


<b>Prüfbericht-Nr.:</b> <i>Test report no.:</i>	<b>CN24W8IH 002</b>	<b>Auftrags-Nr.:</b> <i>Order no.:</i>	<b>168438670</b>	Seite 1 von 29 <i>Page 1 of 29</i>
<b>Kunden-Referenz-Nr.:</b> <i>Client reference no.:</i>	N/A	<b>Auftragsdatum:</b> <i>Order date:</i>	2023-11-09	
<b>Auftraggeber:</b> <i>Client:</i>	<b>SZ DJI TECHNOLOGY CO., LTD</b> Lobby of T2, DJI Sky City, No. 53 Xianyuan Road, Xili Community, Xili Street, Nanshan District, Shenzhen, China			
<b>Prüfgegenstand:</b> <i>Test item:</i>	DJI Avata 2			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type no.:</i>	QF3W4K (Trademark: DJI)			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	Test Report			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.247 RSS-247 Issue 3 August 2023 RSS-Gen Issue 5 February 2021			
<b>Wareneingangsdatum:</b> <i>Date of sample receipt:</i>	2023-11-15	Please refer to Photo Document		
<b>Prüfmuster-Nr.:</b> <i>Test sample no.:</i>	A003598699-001 A003598699-003~013			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	2023-11-24 - 2024-01-09			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	Pass			
<b>geprüft von:</b> <i>tested by:</i>			<b>genehmigt von:</b> <i>authorized by:</i>	
<b>Datum:</b> <i>Date:</i> 2024-02-22	Signed by: Bell Hu		<b>Ausstellungsdatum:</b> <i>Issue date:</i> 2024-02-22	Signed by: Jonathan Li
<b>Stellung / Position:</b>	Sachverständige(r)/Expert		<b>Stellung / Position:</b>	Sachverständige(r)/Expert
<b>Sonstiges /</b> <i>Other:</i>	FCC ID: SS3-QF3W4K23, IC: 11805A-QF3W4K23, PMN: DJI Avata 2, HVIN: QF3W4K This report is for Bluetooth LE, 2.4GHz SDR and 2.4GHz Wi-Fi.			
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
<b>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</b> <i>This test report only relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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**Anmerkungen**  
*Remarks*

1	<p>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.</p> <p>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</p> <p><i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i></p>
2	<p>Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben.</p> <p><i>As contractually agreed, this document has been signed digitally only. TÜV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TÜV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged.</i></p>
3	<p>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.</p> <p>Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</p> <p><i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i></p> <p><i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i></p>
4	<p>Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.</p> <p><i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i></p>

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## ***Test Summary***

**5.1.1 ANTENNA REQUIREMENT**

RESULT: Pass

**5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER**

RESULT: Pass

**5.1.3 CONDUCTED POWER SPECTRAL DENSITY**

RESULT: Pass

**5.1.4 6dB BANDWIDTH**

RESULT: Pass

**5.1.5 99% BANDWIDTH**

RESULT: Pass

**5.1.6 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHz BANDWIDTH**

RESULT: Pass

**5.1.7 RADIATED SPURIOUS EMISSION**

RESULT: Pass

**5.1.8 CONDUCTED EMISSION ON AC MAINS**

RESULT: Pass

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# 1 General Remarks

## 1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Test Results of Bluetooth Low Energy

Appendix B: Test Results of 2.4GHz SDR

Appendix C: Test Results of 2.4GHz Wi-Fi

Appendix D: Photographs of the Test Set-up.

