SAR EVALUATION REPORT

FCC 47 CFR § 2.1093
IEEE Std. 1528-2013
IEC/IEEE 62209-1528:2020

For
Portable Stream Media Player

FCC ID: 2ATNDGOOVISD4-H2

Model: D4-H2

Report Number: 4790829068-SAR-1

Issue Date: Jun 2, 2023

Prepared for
Shenzhen NED Optics Co., Ltd.
4105, Building 1, CFC Building, South side of Shihua Road, Fubao Community, Fubao Street, Futian District, Shenzhen City, Guangdong Province, P.R. China.

Prepared by
UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch
Building 10, Innovation Technology Park, No. 1, Li Bin Road, Song Shan Lake Hi-Tech Development Zone Dongguan, People's Republic of China

Tel: +86 769 22038881
Fax: +86 769 33244054
Website: www.ul.com

Revision History

Rev.	Date	Revisions	Revised By
V1.0	Jun 2, 2023	Initial Issue	\

Note:

1. The Measurement result for the sample received is<Pass> according to < < IEEE Std. 1528> 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.

Table of Contents

1. Attestation of Test Results

Applicant Name	Shenzhen NED Optics Co., Ltd.	
Address	4105, Building 1, CFC Building, South side of Shihua Road, Fubao Community, Fubao Street, Futian District, Shenzhen City, Guangdong Province, P.R. China.	
Manufacturer	Shenzhen SDMC Technology Co., Ltd.	
Address	19/F,Changhong Science & Technology Mansion, No.18, Keji South 12th Road, High-tech Industrial Park, Nanshan District, Shenzhen, China	
EUT Name	Portable Stream Media Player	
Model	D4-H2	
Sample Status	Normal	
Sample Received Date	May 4, 2023	
Date of Tested	May 11 ~ May 24, 2023	
Applicable Standards	FCC 47 CFR § 2.1093 IEEE Std. 1528-2013 KDB publication IEC/IEEE 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	**Equipment Class**	
	DSS	**DTS**	**U-NII**
Body (1-g)	0.024	1.150	1.167
Simultaneous Transmission (1-g)	1.191		
Test Results	Pass		

Prepared By:	Reviewed By:	Approved By:
Burt Hu	Denny Huang	Stephen Guo
Laboratory Engineer	Senior Project Engineer	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

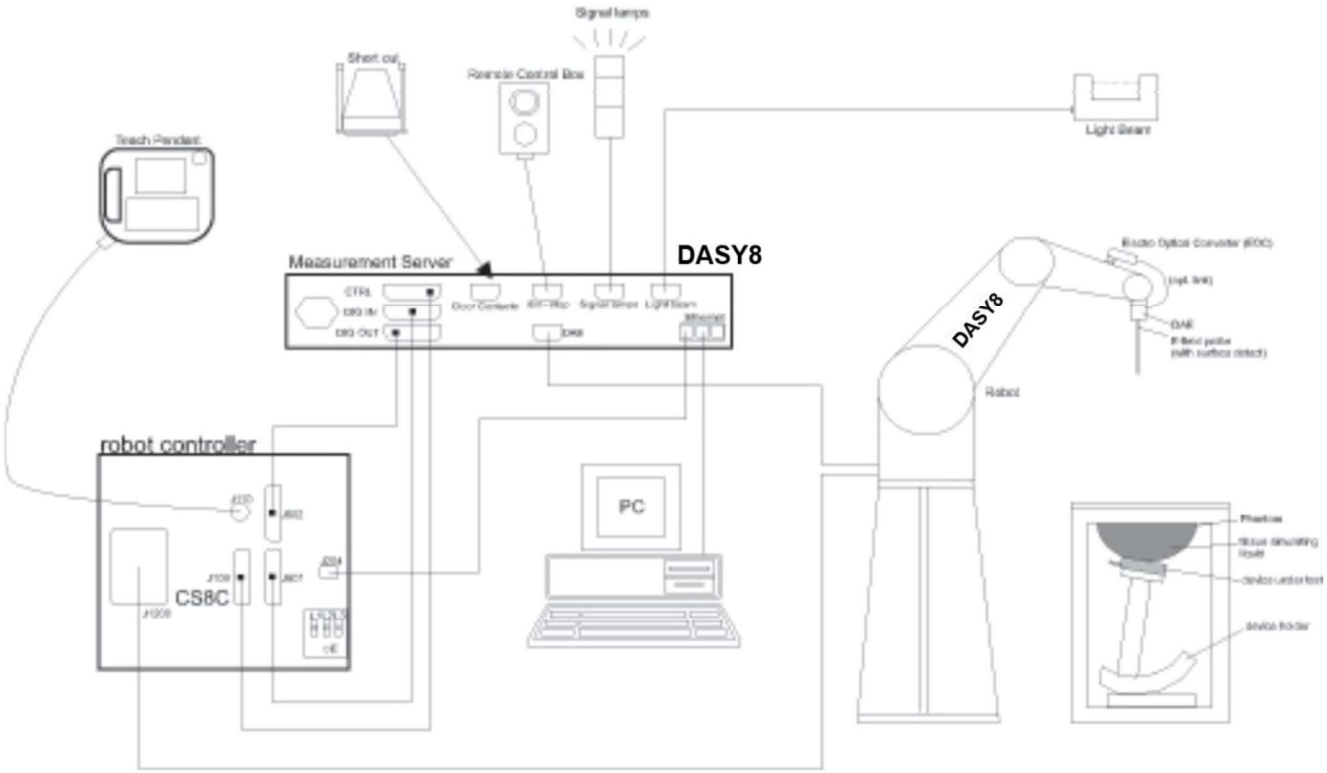
3. Facilities and Accreditation

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	**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. **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 **ISED (Company No.: 21320)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320 and the test lab Conformity Assessment Body Identifier (CABID) is CN0046. **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
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 DASY8 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 Win10 and the DASY8 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 EN IEC/IEEE 62209-1528:2021. 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 EN IEC/IEEE 62209-1528:2021:

