SAR EVALUATION REPORT

FCC 47 CFR § 2.1093
IEEE Std. 1528-2013

For

DJI Goggles N3

MODEL NUMBER: TKGSM

REPORT NUMBER: 4791399837-1-SAR-1

ISSUE DATE: September 25, 2024

FCC ID: SS3-TKGSM24

Prepared for

SZ DJI TECHNOLOGY CO., LTD
Lobby of T2, DJI Sky City, No. 53 Xianyuan Road, Xili Community, Xili Street, Nanshan District, Shenzhen, 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

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

Revision History

Rev.	Issue Date	Revisions	Revised By
V0	September 25, 2024	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 <Simple Acceptance> decision rule is applied.

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

Table of Contents

1. Attestation of Test Results 5

2. Test Specification, Methods and Procedures 6

3. Facilities and Accreditation 7

4. SAR Measurement System & Test Equipment 8

4.1. SAR Measurement System 8
4.2. SAR Scan Procedures 9
4.3. Test Equipment 11

5. Measurement Uncertainty 12

6. Device Under Test (DUT) Information 13

6.1. DUT Description 13
6.2. Wireless Technology 13

7. Conducted Output Power Measurement and tune-up tolerance 14

7.1. Test Results of SRD 2.4GHz 14
7.2. Test Results of SRD 5GHz 17
7.3. Test Results of GFSK 2.4GHz 21
7.4. Duty Cycle 22

8. Test Configuration 24

8.1. 2.4GHz SRD SAR Test Requirements 24
8.2. 5GHz SRD SAR Test Requirements 24
8.3. 2.4GHz GFSK SAR Test Requirements 24

9. Antenna location diagram 25

10. RF Exposure Conditions 26

11. Dielectric Property Measurements & System Check 27

11.1. Dielectric Property Measurements 27
11.2. System Check 29

12. Measured and Reported (Scaled) SAR Results 30

12.1. SAR Test Results of SRD 2.4GHz 31
12.2. SAR Test Results of SRD 5GHz 32
12.3. SAR Test Results of GFSK 2.4GHz 33

13. Simultaneous Transmission SAR Analysis 34

Appendixes 35

4791399837-1-SAR-1_App A Photo 35
4791399837-1-SAR-1_App B System Check Plots 35
4791399837-1-SAR-1_App C Highest Test Plots 35

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

4791399837-1-SAR-1_App D Cal. Certificates 35

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

1. Attestation of Test Results

Applicant Name	SZ DJI TECHNOLOGY CO., LTD		
Address	Lobby of T2, DJI Sky City, No. 53 Xianyuan Road, Xili Community, Xili Street, Nanshan District, Shenzhen, China.		
Manufacturer	SZ DJI TECHNOLOGY CO., LTD		
Address	Lobby of T2, DJI Sky City, No. 53 Xianyuan Road, Xili Community, Xili Street,Nanshan District, Shenzhen, China.		
EUT Name	DJI Goggles N3		
Brand	DJI		
Model	TKGSM		
Sample Received Date	July 17, 2024		
Sample Status	Normal		
Sample ID	7160783		
Date of Tested	September 9 to September 14, 2024		
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	
Occupational / Controlled exposure	8	20	
The Highest Reported SAR (W/kg)			
RF Exposure Conditions	**Band**		
	SRD 2.4GHz	**SRD 5GHz**	**GFSK**
Head 1-g (0 mm)	0.280	0.365	0.017
Simultaneous Transmission (1-g)	0.382		
Test Results	Pass		
Prepared By: Burt Hu Burt Hu Laboratory Engineer	Reviewed By: Kebo Zhang Senior Project Engineer	Approved By: Stephen Guo Laboratory Manager	

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

2. Test Specification, Methods and Procedures

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

- 447498 D01 General RF Exposure Guidance v06
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01
- 865664 D02 RF Exposure Reporting v01