## 2 Test Sites

### 2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P. R. China.

FCC Accreditation Designation No.: 694916

ISED wireless device testing laboratory: 25069

### 2.2 List of Test and Measurement Instruments

**Table 1: List of Test and Measurement Equipment**

Radio Spectrum Testing (SRD-Tonscend)					
Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. until
EXA Signal Analyzer, Multi-touch	Keysight	N9010B	MY60241175	2023-09-22	2024-09-21
MXG X-Series RF Vector Signal Generator	Keysight	N5182B	MY61250137	2023-09-22	2024-09-21
EXG X-Series Microwave Analog Signal Generator	Keysight	N5173B	MY61250141	2023-09-22	2024-09-21
DC power supply	Keysight	E3642A	MY61276100	2023-09-22	2024-09-21
Power Control Unit	Tonscend	JS0806-4ADC	N/A	2023-09-22	2024-09-21
Automation Control Unit	Tonscend	JS0806-2	21C8060396	2023-09-22	2024-09-21
Test Software	Tonscend	JS1120-3	N/A	N/A	N/A
Control PC	Lenovo	TianYi510S-071MB	YLX23JMF	N/A	N/A
Shielding Room 8#	Albatross	SR8	APC17151-SR8	2021-06-22	2024-06-22
Unwanted Emission Testing (TS9975)					
Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. until
EMI Test Receiver	R&S	ESR 7	102021	2023-07-26	2024-07-25
Signal Analyzer	R&S	FSV 40	101439	2023-07-26	2024-07-25
System Controller Interface	R&S	SCI-100	S10010038	N/A	N/A
Filterbank	R&S	Wlan	100759	2023-07-26	2024-07-25
OSP	R&S	OSP 120	102040	N/A	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2023-07-26	2024-07-25
Amplifier	R&S	SCU-18F	180070	2023-07-26	2024-07-25
Amplifier	R&S	SCU40A	100475	2023-07-26	2024-07-25
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2022-08-07	2024-08-06

Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2022-08-07	2024-08-06
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2022-08-28	2024-08-27
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2022-08-07	2024-08-06
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2021-06-22	2024-06-22

Conducted Emission				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
EMI Test Receiver	R&S	ESR3	102680	2024-02-23
Artificial Mains Network	R&S	ENV216	101445	2024-02-23
EMC32 test software	R&S	EMC32(Ver.10.50.00)	N/A	N/A

## 2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

## 2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

## 2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

**Table 2: Measurement Uncertainty**

Parameter	Uncertainty (k=2)
RF output power, conducted	± 0.99 dB
Occupied Channel Bandwidth	± 2.08 %
RF power density, conducted	± 0.99 dB
Unwanted Emissions, conducted	± 0.89 dB
All emissions, radiated	±4.17 dB
Conducted Emission, (9kHz to 150kHz)/(150kHz to 30MHz)	± 3.70 dB / ± 3.30 dB

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## 2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B & C & D of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

## 2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at No. 362 Huanguan Road Middle, Longhua District, 518110, Shenzhen, P. R. China. is listed on the US Federal Communications Commission list of facilities approved to perform measurements.



## 3 General Product Information

### 3.1 Product Function and Intended Use

The Product is DJI Avata 2 which supports Bluetooth, 2.4GHz SDR, 2.4GHz Wi-Fi, 5.2GHz SDR, 5.8GHz Wi-Fi, 5.8GHz SDR and GNSS functions.

\*remark: SDR means specific defined radio, and cannot changes radio specification via software/firmware by end-users.

For details refer to the User Manual, Technical Description and Circuit Diagram.

### 3.2 Ratings and System Details

**Table 3: Technical Specification of EUT**

General Information of EUT	Value
Kind of Equipment	DJI Avata 2
Type Designation	QF3W4K
Trademark	DJI
FCC ID	SS3-QF3W4K23
IC	11805A-QF3W4K23
Operating Voltage	14.76V DC by built-in battery or DC 5V/9V by AC/DC adapter
Testing Voltage	Fully charged battery
Extreme Temperature Range	-10°C to +40°C
Radiofrequency operating mode	1) Bluetooth: operating within 2400-2483.5MHz, Bluetooth BLE (1Mbps&2Mbps) 2) 2.4GHz SDR: operating within 2400-2483.5MHz, supports 1.4MHz/3MHz/5MHz/10MHz/20MHz/40MHz/60MHz Bandwidth 3) 2.4GHz Wi-Fi: operating within 2400-2483.5MHz, supports 20MHz/40MHz Bandwidth and IEEE 802.11 b/g/n20/n40 4) 5.2GHz SDR: operating within 5150-5250MHz, supports 10MHz/20MHz/40MHz Bandwidth *(Only for US, not for IC) 5) 5.8GHz SDR: operating within 5725-5850MHz, supports 1.4MHz/3MHz/5MHz/10MHz/20MHz/40MHz/60MHz/80MHz Bandwidth 6) 5.8GHz Wi-Fi: operating within 5725-5850MHz, supports 20MHz/40MHz/80MHz Bandwidth and IEEE 802.11 a/n20/n40/ac20/ac40/ac80 7) GPS & BDS & Galileo (receiver): operating within 1559-1610MHz
Technical Specification of Bluetooth	
Operating Frequency	2402-2480MHz
Type of Modulation	GFSK
Data Rate	1Mbps, 2Mbps
Channel Number	40 channels
Channel Separation	2MHz
Antenna Type	Integral Antenna
Antenna Number	1
Antenna Gain	1.5 dBi (Provided by the Client)