Table 3 – Area scan parameters

Parameter	DUT transmit frequency being tested	
	$f \leq 3$ GHz	3 GHz $< f \leq 10$ GHz
Maximum distance between the measured points (geometric centre of the sensors) and the inner phantom surface (z_{M1} in Figure 20 in mm)	5 ± 1	$\delta \ln(2)/2 \pm 0,5$ [a]
Maximum spacing between adjacent measured points in mm (see O.8.3.1)[b]	20, or half of the corresponding zoom scan length, whichever is smaller	$60/f$, or half of the corresponding zoom scan length, whichever is smaller
Maximum angle between the probe axis and the phantom surface normal (α in Figure 20)[c]	5° (flat phantom only) 30° (other phantoms)	5° (flat phantom only) 20° (other phantoms)
Tolerance in the probe angle	1°	1°

[a] δ is the penetration depth for a plane-wave incident normally on a planar half-space.

[b] See Clause O.8 on how Δx and Δy may be selected for individual area scan requirements.

[c] The probe angle relative to the phantom surface normal is restricted due to the degradation in the measurement accuracy in fields with steep spatial gradients. The measurement accuracy decreases with increasing probe angle and increasing frequency. This is the reason for the tighter probe angle restriction at frequencies above 3 GHz.

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 EN IEC/IEEE 62209-1528:2021:

Parameter	DUT transmit frequency being tested	
	$f \leq 3$ GHz	3 GHz $< f \leq 10$ GHz
Maximum distance between the closest measured points and the phantom surface (z_{M1} in Figure 20 and Table 3, in mm)	5	$\delta \ln(2)/2$ [a]
Maximum angle between the probe axis and the phantom surface normal (α in Figure 20)	5° (flat phantom only) 30° (other phantoms)	5° (flat phantom only) 20° (other phantoms)
Maximum spacing between measured points in the x- and y-directions (Δx and Δy, in mm)	8	$24/f$ [b]
For uniform grids: Maximum spacing between measured points in the direction normal to the phantom shell (Δz_1 in Figure 20, in mm)	5	$10/(f-1)$
For graded grids: Maximum spacing between the two closest measured points in the direction normal to the phantom shell (Δz_1 in Figure 20, in mm)	4	$12/f$
For graded grids: Maximum incremental increase in the spacing between measured points in the direction normal to the phantom shell ($R_z = \Delta z_2/\Delta z_1$ in Figure 20)	1,5	1,5
Minimum edge length of the zoom scan volume in the x- and y-directions (L_z in O.8.3.2, in mm)	30	22
Minimum edge length of the zoom scan volume in the direction normal to the phantom shell (L_h in O.8.3.2 in mm)	30	22
Tolerance in the probe angle	1°	1°
[a] δ is the penetration depth for a plane-wave incident normally on a planar half-space. [b] This is the maximum spacing allowed, which might not work for all circumstances.		

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan (FCC only)

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

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	2023.10.16
Dielectric Probe kit	SPEAG	SM DAK 040 SA	1155	2025.02.27
DC power supply	Keysight	E36103A	MY55350020	2023.10.16
Signal Generator	Rohde & Schwarz	SME06	837633\001	2023.08.14
BI-Directional Coupler	KRYTAR	1850	54733	2023.10.16
Peak and Average Power Sensor	Keysight	E9325A	MY62220002	2023.10.25
Peak and Average Power Sensor	Keysight	E9325A	MY62220003	2023.10.25
Dual Channel PK Power Meter	Keysight	N1912A	MY55416024	2023.10.16
Amplifier	CORAD TECHNOLOGY LTD	AMF-4D-00400600-50-30P	1983561	NCR
Dosimetric E-Field Probe	SPEAG	EX3DV4	7733	2023.08.01
Data Acquisition Electronic	SPEAG	DAE4	1739	2023.07.28
Dipole Kit 2450 MHz	SPEAG	D2450V2	977	2024.12.16
Dipole Kit 5 GHz	SPEAG	D5GHzV2	1231	2024.12.15
Software	SPEAG	DASY8	N/A	NCR
ELI Phantom	SPEAG	ELI V8.0	2178	NCR
Thermometer	/	GX-138	150709653	2023.10.21
Thermometer	VICTOR	ITHX-SD-5	18470005	2023.10.21

Note:

1) As per KDB865664D01 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) Dielectric assessment kit is calibrated against air, distilled water and a shorting block performed before measuring liquid parameters.
3) NCR is short for "No Calibration Requirement".

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

EUT is a Portable Stream Media Player with 2.4/5GHz and Bluetooth radio.	
DUT Dimension	Overall (Length x Width x Height): 87.28mm x 61.4mm x 10.9mm

6.2. Wireless Technology

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

6.3. Antenna Gain

ANT A		
Antenna type	Band	Gain(dBi)
FPC	2.4 GHz	2.51
FPC	5 GHz	3.19

ANT B		
Antenna type	Band	Gain(dBi)
FPC	2.4 GHz	2.98
FPC	5 GHz	3.29

BT ANT		
Antenna type	Band	Gain(dBi)
Built-in	2.4 GHz	-1.14

7. Conducted Output Power Measurement and tune-up tolerance

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

Band	Mode	Date Rate	Ch.#	Freq. (MHz)	ANT A		ANT B	
					Avg. Pwr. (dBm)	Tune-up (dBm)	Avg. Pwr. (dBm)	Tune-up (dBm)
2.4GHz	802.11b	1Mbps	1	2412	20.17	20.5	19.51	20.8
			6	2437	20.31	20.5	20.4	20.8
			11	2462	20.13	20.5	20.75	20.8
	802.11g	6Mbps	1	2412	Not Required	13.0	Not Required	13.0
			6	2437	Not Required	13.0	Not Required	13.0
			11	2462	Not Required	13.0	Not Required	13.0
	802.11n HT20	MCS0	1	2412	11.36	11.5	10.79	11.5
			6	2437	10.88	11.5	10.24	11.5
			11	2462	10.75	11.5	10.17	11.5
	802.11n HT40	MCS0	3	2422	Not Required	10.5	Not Required	10.5
			6	2437	Not Required	10.5	Not Required	10.5
			9	2452	Not Required	10.5	Not Required	10.5

