16.96	<0.001	0.00	99.88	<0.001
Bottom Edge	802.11b	2437	17.0	16.96	<0.001	0.00	99.88	<0.001

Note:

- 1) The output power of the device was set to transmit at maximum power for all tests.



Limb								
Test Position and Distance (0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	10-g (W/kg)			
ANT1								
Back Surface	802.11b	2437	18.0	17.53	0.034	-0.05	99.88	0.038
Front Surface	802.11b	2437	18.0	17.53	<0.001	0.00	99.88	<0.001
Right Edge	802.11b	2437	18.0	17.53	0.012	0.00	99.88	0.013
Left Edge	802.11b	2437	18.0	17.53	<0.001	0.00	99.88	<0.001
Top Edge	802.11b	2437	18.0	17.53	<0.001	0.00	99.88	<0.001
Bottom Edge	802.11b	2437	18.0	17.53	<0.001	0.00	99.88	<0.001
ANT2								
Back Surface	802.11b	2462	17.0	16.96	0.041	-0.04	99.88	0.041
Front Surface	802.11b	2462	17.0	16.96	<0.001	0.00	99.88	<0.001
Right Edge	802.11b	2462	17.0	16.96	0.019	-0.02	99.88	0.019
Left Edge	802.11b	2462	17.0	16.96	<0.001	0.00	99.88	<0.001
Top Edge	802.11b	2462	17.0	16.96	<0.001	0.00	99.88	<0.001
Bottom Edge	802.11b	2462	17.0	16.96	<0.001	0.00	99.88	<0.001

Note:

- 1) The output power of the device was set to transmit at maximum power for all tests.



10.2. SAR Test Results of 5.2GHz Wi-Fi.

Head SAR								
Test Position and Distance (0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/kg)			
ANT1								
Front Surface	802.11a	5240	17.5	17.23	<0.001	0.00	99.29	<0.001
ANT2								
Front Surface	802.11a	5240	17.0	16.88	<0.001	0.00	99.29	<0.001

Note:

- 1) The output power of the device was set to transmit at maximum power for all tests.

Body SAR								
Test Position and Distance (0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/kg)			
ANT1								
Back Surface	802.11a	5240	17.5	17.23	0.256	-0.06	99.29	0.274
Front Surface	802.11a	5240	17.5	17.23	<0.001	0.00	99.29	<0.001
Right Edge	802.11a	5240	17.5	17.23	0.071	-0.01	99.29	0.076
Left Edge	802.11a	5240	17.5	17.23	<0.001	0.00	99.29	<0.001
Top Edge	802.11a	5240	17.5	17.23	<0.001	0.00	99.29	<0.001
Bottom Edge	802.11a	5240	17.5	17.23	<0.001	0.00	99.29	<0.001
ANT2								
Back Surface	802.11a	5240	17.0	16.88	0.355	-0.12	99.29	0.368
Front Surface	802.11a	5240	17.0	16.88	<0.001	0.00	99.29	<0.001
Right Edge	802.11a	5240	17.0	16.88	0.003	-0.01	99.29	0.003
Left Edge	802.11a	5240	17.0	16.88	<0.001	0.00	99.29	<0.001
Top Edge	802.11a	5240	17.0	16.88	<0.001	0.00	99.29	<0.001
Bottom Edge	802.11a	5240	17.0	16.88	<0.001	0.00	99.29	<0.001

Note:

- 1) The output power of the device was set to transmit at maximum power for all tests.