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

3. Facilities and Accreditation

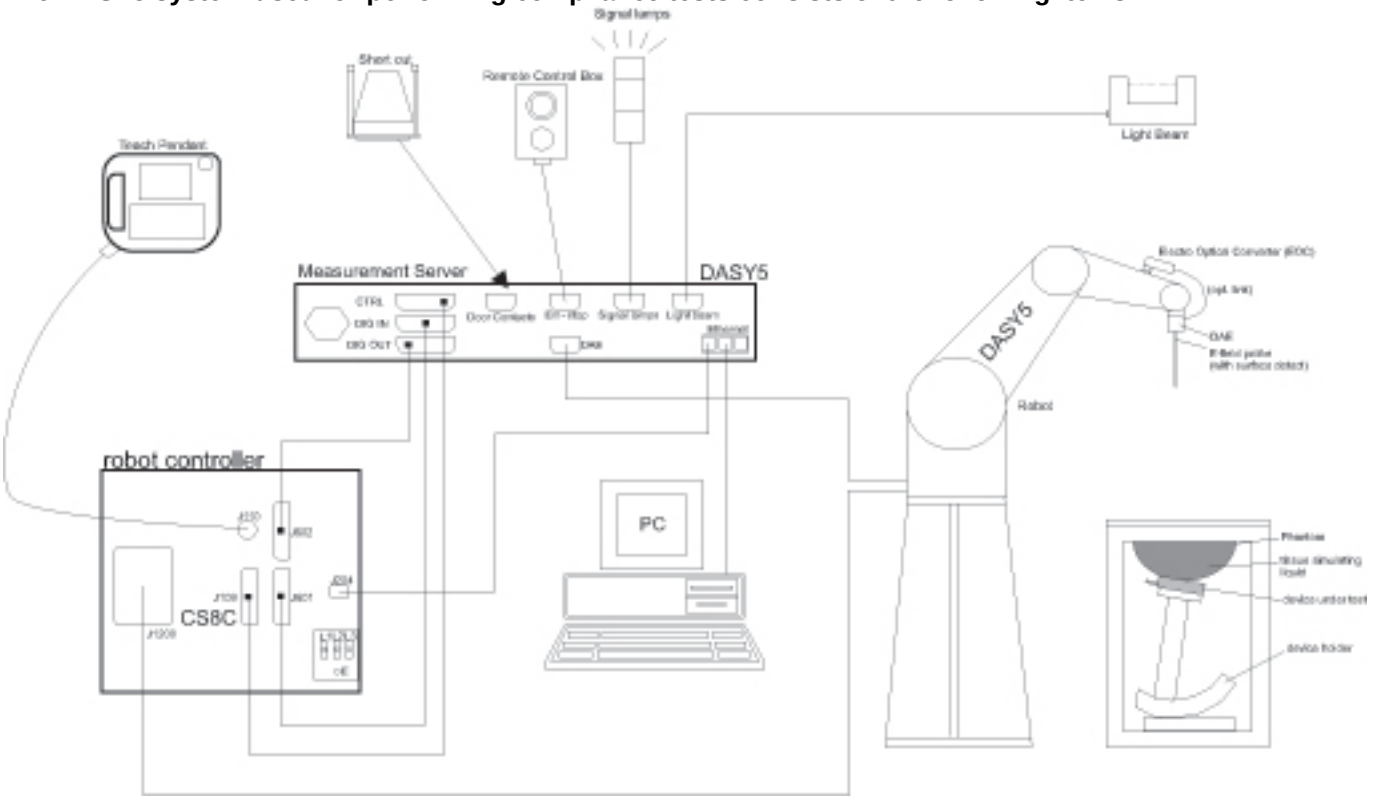
Test Location	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.
Address	Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China
Accreditation Certificate	**A2LA (Certificate No.: 4102.01)** UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA. **FCC (FCC Designation 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-20192, C-20153, T-20155 and R-20202)** 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-20192 and R-20202 Shielding Room B, the VCCI registration No. is C-20153 and T-20155
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

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

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 DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

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 mm ± 1 mm	½·δ·ln(2) mm ± 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.	
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*

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

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 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$ mm	
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 IEEE Std 1528-2013 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB Publication 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.

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

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	2024.10.11
Dielectric Probe kit	SPEAG	SM DAK 040 SA	1155	2025.02.27
DC power supply	Keysight	E36103A	MY55350020	2024.10.11
Signal Generator	Rohde & Schwarz	SMB100A	178553	2024.10.11
BI-Directional Coupler	KRYTAR	1850	54733	2024.10.11
Peak and Average Power Sensor	Keysight	E9325A	MY62220002	2024.10.11
Peak and Average Power Sensor	Keysight	E9325A	MY62220003	2024.10.11
Dual Channel PK Power Meter	Keysight	N1912A	MY55416024	2024.10.11
Amplifier	CORAD TECHNOLOGY LTD	AMF-4D-00400600-50-30P	1983561	NCR
Dosimetric E-Field Probe	SPEAG	EX3DV4	7733	2025.02.20
Data Acquisition Electronic	SPEAG	DAE4	1739	2025.01.22
Dipole Kit 2450 MHz	SPEAG	D2450V2	977	2024.12.16
Dipole Kit 5 GHz	SPEAG	D5GHzV2	1231	2024.12.15
Software	SPEAG	DASY52	N/A	NCR
Twin Phantom	SPEAG	SAM 5.0	1805	NCR
Thermometer	/	GX-138	150709653	2024.10.18
Thermometer	VICTOR	ITHX-SD-5	18470005	2024.10.18

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.