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 te maximum tune-up tolerance limit

7.2. Power measurement result of 5GHz Wi-Fi

Band	Mode	BW (MHz)	Ch.#	Freq. (MHz)	ANT A		ANT B	
					Avg. Pwr. (dBm)	Tune-up (dBm)	Avg. Pwr. (dBm)	Tune-up (dBm)
5.2 GHz & 5.3 GHz	802.11a 6Mbps	20	36	5180	Not Required	12.7	Not Required	12.0
			40	5200	Not Required	12.7	Not Required	12.0
			44	5220	Not Required	12.7	Not Required	12.0
			48	5240	Not Required	12.7	Not Required	12.0
			52	5260	Not Required	12.7	Not Required	12.0
			56	5280	Not Required	12.7	Not Required	12.0
			60	5300	Not Required	12.7	Not Required	12.0
			64	5320	Not Required	12.7	Not Required	12.0
	802.11n HT20	20	36	5180	Not Required	11.5	Not Required	11.5
			40	5200	Not Required	11.5	Not Required	11.5
			44	5220	Not Required	11.5	Not Required	11.5
			48	5240	Not Required	11.5	Not Required	11.5
			52	5260	Not Required	11.5	Not Required	11.5
			56	5280	Not Required	11.5	Not Required	11.5
			60	5300	Not Required	11.5	Not Required	11.5
			64	5320	Not Required	11.5	Not Required	11.5
	802.11ac VHT20	20	36	5180	Not Required	11.0	Not Required	11.0
			40	5200	Not Required	11.0	Not Required	11.0
			44	5220	Not Required	11.0	Not Required	11.0

			48	5240	Not Required	11.0	Not Required	11.0
			52	5260	Not Required	11.0	Not Required	11.0
			56	5280	Not Required	11.0	Not Required	11.0
			60	5300	Not Required	11.0	Not Required	11.0
			64	5320	Not Required	11.0	Not Required	11.0
	802.11n HT40	40	38	5190	11.27	11.5	10.51	11.5
			46	5230	12.71	13.0	11.08	13.0
			54	5270	11.18	11.5	11.18	11.5
			62	5310	11.78	12.0	11.78	12.0
	802.11ac VHT40	40	38	5190	Not Required	10.5	Not Required	10.5
			46	5230	Not Required	10.5	Not Required	10.5
			54	5270	Not Required	10.5	Not Required	10.5
			62	5310	Not Required	10.5	Not Required	10.5
	802.11ac VHT80	80	42	5210	Not Required	10.5	Not Required	10.5
			58	5290	Not Required	10.5	Not Required	10.5

Note:
2) 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.

Band	Mode	BW (MHz)	Ch.#	Freq. (MHz)	ANT A		ANT B	
					Avg. Pwr. (dBm)	Tune-up (dBm)	Avg Pwr (dBm)	Tune-up (dBm)
5.6 GHz	802.11a 6Mbps	20	100	5500	Not Required	11.5	Not Required	11.5
			104	5520	Not Required	11.5	Not Required	11.5
			108	5540	Not Required	11.5	Not Required	11.5
			112	5560	Not Required	11.5	Not Required	11.5
			116	5580	Not Required	11.5	Not Required	11.5
			120	5600	Not Required	11.5	Not Required	11.5
			124	5620	Not Required	11.5	Not Required	11.5
			128	5640	Not Required	11.5	Not Required	11.5
			132	5660	Not Required	11.5	Not Required	11.5
			136	5680	Not Required	11.5	Not Required	11.5
			140	5700	Not Required	11.5	Not Required	11.5
			145	5720	Not Required	11.5	Not Required	11.5
	802.11n HT20	20	100	5500	Not Required	10.5	Not Required	10.5
			104	5520	Not Required	10.5	Not Required	10.5
			108	5540	Not Required	10.5	Not Required	10.5
			112	5560	Not Required	10.5	Not Required	10.5
			116	5580	Not Required	10.5	Not Required	10.5
			120	5600	Not Required	10.5	Not Required	10.5
			124	5620	Not Required	10.5	Not Required	10.5
			128	5640	Not Required	10.5	Not Required	10.5
			132	5660	Not Required	10.5	Not Required	10.5
			136	5680	Not Required	10.5	Not Required	10.5
			140	5700	Not Required	10.5	Not Required	10.5
			145	5720	Not Required	10.5	Not Required	10.5
	802.11ac VHT20	20	100	5500	Not Required	10.5	Not Required	10.5
			104	5520	Not Required	10.5	Not Required	10.5
			108	5540	Not Required	10.5	Not Required	10.5
			112	5560	Not Required	10.5	Not Required	10.5
			116	5580	Not Required	10.5	Not Required	10.5
			120	5600	Not Required	10.5	Not Required	10.5
			124	5620	Not Required	10.5	Not Required	10.5
			128	5640	Not Required	10.5	Not Required	10.5
			132	5660	Not Required	10.5	Not Required	10.5
			136	5680	Not Required	10.5	Not Required	10.5
			140	5700	Not Required	10.5	Not Required	10.5
			145	5720	Not Required	10.5	Not Required	10.5
	802.11n HT40	40	102	5510	11.25	11.5	11.4	11.5
			110	5550	10.24	10.5	10.34	11.5
			118	5590	10.33	10.5	11.03	11.5
			126	5630	10.45	10.5	11.15	11.5
			134	5670	10.65	10.5	11.25	11.5
			142	5710	9.65	10.0	10.33	11.5