Limb								
Test Position and Distance (0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	10-g (W/kg)			
ANT1								
Back Surface	802.11a	5240	17.5	17.23	0.085	-0.06	99.29	0.091
Front Surface	802.11a	5240	17.5	17.23	<0.001	0.00	99.29	<0.001
Right Edge	802.11a	5240	17.5	17.23	0.028	-0.01	99.29	0.030
Left Edge	802.11a	5240	17.5	17.23	<0.001	0.00	99.29	<0.001
Top Edge	802.11a	5240	17.5	17.23	<0.001	0.00	99.29	<0.001
Bottom Edge	802.11a	5240	17.5	17.23	<0.001	0.00	99.29	<0.001
ANT2								
Back Surface	802.11a	5240	17.0	16.88	0.155	-0.12	99.29	0.185
Front Surface	802.11a	5240	17.0	16.88	<0.001	0.00	99.29	<0.001
Right Edge	802.11a	5240	17.0	16.88	<0.001	0.00	99.29	<0.001
Left Edge	802.11a	5240	17.0	16.88	<0.001	0.00	99.29	<0.001
Top Edge	802.11a	5240	17.0	16.88	<0.001	0.00	99.29	<0.001
Bottom Edge	802.11a	5240	17.0	16.88	<0.001	0.00	99.29	<0.001

Note:

- 1) The output power of the device was set to transmit at maximum power for all tests.



10.3. SAR Test Results of 5.8GHz Wi-Fi.

Head SAR								
Test Position and Distance (0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/kg)			
ANT1								
Front Surface	802.11a	5745	17.0	16.68	<0.001	0.00	99.29	<0.001
ANT2								
Front Surface	802.11a	5785	17.0	16.75	<0.001	0.00	99.29	<0.001

Note:

- 1) The output power of the device was set to transmit at maximum power for all tests.

Body SAR								
Test Position and Distance (0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/kg)			
ANT1								
Back Surface	802.11a	5745	17.0	16.68	0.414	0.02	99.29	0.449
Front Surface	802.11a	5745	17.0	16.68	<0.001	0.00	99.29	<0.001
Right Edge	802.11a	5745	17.0	16.68	0.042	0.03	99.29	0.046
Left Edge	802.11a	5745	17.0	16.68	0.025	0.01	99.29	0.027
Top Edge	802.11a	5745	17.0	16.68	<0.001	0.00	99.29	<0.001
Bottom Edge	802.11a	5745	17.0	16.68	<0.001	0.00	99.29	<0.001
ANT2								
Back Surface	802.11a	5785	17.0	16.75	0.307	-0.03	99.29	0.328
Front Surface	802.11a	5785	17.0	16.75	<0.001	0.00	99.29	<0.001
Right Edge	802.11a	5785	17.0	16.75	0.073	0.00	99.29	0.078
Left Edge	802.11a	5785	17.0	16.75	<0.001	0.00	99.29	<0.001
Top Edge	802.11a	5785	17.0	16.75	<0.001	0.00	99.29	<0.001
Bottom Edge	802.11a	5785	17.0	16.75	<0.001	0.00	99.29	<0.001

Note:

- 1) The output power of the device was set to transmit at maximum power for all tests.



Limb								
Test Position and Distance (0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	10-g (W/kg)			
ANT1								
Back Surface	802.11a	5745	17.0	16.68	0.174	0.02	99.29	0.189
Front Surface	802.11a	5745	17.0	16.68	<0.001	0.00	99.29	<0.001
Right Edge	802.11a	5745	17.0	16.68	0.014	0.03	99.29	0.016
Left Edge	802.11a	5745	17.0	16.68	0.010	0.01	99.29	0.011
Top Edge	802.11a	5745	17.0	16.68	<0.001	0.00	99.29	<0.001
Bottom Edge	802.11a	5745	17.0	16.68	<0.001	0.00	99.29	<0.001
ANT2								
Back Surface	802.11a	5785	17.0	16.75	0.130	-0.03	99.29	0.139
Front Surface	802.11a	5785	17.0	16.75	<0.001	0.00	99.29	<0.001
Right Edge	802.11a	5785	17.0	16.75	0.014	0.00	99.29	0.015
Left Edge	802.11a	5785	17.0	16.75	<0.001	0.00	99.29	<0.001
Top Edge	802.11a	5785	17.0	16.75	<0.001	0.00	99.29	<0.001
Bottom Edge	802.11a	5785	17.0	16.75	<0.001	0.00	99.29	<0.001

Note:

- 1) The output power of the device was set to transmit at maximum power for all tests.