The type of wideband data transmission equipment	DTS
<b>Technical Specification of 2.4GHz SDR</b>	
Operating Frequency	2403.5-2467.5MHz for 1.4MHz Bandwidth 2405.12-2469.12MHz for 1.4MHz Bandwidth (CA mode) 2405.5-2465.5MHz for 3MHz Bandwidth 2408.2-2468.2MHz for 3MHz Bandwidth (CA mode) 2404.5-2469.5MHz for 5MHz Bandwidth 2407.5-2467.5MHz for 10MHz Bandwidth 2412.5-2462.5MHz for 20MHz Bandwidth 2422.5-2452.5MHz for 40MHz Bandwidth 2432.5-2442.5MHz for 60MHz Bandwidth
Type of Modulation	OFDM (QPSK, 16QAM, 64QAM)
Channel Number	33 channels for 1.4MHz Bandwidth 33 channels for 1.4MHz Bandwidth (CA mode) 21 channels for 3MHz Bandwidth 21 channels for 3MHz Bandwidth (CA mode) 14 channels for 5MHz Bandwidth 61 channels for 10MHz Bandwidth 51 channels for 20MHz Bandwidth 31 channels for 40MHz Bandwidth 11 channels for 60MHz Bandwidth
Channel Separation	2MHz for 1.4MHz Bandwidth 2MHz for 1.4MHz Bandwidth (CA mode) 3MHz for 3MHz Bandwidth 3MHz for 3MHz Bandwidth (CA mode) 5MHz for 5MHz Bandwidth 1MHz for 10MHz/20MHz/40MHz/60MHz Bandwidth
Antenna Type	Integral Antenna
Antenna Number	1Tx4Rx for SISO mode (ANT0 or ANT1 or ANT2 or ANT3) 2Tx4Rx for MIMO mode (ANT0+ANT1, or ANT0+ANT3, or ANT2+ANT1, or ANT2+ANT3)
Antenna Gain	1.5 dBi for ANT0/ANT1/ANT2/ANT3 (Provided by the Client)
The type of wideband data transmission equipment:	DTS
<b>Technical Specification of 2.4GHz Wi-Fi</b>	
Operating Frequency	2412 - 2462 MHz for 802.11b/g/n(HT20) 2422 - 2452 MHz for 802.11n(HT40)
Type of Modulation	DSSS(DBPSK/DQPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM)
Data Rate	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0 ~ MCS7 for 802.11n
Channel Number	11 channels for 802.11b/g/n(HT20) 7 channels for 802.11n(HT40)
Channel Separation	5 MHz
Antenna Type	Integral Antenna
Antenna Number	1
Antenna Gain	1.5 dBi (Provided by the Client)
The type of wideband data transmission equipment:	DTS

**Table 4: RF Channel and Frequency of Bluetooth LE**

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

**Table 5: RF Channel and Frequency of 2.4GHz SDR**

2.4GHz 1.4MHz Bandwidth (2403.5MHz-2467.5MHz)			
RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
1	2403.5	18	2437.5
2	2405.5	19	2439.5
3	2407.5	20	2441.5
4	2409.5	21	2443.5
5	2411.5	22	2445.5
6	2413.5	23	2447.5
7	2415.5	24	2449.5
8	2417.5	25	2451.5
9	2419.5	26	2453.5
10	2421.5	27	2455.5
11	2423.5	28	2457.5
12	2425.5	29	2459.5
13	2427.5	30	2461.5
14	2429.5	31	2463.5
15	2431.5	32	2465.5
16	2433.5	33	2467.5
17	2435.5		

2.4GHz 1.4MHz Bandwidth (CA Mode) (2405.12MHz-2469.12MHz)			
RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
1	2405.12	18	2439.12
2	2407.12	19	2441.12
3	2409.12	20	2443.12
4	2411.12	21	2445.12
5	2413.12	22	2447.12
6	2415.12	23	2449.12