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

5. Measurement Uncertainty

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

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

6. Device Under Test (DUT) Information

6.1. DUT Description

DUT is a DJI Goggles N3 with GFSK 2.4GHz and SRD 2.4/5.1/5.8GHz wireless capabilities	
DUT Dimension	Overall (Length x Width x Height): 205.75 mm x 103.61 mm x 130.45 mm

6.2. Wireless Technology

Wireless technology	Frequency band
SRD	2.4 GHz
SRD	5.1/5.8 GHz
GFSK	2.4 GHz

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

7. Conducted Output Power Measurement and tune-up tolerance

7.1. Test Results of SRD 2.4GHz

Mode	Channel	AV power (dBm)		Tune-up Limit(dBm)	Tune-up Limit(dBm)
		Ant0	Ant1	Ant0	Ant1
1.4M	2403.5	19.29	19.37	19.5	19.5
	2435.5	21.92	22.39	22.0	22.5
	2469.12	19.62	19.63	20.0	20.0
3M	2405.5	20.25	19.98	20.5	20.0
	2436.12	23.98	24.18	24.0	24.5
	2468.2	20.56	20.68	21.0	21.0
5M	2404.5	18.95	18.51	19.0	19.0
	2436.74	24.01	24.11	24.5	24.5
	2469.5	18.06	17.71	19.5	19.5
10M	2407.5	18.04	17.61	19.5	19.0
	2437.5	24.16	24.45	24.5	24.5
	2467.5	16.26	16.39	17.0	17.0
20M	2412.5	13.70	13.27	14.0	13.5
	2437.5	23.58	23.78	24.0	24.0
	2462.5	10.53	11.04	11.5	12.5
40M	2422.5	15.51	16.03	16.0	16.5
	2437.5	20.85	21.21	21.0	21.5
	2452.5	10.78	11.34	12.0	12.5
60M	2432.5	8.56	11.88	9.0	12.0
	2437.5	10.57	11.05	11.0	11.5
	2442.5	7.63	8.21	8.0	8.5

Mode	Channel	AV power (dBm)		Tune-up Limit(dBm)	Tune-up Limit(dBm)
		Ant0	Ant3	Ant0	Ant3
1.4M	2403.5	17.97	17.63	18.0	18.0
	2435.5	20.78	20.94	21.0	21.0
	2469.12	18.00	18.73	18.0	19.0
3M	2405.5	18.72	18.66	19.0	19.0
	2436.12	22.39	22.50	22.5	22.5
	2468.2	18.94	18.88	19.0	19.0
5M	2404.5	17.33	17.25	17.5	17.5
	2436.74	23.05	22.94	23.5	23.0
	2469.5	16.89	16.75	18.0	18.0
10M	2407.5	16.87	16.32	17.5	17.5

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

	2437.5	23.20	22.89	23.5	23.0
	2467.5	15.36	15.22	15.5	15.5
20M	2412.5	12.23	12.19	12.5	12.5
	2437.5	22.44	22.43	22.5	22.5
	2462.5	9.45	9.57	10.5	11.0
40M	2422.5	13.77	14.32	14.0	14.5
	2437.5	19.45	19.88	19.5	20.0
	2452.5	9.31	10.26	10.5	11.5
60M	2432.5	7.12	10.98	7.5	11.0
	2437.5	9.04	9.31	9.5	9.5
	2442.5	6.25	6.56	6.5	7.0

Mode	Channel	AV power (dBm)		Tune-up Limit(dBm)	Tune-up Limit(dBm)
		Ant1	Ant2	Ant1	Ant2
1.4M	2403.5	18.24	18.02	18.5	18.5
	2435.5	20.60	20.79	21.0	21.0
	2469.12	18.60	18.07	19.0	18.5
3M	2405.5	18.45	18.72	18.5	19.0
	2436.12	22.96	22.38	23.0	22.5
	2468.2	19.51	19.39	20.0	19.5
5M	2404.5	17.72	17.13	18.0	18.0
	2436.74	22.66	22.83	23.0	23.0
	2469.5	16.53	16.75	18.0	18.5
10M	2407.5	16.84	16.38	17.5	17.5
	2437.5	22.78	22.86	23.0	23.0
	2467.5	14.76	14.89	15.0	15.0
20M	2412.5	12.35	12.01	12.5	12.5
	2437.5	21.96	22.43	22.0	22.5
	2462.5	9.09	9.99	10.5	11.5
40M	2422.5	14.58	14.86	15.0	15.0
	2437.5	19.08	19.92	19.5	20.0
	2452.5	9.58	9.66	10.0	11.5
60M	2432.5	7.09	10.50	7.5	10.5
	2437.5	9.04	9.45	9.5	9.5
	2442.5	6.01	6.65	6.5	7.0