10.4. SAR Test Results of Bluetooth.

Head SAR								
Test Position and Distance (0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/kg)			
ANT2								
Front Surface	BLE 1M	2480	7.5	7.11	<0.001	0.000	12.90	<0.001

Body SAR								
Test Position and Distance (0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/kg)			
ANT2								
Back Surface	BLE 1M	2480	7.5	7.11	<0.001	0.000	12.90	<0.001
Front Surface	BLE 1M	2480	7.5	7.11	<0.001	0.000	12.90	<0.001
Right Edge	BLE 1M	2480	7.5	7.11	<0.001	0.000	12.90	<0.001
Left Edge	BLE 1M	2480	7.5	7.11	<0.001	0.000	12.90	<0.001
Top Edge	BLE 1M	2480	7.5	7.11	<0.001	0.000	12.90	<0.001
Bottom Edge	BLE 1M	2480	7.5	7.11	<0.001	0.000	12.90	<0.001

Limb SAR								
Test Position and Distance (0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	10-g (W/kg)			
ANT2								
Back Surface	BLE 1M	2480	7.5	7.11	<0.001	0.000	12.90	<0.001
Front Surface	BLE 1M	2480	7.5	7.11	<0.001	0.000	12.90	<0.001
Right Edge	BLE 1M	2480	7.5	7.11	<0.001	0.000	12.90	<0.001
Left Edge	BLE 1M	2480	7.5	7.11	<0.001	0.000	12.90	<0.001
Top Edge	BLE 1M	2480	7.5	7.11	<0.001	0.000	12.90	<0.001
Bottom Edge	BLE 1M	2480	7.5	7.11	<0.001	0.000	12.90	<0.001



11. Simultaneous Transmission SAR Analysis

Per FCC KDB 447498D01, SAR compliance for simultaneous transmission must be considered when the maximum duration of overlapping transmissions, including network hand-offs, is greater than 30 seconds. This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis.

The Simultaneous Transmission Possibilities of this device are as below:

combination	
1	2.4GHz Wi-Fi + 2.4GHz Wi-Fi
2	5GHz Wi-Fi + 5GHz Wi-Fi

Note:

- 1) 2.4GHz Wi-Fi & BT, 5GHz Wi-Fi & BT, 2.4GHz Wi-Fi & 5GHz Wi-Fi can't transmit in simultaneous.

11.1. Simultaneous Transmission calculation.

Simultaneous Transmission				
RF Exposure Conditions	2.4GHz Wi-Fi Ant 1	2.4GHz Wi-Fi Ant 2	Σ SAR 1-g (W/kg)	Limit (W/kg)
Head	<0.001	0.001	0.001	1.6
Body	0.071	0.078	0.149	
RF Exposure Conditions	2.4GHz Wi-Fi Ant 1	2.4GHz Wi-Fi Ant 2	Σ SAR 10-g (W/kg)	4
Limb	0.038	0.041	0.079	

Simultaneous Transmission				
RF Exposure Conditions	5GHz Wi-Fi Ant 1	5GHz Wi-Fi Ant 2	Σ SAR 1-g (W/kg)	Limit (W/kg)
Head	<0.001	<0.001	<0.001	1.6
Body	0.449	0.368	0.817	
RF Exposure Conditions	5GHz Wi-Fi Ant 1	5GHz Wi-Fi Ant 2	Σ SAR 10-g (W/kg)	4
Limb	0.189	0.185	0.374	



Appendixes

Refer to separated files for the following appendixes.

4790183964-SAR-1_App A Photo (STC_180days)

4790183964-SAR-1-SAR_App B System Check Plots

4790183964-SAR-1-SAR_App C Highest Test Plots

4790183964-SAR-1-SAR_App D Cal. Certificates

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