7	2417.12	24	2451.12
8	2419.12	25	2453.12
9	2421.12	26	2455.12
10	2423.12	27	2457.12
11	2425.12	28	2459.12
12	2427.12	29	2461.12
13	2429.12	30	2463.12
14	2431.12	31	2465.12
15	2433.12	32	2467.12
16	2435.12	33	2469.12
17	2437.12		

2.4GHz 3MHz Bandwidth (2405.5MHz-2465.5MHz)			
RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
1	2405.5	12	2438.5
2	2408.5	13	2441.5
3	2411.5	14	2444.5
4	2414.5	15	2447.5
5	2417.5	16	2450.5
6	2420.5	17	2453.5
7	2423.5	18	2456.5
8	2426.5	19	2459.5
9	2429.5	20	2462.5
10	2432.5	21	2465.5
11	2435.5		

2.4GHz 3MHz Bandwidth (CA Mode) (2408.2MHz-2480.2MHz)					
RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
1	2408.2	8	2429.2	15	2450.2
2	2411.2	9	2432.2	16	2453.2
3	2414.2	10	2435.2	17	2456.2
4	2417.2	11	2438.2	18	2459.2
5	2420.2	12	2441.2	19	2462.2
6	2423.2	13	2444.2	20	2465.2
7	2426.2	14	2447.2	21	2468.2

2.4GHz 5MHz Bandwidth (2404.5MHz-2469.5MHz)			
RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
1	2404.5	8	2439.5
2	2409.5	9	2444.5
3	2414.5	10	2449.5

4	2419.5	11	2454.5
5	2424.5	12	2459.5
6	2429.5	13	2464.5
7	2434.5	14	2469.5

2.4GHz 10MHz Bandwidth (2407.5MHz-2467.5MHz)					
RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
1	2407.5	22	2428.5	43	2449.5
2	2408.5	23	2429.5	44	2450.5
3	2409.5	24	2430.5	45	2451.5
4	2410.5	25	2431.5	46	2452.5
5	2411.5	26	2432.5	47	2453.5
6	2412.5	27	2433.5	48	2454.5
7	2413.5	28	2434.5	49	2455.5
8	2414.5	29	2435.5	50	2456.5
9	2415.5	30	2436.5	51	2457.5
10	2416.5	31	2437.5	52	2458.5
11	2417.5	32	2438.5	53	2459.5
12	2418.5	33	2439.5	54	2460.5
13	2419.5	34	2440.5	55	2461.5
14	2420.5	35	2441.5	56	2462.5
15	2421.5	36	2442.5	57	2463.5
16	2422.5	37	2443.5	58	2464.5
17	2423.5	38	2444.5	59	2465.5
18	2424.5	39	2445.5	60	2466.5
19	2425.5	40	2446.5	61	2467.5
20	2426.5	41	2447.5		
21	2427.5	42	2448.5		

2.4GHz 20MHz Bandwidth (2412.5MHz-2462.5MHz)					
RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
1	2412.5	18	2429.5	35	2446.5
2	2413.5	19	2430.5	36	2447.5
3	2414.5	20	2431.5	37	2448.5
4	2415.5	21	2432.5	38	2449.5
5	2416.5	22	2433.5	39	2450.5
6	2417.5	23	2434.5	40	2451.5
7	2418.5	24	2435.5	41	2452.5
8	2419.5	25	2436.5	42	2453.5
9	2420.5	26	2437.5	43	2454.5
10	2421.5	27	2438.5	44	2455.5
11	2422.5	28	2439.5	45	2456.5

12	2423.5	29	2440.5	46	2457.5
13	2424.5	30	2441.5	47	2458.5
14	2425.5	31	2442.5	48	2459.5
15	2426.5	32	2443.5	49	2460.5
16	2427.5	33	2444.5	50	2461.5
17	2428.5	34	2445.5	51	2462.5

2.4GHz 40MHz Bandwidth (2422.5MHz-2452.5MHz)					
RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
1	2422.5	12	2433.5	23	2444.5
2	2423.5	13	2434.5	24	2445.5
3	2424.5	14	2435.5	25	2446.5
4	2425.5	15	2436.5	26	2447.5
5	2426.5	16	2437.5	27	2448.5
6	2427.5	17	2438.5	28	2449.5
7	2428.5	18	2439.5	29	2450.5
8	2429.5	19	2440.5	30	2451.5
9	2430.5	20	2441.5	31	2452.5
10	2431.5	21	2442.5		
11	2432.5	22	2443.5		