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

Mode	Channel	AV power (dBm)		Tune-up Limit(dBm)	Tune-up Limit(dBm)
		Ant2	Ant3	Ant2	Ant3
1.4M	2403.5	18.33	18.17	18.5	18.5
	2435.5	20.43	20.48	20.5	20.5
	2469.12	17.85	17.98	18.0	18.0
3M	2405.5	18.45	18.87	18.5	19.0
	2436.12	22.93	22.98	23.0	23.0
	2468.2	19.27	19.75	19.5	20.0
5M	2404.5	17.90	17.19	18.0	17.5
	2436.74	23.06	22.88	23.5	23.0
	2469.5	16.92	16.45	18.0	18.0
10M	2407.5	17.02	15.99	18.0	17.5
	2437.5	21.88	23.31	22.0	24.0
	2467.5	14.46	15.31	14.5	15.5
20M	2412.5	12.68	11.77	13.0	12.0
	2437.5	22.20	22.16	22.5	22.5
	2462.5	9.45	9.27	10.5	11.0
40M	2422.5	13.80	14.53	14.0	15.0
	2437.5	19.08	19.98	19.5	20.0
	2452.5	9.67	10.26	10.0	11.5
60M	2432.5	7.00	10.59	7.0	11.0
	2437.5	8.92	9.98	9.0	10.0
	2442.5	6.37	7.22	6.5	7.5

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

7.2. Test Results of SRD 5GHz

Mode	Channel	AV power (dBm)		Tune-up Limit(dBm)	Tune-up Limit(dBm)
		ANT0	ANT1	ANT0	ANT1
1.4M	5728.5	24.02	23.51	24.5	24.0
	5786.5	23.65	23.66	24.5	24.0
	5846.12	23.72	23.46	24.5	24.0
3M	5727.5	24.44	24.07	24.5	24.5
	5787.2	24.24	24.13	24.5	24.5
	5847.2	24.31	24.13	24.5	24.5
5M	5732.5	25.48	25.86	25.5	26.0
	5787.5	24.71	25.39	25.5	26.0
	5842.5	25.00	25.23	25.5	26.0
10M	5157	1.49	1.74	1.5	2.0
	5201	15.48	14.66	15.5	16.5
	5245	13.54	16.14	15.5	16.5
	5730.5	26.14	25.70	26.5	26.5
	5787.5	25.78	25.64	26.5	26.5
	5844.5	25.48	25.96	26.5	26.5
20M	5161	4.02	3.77	4.5	4.0
	5201	15.60	14.73	16.0	16.5
	5240	14.09	16.17	16.0	16.5
	5735.5	25.78	25.32	26.0	26.0
	5787.5	25.79	25.41	26.0	26.0
	5839.5	25.82	25.69	26.0	26.0
40M	5170	7.33	7.57	7.5	8.0
	5200	15.35	15.32	15.5	15.5
	5230	15.10	15.47	15.5	15.5
	5745.5	21.94	21.23	22.0	21.5
	5765.5	25.96	25.52	26.0	26.0
	5829.50	21.50	20.91	21.5	21.0
60M	5755.5	22.38	21.29	23.0	22.0
	5787.5	22.24	21.73	23.0	22.0
	5819.5	22.51	21.42	23.0	22.0
80M	5765.5	22.72	21.50	23.0	22.5
	5787.5	22.59	22.08	23.0	22.5
	5809.5	22.54	21.67	23.0	22.5

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

Mode	Channel	AV power (dBm)		Tune-up Limit(dBm)	Tune-up Limit(dBm)
		ANT0	ANT3	ANT0	ANT3
1.4M	5728.5	22.58	21.79	23.0	22.0
	5786.5	22.32	21.24	23.0	22.0
	5846.12	21.93	21.71	23.0	22.0
3M	5727.5	21.89	22.13	22.5	22.5
	5787.2	22.05	22.34	22.5	22.5
	5847.2	22.19	22.21	22.5	22.5
5M	5732.5	24.24	23.54	24.5	24.0
	5787.5	22.51	23.11	24.5	24.0
	5842.5	23.12	22.97	24.5	24.0
10M	5157	-0.51	-0.36	-0.5	0.0
	5201	12.58	12.96	13.0	13.5
	5245	11.14	13.45	13.0	13.5
	5730.5	24.02	23.58	24.5	24.0
	5787.5	23.70	24.00	24.5	24.0
	5844.5	23.89	23.92	24.5	24.0
20M	5161	2.22	1.37	2.5	1.5
	5201	12.90	12.58	13.0	14.0
	5240	11.74	13.82	13.0	14.0
	5735.5	24.03	23.80	24.5	24.5
	5787.5	24.03	23.69	24.5	24.5
	5839.5	23.90	24.01	24.5	24.5
40M	5170	4.73	5.22	5.0	5.5
	5200	12.60	12.87	13.0	13.0
	5230	12.90	12.82	13.0	13.0
	5745.5	19.94	19.87	20.0	20.0
	5765.5	24.13	23.80	24.5	24.0
	5829.50	19.10	19.43	19.5	19.5
60M	5755.5	20.76	19.81	21.5	20.0
	5787.5	20.84	19.97	21.5	20.0
	5819.5	21.11	19.30	21.5	20.0
80M	5765.5	21.03	20.22	21.5	20.5
	5787.5	21.39	19.84	21.5	20.5
	5809.5	20.42	19.59	21.5	20.5