	802.11ac VHT40	40	102	5510	Not Required	11.0	Not Required	11.0
			110	5550	Not Required	11.0	Not Required	11.0
			118	5590	Not Required	11.0	Not Required	11.0
			126	5630	Not Required	11.0	Not Required	11.0
			134	5670	Not Required	11.0	Not Required	11.0
	802.11ac VHT80	80	106	5530	Not Required	10.5	Not Required	10.5
			122	5610	Not Required	10.5	Not Required	10.5
			138	5690	Not Required	10.5	Not Required	10.5

Band	Mode	BW (MHz)	Ch.#	Freq. (MHz)	ANT A		ANT B	
					Avg. Pwr. (dBm)	Tune-up (dBm)	Total Power (dBm)	Tune-up (dBm)
5.8GHz	802.11a 6Mbps	20	149	5745	Not Required	11.5	Not Required	11.5
			153	5765	Not Required	11.5	Not Required	11.5
			157	5785	Not Required	11.5	Not Required	11.5
			161	5805	Not Required	11.5	Not Required	11.5
			165	5825	Not Required	11.5	Not Required	11.5
	802.11n HT20	20	149	5745	Not Required	11.0	Not Required	11.0
			153	5765	Not Required	11.0	Not Required	11.0
			157	5785	Not Required	11.0	Not Required	11.0
			161	5805	Not Required	11.0	Not Required	11.0
			165	5825	Not Required	11.0	Not Required	11.0
	802.11ac VHT20	20	149	5745	Not Required	11.0	Not Required	11.0
			153	5765	Not Required	11.0	Not Required	11.0
			157	5785	Not Required	11.0	Not Required	11.0
			161	5805	Not Required	11.0	Not Required	11.0
			165	5825	Not Required	11.0	Not Required	11.0
	802.11n HT40	40	151	5755	10.7	11.0	11.67	12.0
			159	5795	11.36	11.5	11.61	12.0
	802.11ac VHT40	40	151	5755	Not Required	10.5	Not Required	10.5
			159	5795	Not Required	10.5	Not Required	10.5
	802.11ac VHT80	80	156	5775	Not Required	10.5	Not Required	10.5

Note:
3) 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

Type	Mode	Average Conducted Power (dBm)			Tune-up
		2402MHz	2441MHz	2480MHz	
BT	DH5	Not Required			7.5
BT	2DH5	Not Required			9.0
BT	3DH5	8.28	8.96	7.79	9.0

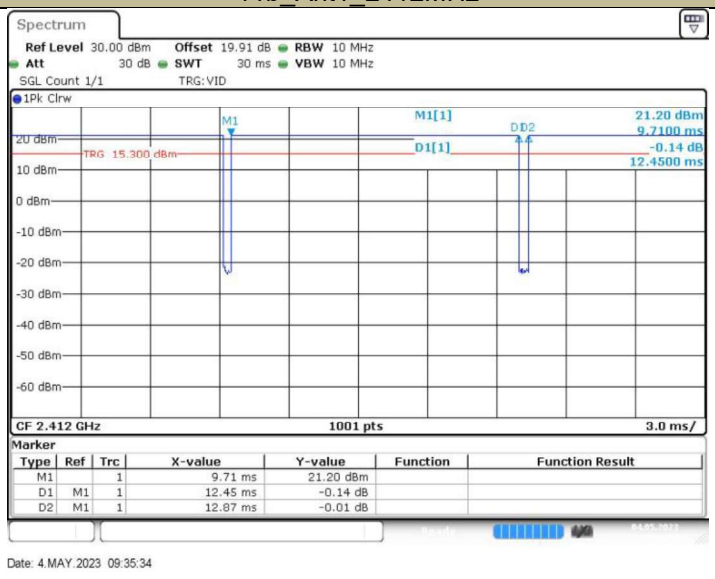
Type	Mode	Average Conducted Power (dBm)			Tune-up
		2402MHz	2440MHz	2480MHz	
BLE	1M	Not Required			8.0
BLE	2M	Not Required			7.5

Note:
4) The output power of the device was set to transmit at maximum power for all tests.
5) The maximum output power mode BT 3DH5 was selected as the primary mode to test SAR for Bluetooth mode. SAR measurement is not required for the other modes, when the secondary mode is ≤0.25 dB higher than the primary mode.
6) 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.

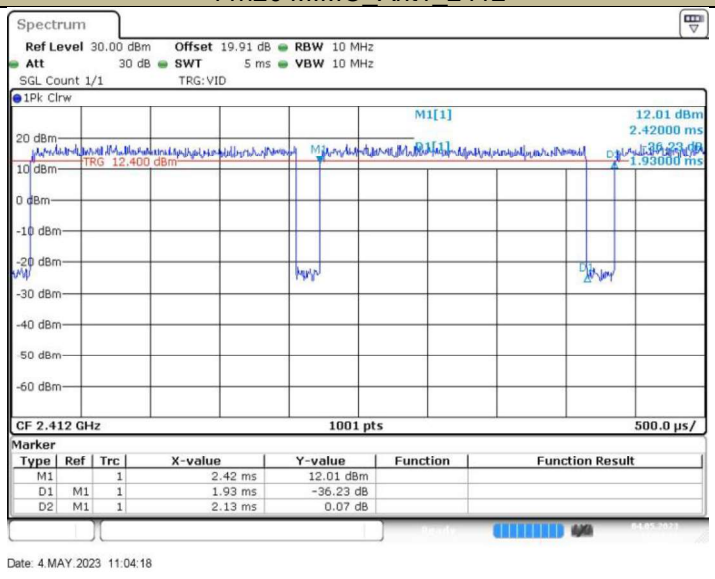
7.5. Duty Cycle

Test Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)
11b	12.45	12.87	0.9764	97.64
11n20	1.93	2.13	0.9061	90.61
11n40	0.34	0.35	0.9714	97.14
BT DH5	2.89	3.74	0.7727	77.27