2.4GHz 60MHz Bandwidth (2432.5MHz-2442.5MHz)			
RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
1	2432.5	7	2438.5
2	2433.5	8	2439.5
3	2434.5	9	2440.5
4	2435.5	10	2441.5
5	2436.5	11	2442.5
6	2437.5		

**Table 6: RF Channel and Frequency of Wi-Fi 802.11 b/g/n**

RF Channel	802.11 b/g/n(HT20)	802.11 n(HT40)
	Frequency (MHz)	Frequency (MHz)
01	2412	/
02	2417	/
03	2422	2422
04	2427	2427
05	2432	2432
06	2437	2437
07	2442	2442
08	2447	2447
09	2452	2452
10	2457	/
11	2462	/

### 3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Bluetooth wireless transmitting mode
  - 1) Low Channel
  - 2) Middle Channel
  - 3) High Channel
- B. On, 2.4GHz SDR wireless transmitting mode
  - 1) Low Channel
  - 2) Middle Channel
  - 3) High Channel
- C. On, 2.4GHz Wi-Fi wireless transmitting mode
  - 1) Low Channel
  - 2) Middle Channel
  - 3) High Channel
- D. Off

### 3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

### 3.5 Submitted Documents

- |                              |                         |
|------------------------------|-------------------------|
| - Application Form           | - User Manual           |
| - ID Label and Location Info | - Operation Description |

## 4 Test Set-up and Operation Modes

### 4.1 Principle of Configuration Selection

**Radio Spectrum:** The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

**Emission:** The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

### 4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all tests were performed on model QF3W4K in this report.

### 4.3 Special Accessories and Auxiliary Equipment

Table 7: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	Remark
Laptop	Lenovo	T480	PF-16A6N8
AC/DC Adapter	/	PD-30CN	Input: 100-240V, 50/60Hz, 0.8A Max Output: 3.3-11V, 2.72A or 5V/3A or 9V/3A or 12V/2.5A or 15V/2A

### 4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.



## 4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

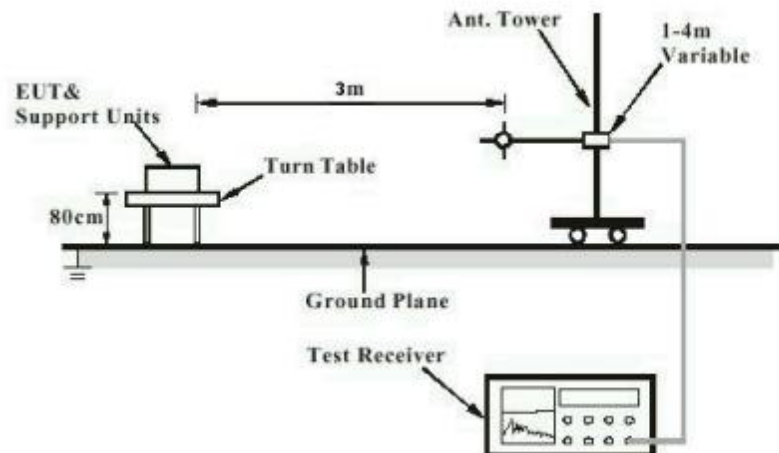
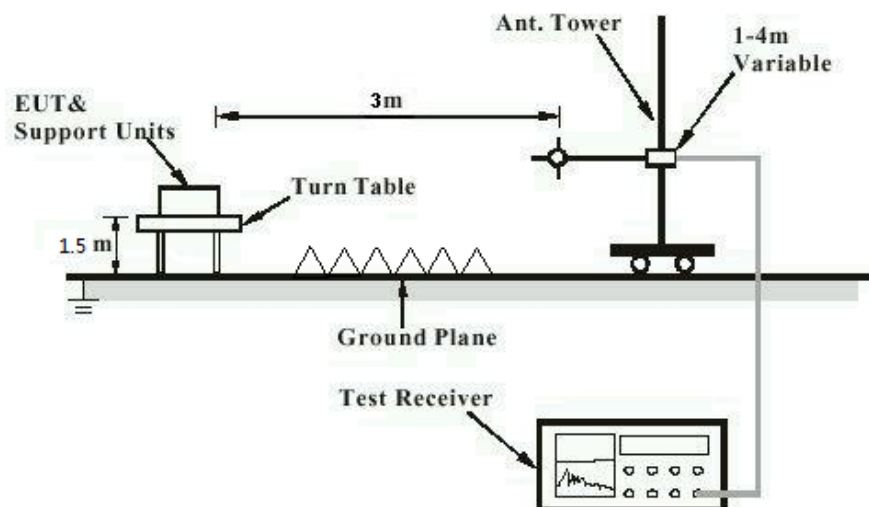
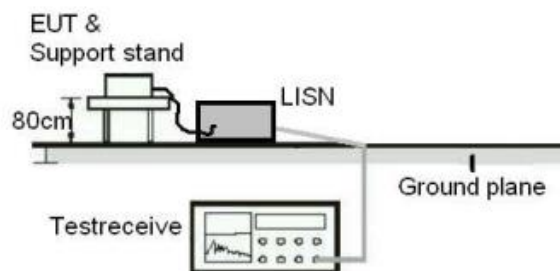