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

Mode	Channel	AV power (dBm)		Tune-up Limit(dBm)	Tune-up Limit(dBm)
		ANT1	ANT2	ANT1	ANT2
1.4M	5728.5	22.74	21.43	23.0	22.0
	5786.5	22.13	21.89	23.0	22.0
	5846.12	22.03	21.08	23.0	22.0
3M	5727.5	21.45	22.15	22.0	22.5
	5787.2	21.33	22.05	22.0	22.5
	5847.2	21.79	22.01	22.0	22.5
5M	5732.5	23.64	24.34	24.0	24.5
	5787.5	23.07	23.03	24.0	24.5
	5842.5	23.56	23.12	24.0	24.5
10M	5157	-0.86	-0.11	-0.5	0.0
	5201	12.53	11.66	13.0	13.5
	5245	11.39	13.47	13.0	13.5
	5730.5	24.22	24.50	24.5	25.0
	5787.5	24.18	24.04	24.5	25.0
	5844.5	23.98	24.01	24.5	25.0
20M	5161	1.62	1.87	2.0	2.0
	5201	12.75	12.83	13.0	13.5
	5240	11.09	13.47	13.0	13.5
	5735.5	24.46	23.52	24.5	24.5
	5787.5	24.03	23.45	24.5	24.5
	5839.5	24.02	24.01	24.5	24.5
40M	5170	4.63	5.82	5.0	6.0
	5200	13.15	12.42	13.5	12.5
	5230	13.00	12.47	13.5	12.5
	5745.5	19.74	19.51	20.0	20.0
	5765.5	24.76	23.56	25.0	24.0
	5829.50	19.50	18.87	19.5	19.0
60M	5755.5	20.70	19.41	21.5	20.5
	5787.5	20.77	20.13	21.5	20.5
	5819.5	21.15	19.14	21.5	20.5
80M	5765.5	20.48	20.02	21.0	21.0
	5787.5	20.51	20.84	21.0	21.0
	5809.5	20.98	19.87	21.0	21.0

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

Mode	Channel	AV power (dBm)		Tune-up Limit(dBm)	Tune-up Limit(dBm)
		ANT2	ANT3	ANT2	ANT3
1.4M	5728.5	22.74	21.31	23.0	22.5
	5786.5	22.15	21.94	23.0	22.5
	5846.12	21.94	22.01	23.0	22.5
3M	5727.5	22.31	22.07	23.0	22.5
	5787.2	22.54	22.17	23.0	22.5
	5847.2	22.45	22.33	23.0	22.5
5M	5732.5	23.96	24.13	24.0	24.5
	5787.5	23.07	23.27	24.0	24.5
	5842.5	23.54	23.15	24.0	24.5
10M	5157	-0.31	-0.71	0.0	-0.5
	5201	12.53	12.11	13.0	14.0
	5245	11.69	13.79	13.0	14.0
	5730.5	24.14	23.46	24.5	24.0
	5787.5	23.98	23.88	24.5	24.0
	5844.5	23.89	23.97	24.5	24.0
20M	5161	1.57	0.97	2.0	1.0
	5201	12.40	12.58	12.5	14.5
	5240	10.64	14.17	12.5	14.5
	5735.5	23.54	23.40	24.5	24.5
	5787.5	24.13	23.65	24.5	24.5
	5839.5	24.21	24.23	24.5	24.5
40M	5170	5.13	5.27	5.5	5.5
	5200	12.80	12.92	13.0	13.0
	5230	12.20	12.97	13.0	13.0
	5745.5	20.10	19.07	20.5	19.5
	5787.5	23.98	24.11	24.0	24.5
	5829.50	19.34	18.95	19.5	19.0
60M	5755.5	20.50	19.49	21.0	20.0
	5787.5	20.40	19.49	21.0	20.0
	5819.5	20.83	19.74	21.0	20.0
80M	5765.5	21.03	20.06	21.5	20.5
	5787.5	20.75	20.04	21.5	20.5
	5809.5	21.06	19.67	21.5	20.5

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

7.3. Test Results of GFSK 2.4GHz

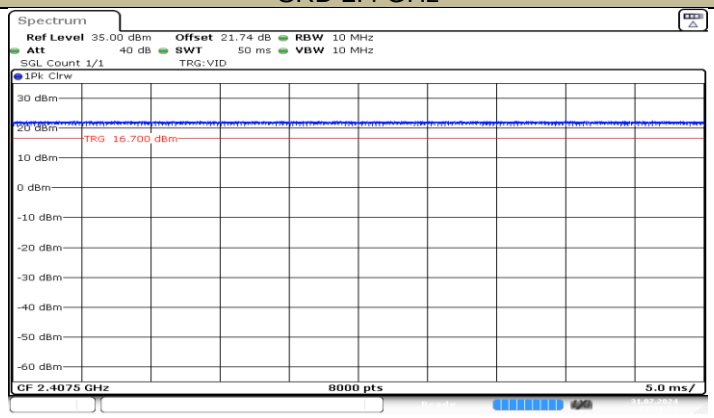
Mode	Freq	AV power
GFSK	2402	19.67
	2436	20.1
	2474	19.56