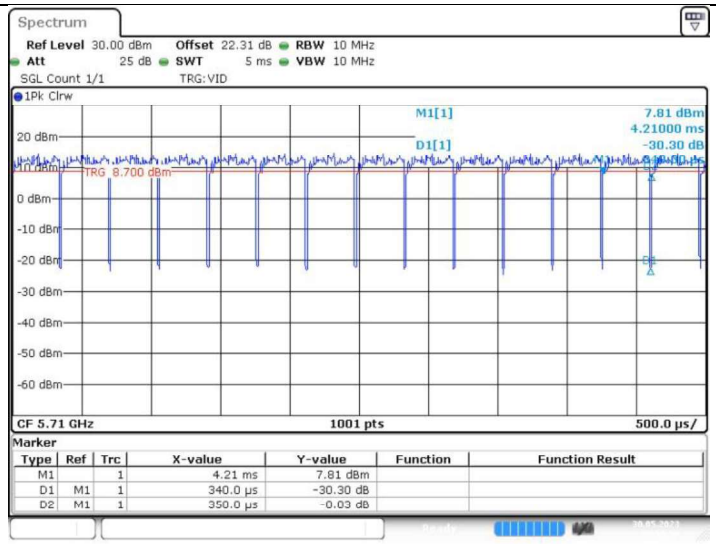
11b_Ant1_2412MHz



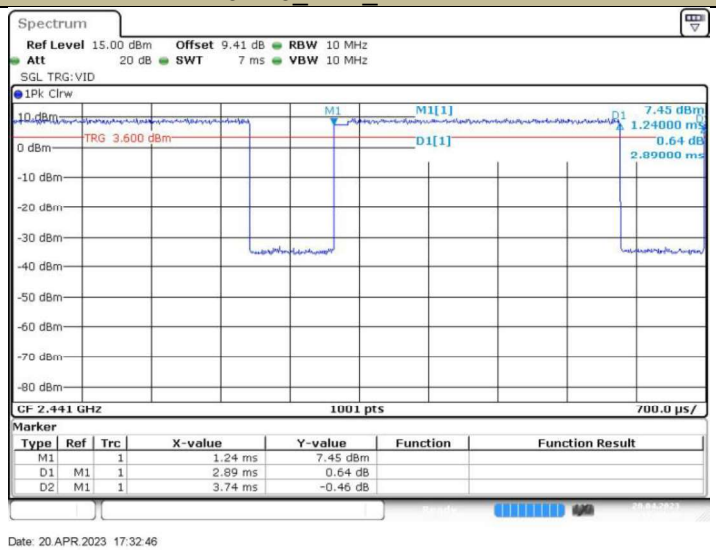
11n20 MIMO_Ant1_2412



11n40 MIMO_Ant1_5710MHz



3DH5_Ant1_2441MHz



8. Test Configuration

8.1. Wi-Fi Test Configuration

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 test procedures in KDB 248227D01 are applied.

8.1.1. 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 ≤ 0.4W/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 ≤ 0.8W/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 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 ≤ 1.2 W/kg or all required channels are tested.

8.1.2. 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). 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 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 ≤ 1.2 W/kg or all required channels are tested.

8.1.3. 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 ≤ 1.2 W/kg, SAR is not required for that subsequent test configuration.

8.1.4. 2.4GHz Wi-Fi SAR Test Procedures

Separate SAR procedures are applied to DSSS and OFDM configurations in the 2.4 GHz band to simplify DSSS test requirements. For 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure applies to multiple exposure test positions.

A) 802.11b DSSS SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1) When the reported SAR of the highest measured maximum output power channel (section 3.1 of KDB 248227D01) for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
2) When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

B) 2.4GHz 802.11g/n OFDM SAR Test Exclusion Requirements

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied (section 5.3 of KDB 248227D01). SAR is not required for the following 2.4 GHz OFDM conditions.

1) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
2) When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

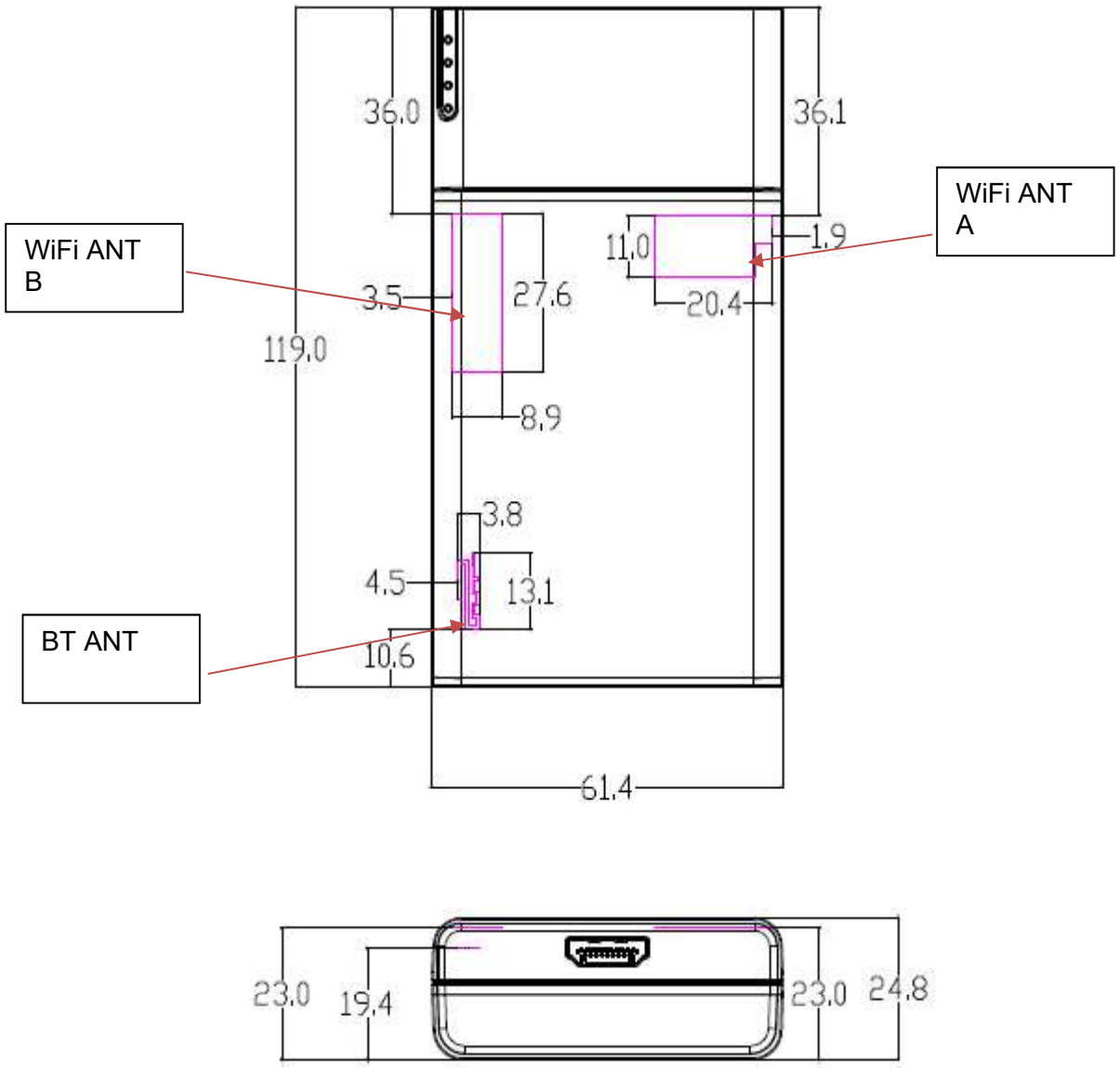
C) SAR Test Requirements for OFDM configurations

When SAR measurement is required for 802.11 g/n OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

9. RF Exposure Conditions

Refer to the diagram inside the device which attached below for the specific details of the antenna-to-edges distances. As per KDB 941225 D06, when the antenna to-edge-distance is greater than 2.5 cm, SAR evaluation is not required for the corresponding position.

Antenna Location Map



	Test Position	antenna to-edge-distance	Test required
WiFi Ant A	Front Surface	<25mm	Yes
	Back Surface	<25mm	Yes
	Left Edge	>25mm	No
	Right Edge	<25mm	Yes
	Top Edge	>25mm	No
	Bottom Edge	>25mm	No

WiFi Ant B	Test Position	antenna to-edge-distance	Test required
	Front Surface	<25mm	Yes
	Back Surface	<25mm	Yes
	Left Edge	<25mm	Yes
	Right Edge	>25mm	No
	Top Edge	>25mm	No
	Bottom Edge	>25mm	No
BT ANT	Test Position	antenna to-edge-distance	Test required
	Front Surface	<25mm	Yes
	Back Surface	<25mm	Yes
	Left Edge	<25mm	Yes
	Right Edge	>25mm	No
	Top Edge	>25mm	No
	Bottom Edge	<25mm	Yes

10. SAR Test Configuration

EUT is a portable media player that may be very close to the human body when used, so a 1-g Body SAR (5mm) evaluation is considered.

11. Dielectric Property Measurements & System Check

11.1. 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				Deviation(%)		Limit (%)	Temp. (°C)	Test Date
		Measured		Target						
		ε_r	σ	ε_r	σ	ε_r	σ			
Head 2450	2360	40.30	1.73	39.36	1.72	2.39	0.58	±5	21.6	2023.5.11
	2450	40.20	1.84	39.20	1.80	2.55	2.22			
	2540	39.70	1.95	39.09	1.90	1.56	2.63			
Head 2450	2360	40.40	1.74	39.36	1.72	2.64	1.16	±5	22	2023.5.18
	2450	40.30	1.86	39.20	1.80	2.81	3.33			
	2540	39.90	1.96	39.09	1.90	2.07	3.16			
Head 5250	5160	35.00	4.50	36.03	4.61	-2.86	-2.39	±5	22.7	2023.5.23
	5250	34.90	4.59	35.93	4.71	-2.87	-2.55			
	5340	34.80	4.68	35.83	4.80	-2.87	-2.50			
Head 5600	5500	35.40	4.84	35.64	4.96	-0.67	-2.42	±5	22.7	2023.5.23
	5600	35.40	5.00	35.53	5.07	-0.37	-1.38			
	5700	35.30	5.04	35.41	5.17	-0.31	-2.51			

Head 5750	5660	35.70	5.05	35.46	5.13	0.68	-1.56	±5	21.3	2023.5.24
	5750	35.40	5.11	35.36	5.22	0.11	-2.11			
	5840	35.50	5.23	35.27	5.30	0.65	-1.32			

11.2. 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(≤2GHz), 12 mm in x- and y-dimension (2-4 GHz) and 10mm in x- and y- dimension(4-6GHz).
- For zoom scan, Δ x_{zoom}, Δ y_{zoom}≤ 2GHz - ≤8mm, 2-4GHz - ≤5 mm and 4-6 GHz-≤4 mm; Δ z_{zoom} ≤3GHz - ≤5 mm, 3-4 GHz- ≤4 mm and 4-6 GHz-≤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	13.200	52.80	54.60	-3.30	±10	21.6	2023.5.11
	10-g	6.170	24.68	24.20	1.98			
Head 2450	1-g	13.500	54.00	54.60	-1.10	±10	22	2023.5.18
	10-g	6.130	24.52	24.20	1.32			
Head 5250	1-g	8.210	82.10	77.90	5.39	±10	22.7	2023.5.23
	10-g	2.400	24.00	22.60	6.19			
Head 5600	1-g	8.400	84.00	80.90	3.83	±10	22.7	2023.5.23
	10-g	2.410	24.10	23.30	3.43			
Head 5750	1-g	7.930	79.30	78.30	1.28	±10	21.3	2023.5.24
	10-g	2.290	22.90	22.40	2.23			

12. Measured and Reported (Scaled) SAR Results

As per KDB 447498 D01 v06 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 v06 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 ≥0.8W/Kg; if the deviation among the repeated measurement is ≤ 20%, and the measured SAR <1.45W/Kg, only one repeated measurement is required.

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 ≤ 1.2 W/kg, SAR is not required for that subsequent test configuration.

13. Measured SAR Results

13.1. 2.4GHz Wi-Fi DTS Band

Test Position (Body 5mm)	Test Mode	Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/kg)			
ANT A								
Front surface	11b	2437	20.5	20.31	0.987	0.00	96.74	1.066
Back surface	11b	2437	20.5	20.31	0.059	0.02	96.74	0.064
Right Edge	11b	2437	20.5	20.31	0.396	-0.05	96.74	0.428
Front surface	11b	2412	20.5	20.17	0.940	-0.04	96.74	1.048
Front surface	11b	2462	20.5	20.13	0.882	-0.01	96.74	0.993
Worst Case repeated								
Front surface	11b	2437	20.5	20.31	0.966	-0.03	96.74	1.043
ANT B								
Front surface	11b	2462	20.8	20.75	1.100	-0.03	96.74	1.150
Back surface	11b	2462	20.8	20.75	0.040	-0.05	96.74	0.042
Left Edge	11b	2462	20.8	20.75	0.571	-0.01	96.74	0.597
Front surface	11b	2412	20.8	19.51	0.641	-0.01	96.74	0.892
Front surface	11b	2437	20.8	20.40	0.935	-0.05	96.74	1.060
Worst Case repeated								
Front surface	11b	2462	20.8	20.63	1.060	-0.08	96.74	1.139
MIMO								
Front surface	11n20	2412	11.5	11.36	0.177	-0.09	90.61	0.202
Back surface	11n20	2412	11.5	11.36	<0.01	0.00	90.61	<0.01
Left Edge	11n20	2412	11.5	11.36	0.125	0.01	90.61	0.142
Right Edge	11n20	2412	11.5	11.36	0.034	-0.05	90.61	0.039

Note:
1) The SAR testing was set to transmit at maximum power for all tests.
2) For all positions/configurations tested using the initial test position and subsequent test positions,when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

OFDM mode SAR evaluation exclusion analysis ANT A

Mode	Tune-up (dBm)	Tune-up (mW)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11b	20.5	112.20	1.066	\	\
802.11g	13	19.95	\	0.190	Excluded
802.11n40	10.5	11.22	\	0.107	Excluded

Note:
3) The highest reported SAR for DSSS adjusted by the ratio of OFDM 802.11g/n to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, so SAR evaluation for 802.11g/n/ac is not required.

OFDM mode SAR evaluation exclusion analysis ANT B

Mode	Tune-up (dBm)	Tune-up (mW)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11b	20.8	120.23	1.150	\	\
802.11g	13	19.95	\	0.191	Excluded
802.11n40	10.5	11.22	\	0.107	Excluded

Note:
4) The highest reported SAR for DSSS adjusted by the ratio of OFDM 802.11g/n to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, so SAR evaluation for 802.11g/n/ac is not required.

OFDM mode SAR evaluation exclusion analysis MIMO

Mode	Tune-up (dBm)	Tune-up (mW)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11n20	11.5	14.13	0.202	\	\
802.11g	13	19.95	\	0.285	Excluded
802.11n40	10.5	11.22	\	0.160	Excluded

Note:
5) The highest reported SAR for DSSS adjusted by the ratio of OFDM 802.11g/n to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, so SAR evaluation for 802.11g/n/ac is not required.

13.2. SAR Test Results of 5GHz Wi-Fi (U-NII-1/2A)

Test Position (Body 5mm)	Test Mode	Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/kg)			
MIMO								
Front surface	11n40	5230	13.0	12.71	0.995	-0.01	97.14	1.095
Back surface	11n40	5230	13.0	12.71	<0.01	0.00	97.14	<0.01
Left Edge	11n40	5230	13.0	11.08	0.119	0.00	97.14	0.131
Right Edge	11n40	5230	13.0	12.71	<0.01	0.00	97.14	<0.01
Front surface	11n40	5190	11.5	11.27	0.887	-0.13	97.14	0.963
Front surface	11n40	5270	11.5	11.18	0.838	-0.02	97.14	0.929
Front surface	11n40	5310	12.0	11.78	0.780	0.00	97.14	0.845
Worst Case repeated								
Front surface	11n40	5230	13.0	12.71	0.990	-0.04	97.14	1.090

Note:
1) The SAR testing was set to transmit at maximum power for all tests.
2) For all positions/configurations tested using the initial test position and subsequent test positions,when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

Subsequent test configuration SAR evaluation exclusion analysis for U-NII-I/2A band

Mode	Tune-up (dBm)	Tune-up (mW)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11n 40M	13	19.95	1.095	\	\
802.11a	12.7	18.62	\	1.022	Excluded
802.11n 20M	11.5	14.13	\	0.775	Excluded
802.11ac 20M	11	12.59	\	0.691	Excluded
802.11ac 40M	10.5	11.22	\	0.616	Excluded
802.11ac 80M	10.5	11.22	\	0.616	Excluded

Note:
3) The 802.11n40 MIMO 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 is not required.

13.3. SAR Test Results of 5GHz Wi-Fi (U-NII-2C)

Test Position (Body 5mm)	Test Mode	Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/kg)			
MIMO								
Front surface	11n40	5510	11.5	11.25	1.070	-0.01	97.14	1.167
Back surface	11n40	5510	11.5	11.25	<0.01	0.00	97.14	<0.01
Left Edge	11n40	5510	11.5	11.25	0.324	-0.05	97.14	0.353
Right Edge	11n40	5510	11.5	11.25	<0.01	0.00	97.14	<0.01
Front surface	11n40	5550	10.5	10.24	1.020	0.03	97.14	1.115
Front surface	11n40	5590	10.5	10.33	0.986	-0.06	97.14	1.056
Front surface	11n40	5630	10.5	10.45	1.020	-0.08	97.14	1.062
Front surface	11n40	5670	10.5	10.41	0.998	-0.05	97.14	1.049
Front surface	11n40	5710	10.0	9.65	0.924	-0.05	97.14	1.031
Worst Case repeated								
Front surface	11n40	5510	11.5	11.25	0.996	-0.05	97.14	1.086