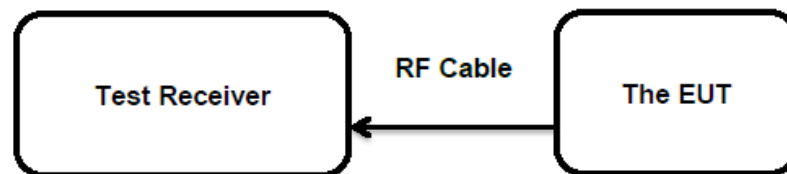
Diagram of Measurement Configuration for Radiation Test (Above 1GHz)



### Diagram of Measurement Configuration for Mains Conduction Measurement



### Diagram of Measurement Configuration for Conducted Transmitter Measurement



## 5 Test Results

### 5.1 Transmitter Requirement & Test Suites

#### 5.1.1 Antenna Requirement

**RESULT:****Pass****Test Specification**

Test standard : FCC Part 15.247(b)(4) and Part 15.203  
RSS-Gen Clause 6.8  
Limit : the use of antennas with directional gains that do not  
exceed 6 dBi

According to the manufacturer declared, the EUT have for Integral Antennas, the max. antenna gain antenna is 1.5dBi for 2.4GHz SDR and 1.5dBi for 2.4GHz Wi-Fi & BLE , permanent attachment and no consideration of replacement..

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

## 5.1.2 Maximum Peak Conducted Output Power

**RESULT:**

**Pass**

### Test Specification

Test standard	: FCC Part 15.247(b)(3) RSS-247 Clause 5.4(d)
Basic standard	: ANSI C63.10: 2013
Limits	: < 1 W (Maximum Conducted Peak Power) e.i.r.p. <4W
Kind of test site	: Shielded Room

### Test Setup

Date of testing	: 2023-12-20 to 2024-01-03
Input voltage	: Fully charged battery
Operation mode	: A, B, C
Test channel	: Low / Middle / High
Ambient temperature	: 25.2 °C
Relative humidity	: 31 %
Atmospheric pressure	: 101 kPa

For details refer to following test result.

**Table 8: Test Result of Maximum Conducted Output Power, Bluetooth LE**

Test Mode	Data Rate	Test Channel (MHz)	Measured Peak Power		Limit (W)
			(dBm)	(W)	
Bluetooth LE	1 Mbps	2402	4.02	0.0025	< 1.0
		2440	5.02	0.0032	
		2480	3.12	0.0021	
	2 Mbps	2402	4.44	0.0028	
		2440	4.76	0.0030	
		2480	2.93	0.0020	
Maximum Measured Value			5.02	0.0032	
Max. e.i.r.p.=5.02dBm+1.5dBi=6.52dBm, which is less than 36dBm=4W.					

**Table 9: Test Result of Maximum Conducted Output Power, 2.4GHz Wi-Fi**

Test Mode	Data Rate	Test Channel (MHz)	Measured Peak Power		Limit (W)
			(dBm)	(W)	
802.11b	1 Mbps	2412	14.27	0.0267	< 1.0
		2437	18.77	0.0753	
		2462	15.83	0.0383	
802.11g	6 Mbps	2412	18.21	0.0662	
		2437	22.77	0.1892	
		2462	19.67	0.0927	
802.11n (HT20)	MCS0	2412	18.39	0.0690	
		2437	22.95	0.1972	
		2462	19.99	0.0998	
802.11n (HT40)	MCS0	2422	22.97	0.1982	
		2437	22.26	0.1683	
		2452	22.62	0.1828	

<b>Maximum Measured Value</b>	<b>22.97</b>	<b>0.1982</b>	
Max. e.i.r.p.=22.97dBm+1.5dBi=24.47dBm, which is less than 36dBm=4W.			

**Table 10: Test Result of Maximum Conducted Output Power, 2.4GHz SDR**

Worst case: SISO mode (ANT 3)

Test Mode	Test Channel (MHz)	Measured Average Power		Limit (W)
		(dBm)	(W)	
1.4MHz BW	2403.5	27.03	0.5047	< 1.0
	2435.5	28.98	0.7907	
	2463.5	27.39	0.5483	
	2467.5	22.48	0.1770	
1.4MHz BW CA	2405.12	29.21	0.8337	
	2437.12	28.89	0.7745	
	2465.12	27.23	0.5284	
	2469.12	19.26	0.0843	
3MHz BW	2405.5	29.67	0.9268	
	2435.5	29.20	0.8318	
	2465.5	27.76	0.5970	
3MHz BW CA	2408.2	29.56	0.9036	
	2438.2	29.35	0.8610	
	2462.2	27.70	0.5888	
	2465.2	26.02	0.3999	
	2468.2	21.15	0.1303	
5MHz BW	2404.5	27.12	0.5152	
	2434.5	28.93	0.7816	
	2459.5	27.87	0.6124	
	2469.5	20.64	0.1159	
10MHz BW	2407.5	26.96	0.4966	
	2437.5	28.67	0.7362	
	2465.5	25.93	0.3917	
	2467.5	24.75	0.2985	
20MHz BW	2412.5	26.13	0.4102	
	2437.5	28.35	0.6839	
	2460.5	25.23	0.3334	
	2462.5	24.49	0.2812	
40MHz BW	2422.5	23.91	0.2460	
	2425.5	24.82	0.3034	
	2430.5	26.39	0.4355	
	2437.5	28.33	0.6808	
	2450.5	25.37	0.3443	
	2452.5	24.05	0.2541	
60MHz BW	2432.5	22.15	0.1641	
	2433.5	25.93	0.3917	
	2437.5	28.33	0.6808	
	2440.5	25.07	0.3214	
	2442.5	24.63	0.2904	
<b>Maximum Measured Value</b>		<b>29.67</b>	<b>0.9268</b>	
Max. e.i.r.p.=29.67dBm+1.5dBi=31.17dBm, which is less than 36dBm=4W.				

Worst case: MIMO mode (ANT 2+1)

Test Mode	Test Channel (MHz)	Measured Average Power		Limit (W)	
		(dBm)	(W)		
1.4MHz BW	2403.5	27.75	0.5957	< 1.0	
	2435.5	27.52	0.5649		
	2467.5	26.89	0.4887		
1.4MHz BW CA	2405.12	27.82	0.6053		
	2437.12	27.51	0.5636		
	2469.12	25.99	0.3972		
3MHz BW	2405.5	28.47	0.7031		
	2435.5	28.87	0.7709		
	2465.5	28.19	0.6592		
3MHz BW CA	2408.2	29.16	0.8241		
	2438.2	28.72	0.7447		
	2468.2	26.49	0.4457		
5MHz BW	2404.5	28.92	0.7798		
	2434.5	29.37	0.8650		
	2464.5	27.67	0.5848		
	2469.5	24.12	0.2582		
10MHz BW	2407.5	28.3	0.6761		
	2437.5	28.56	0.7178		
	2467.5	27.48	0.5598		
20MHz BW	2412.5	25.93	0.3917		
	2437.5	28.51	0.7096		
	2460.5	25.6	0.3631		
	2462.5	25.03	0.3184		
40MHz BW	2422.5	24.36	0.2729		
	2424.5	25.99	0.3972		
	2437.5	28.52	0.7112		
	2445.5	26.77	0.4753		
	2450.5	25.01	0.3170		
	2452.5	22.19	0.1656		
60MHz BW	2432.5	26.85	0.4842		
	2437.5	28.42	0.6950		
	2442.5	27.68	0.5861		
Maximum Measured Value		29.37	0.8650		
Max. e.i.r.p.=29.37dBm+1.5dBi=30.87dBm, which is less than 36dBm=4W.					