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

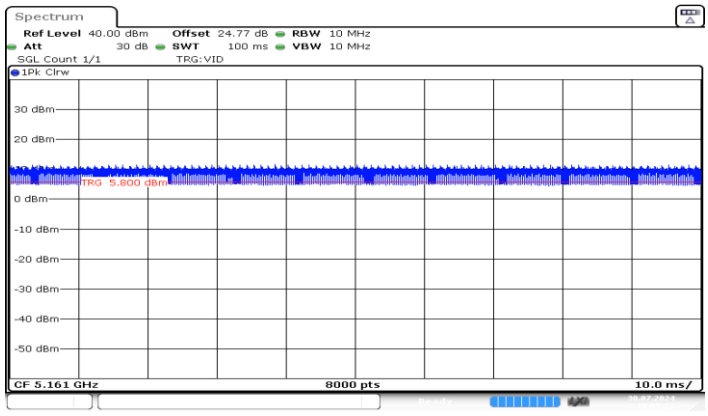
7.4. Duty Cycle

Test Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)
SRD 2.4 GHz	100.00	100.00	1.0000	100.00
SRD 5 GHz	100.00	100.00	1.0000	100.00
GFSK 2.4 GHz	0.39	0.62	0.6290	62.9

SRD 2.4 GHz

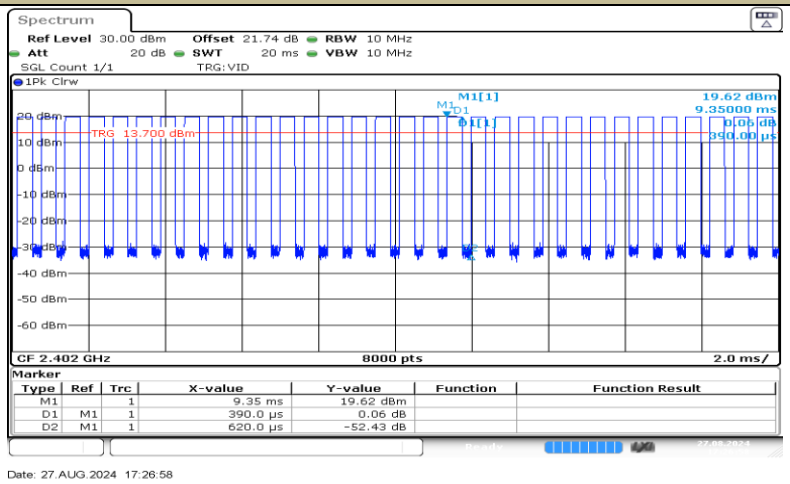


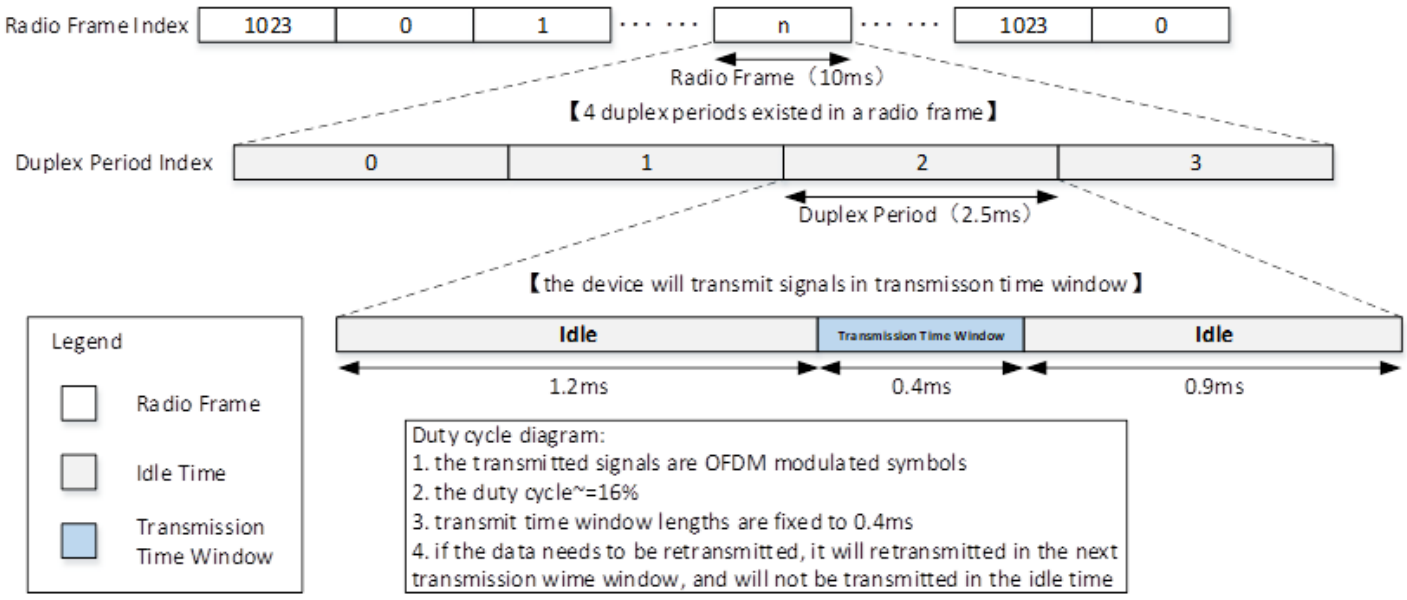
SRD 5 GHz



This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

GFSK 2.4 GHz





This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

8. Test Configuration

8.1.2.4GHz SRD SAR Test Requirements

2.4GHz SRD operating modes are tested independently according to the service requirements in each frequency band for each antenna. SISO modes are tested on the maximum average output power mode.

8.2.5GHz SRD SAR Test Requirements

5GHz SRD operating modes are tested independently according to the service requirements in each frequency band for each antenna. SISO modes are tested on the maximum average output power mode.

8.3.2.4GHz GFSK SAR Test Requirements

2.4GHz GFSK operating modes are tested independently according to the service requirements in each frequency band for each antenna. SISO modes are tested on the maximum average output power mode.

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

9. Antenna location diagram

Referred to 4791399837-1-SAR-1_App A Photo.

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

10.RF Exposure Conditions

Wireless technologies	RF Exposure Conditions	DUT-to-User Separation
SRD/GFSK	Head	0 mm

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

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

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

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. (℃)	Test Date
		Measured		Target						
		ϵ_r	σ	ϵ_r	σ	ϵ_r	σ			
Head 2450	2400	39.090	1.724	39.29	1.76	-0.51	-2.05	±5	22.7	September 14, 2024
	2450	39.120	1.774	39.20	1.80	-0.20	-1.44			
	2480	39.040	1.792	39.16	1.83	-0.31	-2.08			
Head 2450	2400	39.510	1.732	39.29	1.76	0.56	-1.59	±5	21.9	September 9, 2024
	2450	39.530	1.782	39.20	1.80	0.84	-1.00			
	2480	39.450	1.800	39.16	1.83	0.74	-1.64			