Note:
4) The SAR testing was set to transmit at maximum power for all tests.
5) For all positions/configurations tested using the initial test position and subsequent test positions,when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

Subsequent test configuration SAR evaluation exclusion analysis for U-NII-2C band

Mode	Tune-up (dBm)	Tune-up (mW)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11n 40M	11.5	14.13	1.167	\	\
802.11a	11.5	14.13	\	1.167	Excluded
802.11n 20M	10.5	11.22	\	0.927	Excluded
802.11ac 20M	10.5	11.22	\	0.927	Excluded
802.11ac 40M	11	12.59	\	1.040	Excluded
802.11ac 80M	10.5	11.22	\	0.927	Excluded

Note:
6) The 802.11n40 MIMO 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 is not required.

13.4. SAR Test Results of 5GHz Wi-Fi (U-NII-3)

Test Position (Body 5mm)	Test Mode	Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/kg)			
MIMO								
Front surface	11n40	5795	11.5	11.36	0.969	-0.03	97.14	1.030
Back surface	11n40	5795	11.5	11.36	0.395	-0.03	97.14	0.420
Left Edge	11n40	5795	11.5	11.36	<0.01	0.00	97.14	<0.01
Right Edge	11n40	5795	11.5	11.36	0.386	0.00	97.14	0.410
Front surface	11n40	5755	11.0	10.70	0.802	-0.11	97.14	0.885
Worst Case repeated								
Front surface	11n40	5795	11.5	11.36	0.955	0.00	97.14	1.015

Note:
7) The SAR testing was set to transmit at maximum power for all tests.
8) For all positions/configurations tested using the initial test position and subsequent test positions,when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

Subsequent test configuration SAR evaluation exclusion analysis for U-NII-3 band

Mode	Tune-up (dBm)	Tune-up (mW)	Highest Reported SAR (W/Kg)	Adjusted SAR (W/Kg)	SAR Test
802.11n 40M	11.5	14.13	1.03	\	\
802.11a	11.5	14.13	\	1.030	Excluded
802.11n 20M	11	12.59	\	0.918	Excluded
802.11ac 20M	11	12.59	\	0.918	Excluded
802.11ac 40M	10.5	11.22	\	0.818	Excluded
802.11ac 80M	10.5	11.22	\	0.818	Excluded

Note:
9) The 802.11n40 MIMO 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 is not required.

13.5. SAR Test Results of Bluetooth

Test Position (Body 5mm)	Test Mode	Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (W/kg)			
Back surface	BT 3DH5	2441	9.0	8.96	0.018	-0.03	77.27	0.024
Front surface	BT 3DH5	2441	9.0	8.96	<0.01	0.00	77.27	<0.01
Right Edge	BT 3DH5	2441	9.0	8.96	<0.01	0.00	77.27	<0.01
Bottom Edge	BT 3DH5	2441	9.0	8.96	<0.01	0.00	77.27	<0.01

Note:
10) The SAR testing was set to transmit at maximum power for all tests.

14. Simultaneous Transmission SAR Analysis

According to FCC OET KDB447498 D01, when the sum of 1g SAR for all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration.

14.1. Simultaneous Transmission calculation

NO.	Combination	Scenario
		Body
1	ANT A 2.4GHz WiFi + ANT B 2.4GHz WiFi	×
2	ANT A 2.4GHz WiFi + ANT B 2.4GHz WiFi +BT	×
3	ANT A 2.4GHz WiFi +BT	√
4	ANT B 2.4GHz WiFi +BT	√
5	MIMO 2.4GHz WiFi +BT	√
6	ANT A 5GHz WiFi + ANT B 5GHz WiFi	×
7	ANT A 5GHz WiFi + ANT B 5GHz WiFi +BT	×
8	MIMO 5GHz WiFi +BT	√

Note:
1) "√" indicates exist, "×" indicates inexistence.
2) MIMO mode replaces ANT A+ANT B, so superposition is not considered

Position	Simultaneous Tx Antenna Combination		∑SAR 1g (W/kg)	Limit (W/kg)
	ANT A 2.4GHz	BT		
Front surface	1.066	0.024	1.090	1.6
Back surface	0.064	<0.01	0.064	
Left Edge	/	<0.01	<0.01	
Right Edge	0.428	/	0.428	
Bottom Edge	/	<0.01	<0.01	

Position	Simultaneous Tx Antenna Combination		∑SAR 1g (W/kg)	Limit (W/kg)
	ANT B 2.4GHz	BT		
Front surface	1.150	0.024	1.174	1.6
Back surface	0.042	<0.01	0.042	
Left Edge	0.597	<0.01	0.597	
Right Edge	/	/	/	
Bottom Edge	/	<0.01	<0.01	

Position	Simultaneous Tx Antenna Combination		∑SAR 1g (W/kg)	Limit (W/kg)
	2.4 GHz MIMO	BT		
Front surface	0.202	0.024	0.224	1.6
Back surface	<0.01	<0.01	<0.01	
Left Edge	0.142	<0.01	0.142	
Right Edge	0.039	/	0.039	
Bottom Edge	/	<0.01	<0.01	

Position	Simultaneous Tx Antenna Combination		∑SAR 1g (W/kg)	Limit (W/kg)
	5GHz MIMO	BT		
Front surface	1.167	0.024	1.191	1.6
Back surface	0.420	<0.01	0.420	
Left Edge	0.353	<0.01	0.353	
Right Edge	0.410	/	0.410	
Bottom Edge	/	<0.01	<0.01	

Appendixes

Refer to separated files for the following appendixes.

4790829068-SAR-1_App A Photo

4790829068-SAR-1_App B System Check Plots

4790829068-SAR-1_App C Highest Test Plots

4790829068-SAR-1_App D Cal. Certificates

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