Note:

- 1) The cable loss is taken into account in results,  $e.i.r.p. = P_{(Peak\ power)} + G$
- 2) Antenna gain(G) of 2.4GHz: 1.5dBi  
Antenna gain(G) of 2.4GHz Wi-Fi : 1.5dBi  
Antenna gain(G) of 2.4GHz SDR: 1.5dBi

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### 5.1.3 Conducted Power Spectral Density

RESULT:

Pass

**Test Specification**

Test standard : FCC Part 15.247(e)  
RSS-247 Clause 5.2(b)  
Basic standard : ANSI C63.10: 2013  
Limits : 8 dBm / 3kHz  
Kind of test site : Shielded Room

**Test Setup**

Date of testing : 2023-12-20 to 2024-01-03  
Input voltage : Fully charged battery  
Operation mode : A, B, C  
Test channel : Low / Middle / High  
Ambient temperature : 25.2 °C  
Relative humidity : 31 %  
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix A, B, C.

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### 5.1.4 6dB Bandwidth

**RESULT:****Pass****Test Specification**

Test standard : FCC Part 15.247(a)(2)  
RSS-247 Clause 5.2(a)  
Basic standard : ANSI C63.10: 2013  
Limits : > 500 KHz  
Kind of test site : Shielded Room

**Test Setup**

Date of testing : 2023-12-20 to 2024-01-03  
Input voltage : Fully charged battery  
Operation mode : A, B, C  
Test channel : Low / Middle / High  
Ambient temperature : 25.2 °C  
Relative humidity : 31 %  
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix A, B, C.



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### 5.1.5 99% Bandwidth

**RESULT:**

**Pass**

#### Test Specification

Test standard : FCC Part 15.247(a)  
RSS-Gen clause 6.7  
Basic standard : ANSI C63.10: 2013  
Kind of test site : Shielded Room

#### Test Setup

Date of testing : 2023-12-20 to 2024-01-03  
Input voltage : Fully charged battery  
Operation mode : A, B, C  
Test channel : Low / Middle / High  
Ambient temperature : 25.2 °C  
Relative humidity : 31 %  
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix A, B, C.

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### 5.1.6 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

**RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.247(d) RSS-247 Clause 5.5
Basic standard	: ANSI C63.10: 2013
Limits	: 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	: Shielded Room

**Test Setup**

Date of testing	: 2023-12-20 to 2024-01-03
Input voltage	: Fully charged battery
Operation mode	: A, B, C
Test channel	: Low / Middle / High
Ambient temperature	: 25.2 °C
Relative humidity	: 31 %
Atmospheric pressure	: 101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix A, B, C.

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### 5.1.7 Radiated Spurious Emission

**RESULT:****Pass****Test Specification**

Test standard : FCC Part 15.247(d) & FCC Part 15.205  
RSS-247 Clause 3.3 & 5.5

Basic standard : ANSI C63.10: 2013

Limits : Refer to 15.209(a) of FCC part 15.247(d)  
RSS-Gen Table 5

Kind of test site : 3m Semi-anechoic Chamber

**Test Setup**

Date of testing : 2023-12-24 to 2024-01-09

Input voltage : Fully charged battery

Operation mode : A, B, C

Test channel : Low / Middle / High

Ambient temperature : Refer to test result

Relative humidity : Refer to test result

Atmospheric pressure : 101 kPa

**Remark:**

Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix A, B, C.

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### 5.1.8 Conducted Emission on AC Mains

**RESULT:****Pass****Test Specification**

Test standard	: FCC Part 15.207(a) RSS-Gen Section 8.8
Basic standard	: ANSI C63.10: 2013
Frequency range	: 0.15 – 30MHz
Classification	: Class B
Limits	: FCC Part 15.207(a) RSS-Gen Table 4
Kind of test site	: Shielded Room

**Test Setup**

Date of testing	: 2023-11-24
Input voltage	: AC 120V, 60Hz
Operation mode	: A, B, C
Earthing	: Not connected
Ambient temperature	: 25.0 °C
Relative humidity	: 51.2 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A, B, C.

## 6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix D.

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