Head 5250	5160	35.560	4.508	36.03	4.61	-1.30	-2.21	±5	21.5	September 13, 2024
	5250	35.630	4.595	35.93	4.71	-0.83	-2.44			
	5340	35.500	4.679	35.83	4.80	-0.92	-2.52			
Head 5750	5660	35.050	5.066	35.46	5.13	-1.16	-1.25	±5	21.5	September 13, 2024
	5750	34.960	5.300	35.36	5.22	-1.13	1.53			
	5840	34.990	5.483	35.27	5.30	-0.79	3.45			

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

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 10 mm (above 1GHZ) and 15 mm (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 10 mm in x- and y- dimension (4-6GHz).
- For zoom scan, Δ x_{zoom}, Δ y_{zoom} ≤ 2 GHz - ≤ 8 mm, 2-4 GHz - ≤ 5 mm and 4-6 GHz-≤ 4 mm; Δ z_{zoom} ≤ 3 GHz - ≤ 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 5 GHz 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. (℃)	Test Date
		Zoom Scan (W/Kg)	Normalize to 1W (W/Kg)					
Head 2450	1-g	5.150	51.50	53.20	-3.20	±10	22.7	September 14, 2024
	10-g	2.380	23.80	24.20	-1.65			
Head 2450	1-g	5.360	53.60	53.20	0.75	±10	21.9	September 9, 2024
	10-g	2.480	24.80	24.20	2.48			
Head 5250	1-g	7.330	73.30	77.90	-5.91	±10	21.5	September 13, 2024
	10-g	2.090	20.90	22.60	-7.52			
Head 5750	1-g	7.760	77.60	78.30	-0.89	±10	21.5	September 13, 2024
	10-g	2.210	22.10	22.40	-1.34			

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

12.Measured and Reported (Scaled) SAR Results

• Reported SAR(W/kg) = Measured SAR * Tune-up scaling factor * Duty Cycle scaling factor

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

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

12.1.SAR Test Results of SRD 2.4GHz

Test Position (Head 0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (Zoom Scan)			
ANT 0								
Inner forehead side-ant. folded	10M	2437.5	24.5	24.16	0.745	-0.03	100.00	0.129
Inner forehead side-ant. extended	10M	2437.5	24.5	24.16	0.341	-0.01	100.00	0.059
ANT 1								
Inner forehead side-ant. folded	10M	2437.5	24.5	24.45	0.930	-0.07	100.00	0.151
Inner forehead side-ant. extended	10M	2437.5	24.5	24.45	0.334	-0.11	100.00	0.054
ANT 2								
Inner forehead side	5M	2436.74	23.5	23.06	0.188	-0.11	100.00	0.033
ANT 3								
Inner forehead side	10M	2437.5	24.0	23.31	0.281	-0.03	100.00	0.053

Note：

1) SAR evaluation is conducted under fixed frequency mode, the duty cycle is 100% when in fixed frequency mode, but when actual used, the duty cycle is only 16%, so the SAR result is scaled down to 16% duty cycle depending on result of 100%.
2) Calculation formula: Scaled =10^(Tune up/10) / 10^(meas./10) * Measured SAR Value * (16 / Duty Cycle)

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

12.2.SAR Test Results of SRD 5GHz

Test Position (Head 0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (Zoom Scan)			
5.1G FCC								
ANT 0								
Inner forehead side-ant. folded	20M	5201	16.0	15.60	0.357	0.10	100.00	0.063
Inner forehead side-ant. extended	20M	5201	16.0	15.60	0.379	-0.05	100.00	0.066
ANT 1								
Inner forehead side-ant. folded	20M	5240	16.5	16.17	0.545	-0.03	100.00	0.094
Inner forehead side-ant. extended	20M	5240	16.5	16.17	0.410	-0.04	100.00	0.071
ANT 2								
Inner forehead side-ant. folded	20M	5240	13.5	13.47	0.002	-0.11	100.00	0.000
ANT 3								
Inner forehead side-ant. folded	20M	5240	14.5	14.17	0.030	-0.08	100.00	0.005
5.8G								
ANT 0								
Inner forehead side-ant. folded	10M	5730.5	26.5	26.14	0.878	-0.11	100.00	0.153
Inner forehead side-ant. extended	10M	5730.5	26.5	26.14	0.819	-0.04	100.00	0.142
ANT 1								
Inner forehead side-ant. folded	10M	5844.5	26.5	25.96	1.170	-0.11	100.00	0.212
Inner forehead side-ant. extended	10M	5844.5	26.5	25.96	1.070	-0.04	100.00	0.194
ANT 2								
Inner forehead side-ant. folded	10M	5730.5	25.0	24.50	0.128	-0.14	100.00	0.023
ANT 3								
Inner forehead side-ant. folded	20M	5839.5	24.5	24.23	0.103	0.02	100.00	0.018

Note：

1) SAR evaluation is conducted under fixed frequency mode, the duty cycle is 100% when in fixed frequency mode, but when actual used, the duty cycle is only 16%, so the SAR result is scaled down to 16% duty cycle depending on result of 100%.
2) Calculation formula: Scaled =$10^{\wedge(\text{Tune up}/10)}$ / $10^{\wedge(\text{meas.}/10)}$ * Measured SAR Value * (16 / Duty Cycle)

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

12.3.SAR Test Results of GFSK 2.4GHz

Test Position (Head 0mm)	Test Mode	Channel/ Frequency	Power (dBm)		SAR Value	Power Drift	Duty Factor (%)	Scaled (W/Kg)
			Tune-up	Meas.	1-g (Zoom Scan)			
Inner forehead side-ant. folded	GFSK	2436	20.5	20.10	0.010	-0.05	62.90	0.017

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

13.Simultaneous Transmission SAR Analysis

Simultaneous transmission possibilities		
NO	Simultaneous TX Combination	Head
1	GFSK+SRD 2.4GHz	Y
2	GFSK+SRD 5GHz	Y

Serial Number:	1	2	3	4	5	6	7	8	9
Test Position (Head 0mm)	SDR 2.4G ANT0	SDR 2.4G ANT1	SDR 2.4G ANT2	SDR 2.4G ANT3	SDR 5G ANT0	SDR 5G ANT1	SDR 5G ANT2	SDR 5G ANT3	GFSK
Inner forehead side	0.129	0.151	0.033	0.053	0.153	0.212	0.023	0.018	0.017

MIMO is supported, the pairs of MIMO antenna is as below.

Test Position (Head 0mm)	1+2	1+4	2+3	3+4	5+6	5+8	6+7	7+8
Inner forehead side	0.280	0.182	0.184	0.086	0.365	0.171	0.235	0.041

Test Position (Head 0mm)	1+2+9	1+4+9	2+3+9	3+4+9	5+6+9	5+8+9	6+7+9	7+8+9
Inner forehead side	0.297	0.199	0.201	0.103	0.382	0.188	0.252	0.058

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.

Appendixes

Refer to separated files for the following appendixes.

4791399837-1-SAR-1_App A Photo

4791399837-1-SAR-1_App B System Check Plots

4791399837-1-SAR-1_App C Highest Test Plots

4791399837-1-SAR-1_App D Cal. Certificates

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

This report shall not be reproduced except in full, without the written approval of UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch.