

Prüfbericht-Nr.: <i>Test report no.:</i>	CN23PXI2 001	Auftrags-Nr.: <i>Order no.:</i>	168400062	Seite 1 von 26 Page 1 of 26
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2022-11-23	
Auftraggeber: <i>Client:</i>	SZ DJI TECHNOLOGY CO., LTD. Lobby of T2, DJI Sky City, No. 53 Xianyuan Road, Xili Community, Xili Street, Nanshan District, Shenzhen, China			
Prüfgegenstand: <i>Test item:</i>	DJI Mavic 3 Pro, DJI Mavic 3 Pro Cine			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	L2S, L2E			
Auftrags-Inhalt: <i>Order content:</i>	Test Report			
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209 RSS-247 Issue 2 February 2017 RSS-Gen Issue 5 March 2019			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2022-12-06	Please refer to photo documents		
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003384103-003 A003384103-004			
Prüfzeitraum: <i>Testing period:</i>	2022-12-06 to 2023-01-13			
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>		genehmigt von: <i>authorized by:</i>		
Datum: <i>Date:</i>	2023-02-03	Ausstellungsdatum: <i>Issue date:</i>	2023-02-03	
Stellung / Position:	Sachverständige(r) / Expert	Stellung / Position:	Sachverständige(r) / Expert	
Sonstiges / Other:	FCC ID: SS3-L2ES2212, IC: 11805A-L2ES2212, HVIN: L2S, L2E This report is for Bluetooth BLE, 2.4GHz SDR and 2.4GHz Wi-Fi. Applicant & Manufacturer: SZ DJI TECHNOLOGY CO., LTD., Lobby of T2, DJI Sky City, No. 53 Xianyuan Road, Xili Community, Xili Street, Nanshan District, Shenzhen, China			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend 5 = mangelhaft N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient 5 = poor N/T = not tested
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. <i>This test report only relates to the a. m. 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>				

V05

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

TABLE OF CONTENTS

1	GENERAL REMARKS	4
1.1	Complementary Materials	4
2	TEST SITES.....	5
2.1	Test Facilities	5
2.2	List of Test and Measurement Instruments.....	5
2.3	Traceability	6
2.4	Calibration	6
2.5	Measurement Uncertainty	6
2.6	Location of Original Data.....	6
2.7	Status of Facility Used for Testing	6
3	GENERAL PRODUCT INFORMATION	7
3.1	Product Function and Intended Use.....	7
3.2	Ratings and System Details	7
3.3	Independent Operation Modes.....	12
3.4	Noise Generating and Noise Suppressing Parts	13
3.5	Submitted Documents	13
4	TEST SET-UP AND OPERATION MODES	14
4.1	Principle of Configuration Selection	14
4.2	Test Operation and Test Software	14
4.3	Special Accessories and Auxiliary Equipment	14
4.4	Countermeasures to Achieve EMC Compliance.....	14
4.5	Test Setup Diagram	15
5	TEST RESULTS	17
5.1	Transmitter Requirement & Test Suites	17
5.1.1	Antenna Requirement	17
5.1.2	Maximum Peak Conducted Output Power.....	18
5.1.3	Conducted Power Spectral Density	21
5.1.4	6dB Bandwidth	22
5.1.5	99% Bandwidth	23
5.1.6	Conducted Spurious Emissions Measured in 100 kHz Bandwidth.....	24
5.1.7	Radiated Spurious Emission.....	25
6	PHOTOGRAPHS OF THE TEST SET-UP	26
7	LIST OF TABLES.....	26

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 BLE

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.

362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China

FCC Registration No.: 694916

ISED wireless device testing laboratory: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Equip. No.	Description	Manufacturer	Model	Serial No.	Calibrated until (DD.MM.YYYY)
9039436	EXA Signal Analyzer, Multi-touch	Keysight	N9010B	MY60241175	10.10.2023
9039437	MXG X-Series RF Vector Signal Generator	Keysight	N5182B	MY61250137	10.10.2023
9039438	EXG X-Series Microwave Analog Signal Generator	Keysight	N5173B	MY61250141	10.10.2023
9039439	DC Power Supply	Keysight	E3642A	MY61276100	10.10.2023
9039440	Wireless Connectivity Tester	R&S	CMW270	102505	10.10.2023
9039441	Power Control Unit	Tonscend	JS0806-4ADC	N/A	10.10.2023
9039442	Automation Control Unit	Tonscend	JS0806-2	21C8060396	10.10.2023
9039443	Test Software	Tonscend	JS1120-3	N/A	N/A
9039444	Control PC	Lenovo	TianYi510S-071MB	YLX23JMF	N/A
Equip. No.	Description	Manufacturer	Model	Serial No.	Calibrated until (DD.MM.YYYY)
G1826021	EMI Test Receiver	R&S	ESR 7	102021	02.08.2023
G1826023	Signal Analyzer	R&S	FSV 40	101439	01.08.2023
G1826024	System Controller Interface	R&S	SCI-100	S10010038	N/A
G1826025	Filterbank	R&S	Wlan	100759	01.08.2023
G1826026	OSP	R&S	OSP 120	102040	N/A
G1826028	Pre-amplifier	R&S	SCU08F1	08320031	02.08.2023
G1826029	Amplifier	R&S	SCU-18F	180070	02.08.2023
G1826030	Amplifier	R&S	SCU40A	100475	02.08.2023
G1826031	Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	06.08.2024
G1826032	Double-Ridged Antenna (1 - 18 GHz)	ETS-LINDGREN	3117	00218717	06.08.2024
G1826033	Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	27.08.2024
G1826034	Active Loop Antenna	Schwarzbeck	FMZB 1513	302	06.08.2024
G1826036	Test software	R&S	EMC32 (V10.60.10)	N/A	N/A

G1826037	Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
G1826433	3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	22.06.2024

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.

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-7}$
RF Power (conducted)	± 2.5 dB
Radiated Emission of Transmitter, valid up to 26.5 GHz	± 6 dB
Radiated Emission of Receiver, valid up to 26.5 GHz	± 6 dB
Conducted Emission, (9kHz to 150kHz)/(150kHz to 30MHz)	± 3.70 dB / ± 3.30 dB
Radiated Emission (3m SAC), 30MHz to 1000MHz	± 4.52 dB
Radiated Emission (3m SAC), above 1000MHz	± 4.37 dB
Temperature	± 1 °C
Humidity	± 5 %
Voltage (DC)	± 1 %
Voltage (AC, <10kHz)	± 2 %

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) Co., Ltd. file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at 362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of 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 **EUT (Equipment Under Test)** is an aircraft (DJI Mavic 3 Pro with model L2S, DJI Mavic 3 Pro Cine with model L2E). It supports Bluetooth BLE, 2.4GHz SDR, 2.4GHz Wi-Fi, 5.2GHz SDR, 5.8GHz SDR, 5.8GHz Wi-Fi, GPS/BDS/Galileo and ADS-B functions.

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

According to the declaration of the applicant, the electrical circuit design and PCB layout are identical, the different is that L2E has an additional SSD than L2S.

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

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	DJI Mavic 3 Pro, DJI Mavic 3 Pro Cine
Type Designation	L2S (product name: DJI Mavic 3 Pro) L2E (product name: DJI Mavic 3 Pro Cine)
Operating Voltage	DC 15.4V (Re-charged Battery, 15.4 V, 5000mAh, 77Wh)
Extreme Temperature Range	-10°C to +40°C
Radiofrequency operating mode	1) Bluetooth: operating within 2400-2483.5MHz, supports BT 5.1@BLE only, 1Mbps&2Mbps 2) 2.4GHz SDR: operating within 2400-2483.5MHz, supports 1.4MHz/3MHz/10MHz/20MHz/40MHz Bandwidth 3) 2.4GHz Wi-Fi: operating within 2400-2483.5MHz, supports 20MHz/40MHz Bandwidth and IEEE 802.11 b/g/n20/n40/ax20/ax40 4) 5.2GHz SDR: operating within 5150-5250MHz, supports 10MHz/20MHz/40MHz Bandwidth (not applicable for Canada market) 5) 5.8GHz SDR: operating within 5725-5850MHz, supports 1.4MHz/3MHz/10MHz/20MHz/40MHz 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/ax20/ax40/ax80 7) GPS & BDS & Galileo (receiver): operating within 1559-1610MHz 8) ADS-B (receiver): operating at 978MHz (1MHz Bandwidth) and 1090MHz (2MHz Bandwidth)
Technical Specification of Bluetooth	
Operating Frequency	2402-2480MHz
Type of Modulation	GFSK
Data Rate	1Mbps, 2Mbps
Channel Number	40 channels for Bluetooth BLE
Channel Separation	1MHz and 2MHz

Antenna Type	Integral Antenna
Antenna Number	1 (ANT0)
Antenna Gain	-2.5 dBi
The type of wideband data transmission equipment	DTS
Technical Specification of 2.4GHz SDR	
Operating Frequency	2403.5-2469.5MHz for 1.4MHz Bandwidth 2405.12-2471.12MHz for 1.4MHz Bandwidth (CA mode) 2405.5-2468.5MHz for 3MHz Bandwidth 2408.2-2471.2MHz for 3MHz Bandwidth (CA mode) 2407.5-2467.5MHz for 10MHz Bandwidth 2412.5-2462.5MHz for 20MHz Bandwidth 2422.5-2452.5MHz for 40MHz Bandwidth
Type of Modulation	OFDM (QPSK, 16QAM, 64QAM)
Channel Number	34 channels for 1.4MHz Bandwidth 34 channels for 1.4MHz Bandwidth (CA mode) 22 channels for 3MHz Bandwidth 22 channels for 3MHz Bandwidth (CA mode) 61 channels for 10MHz Bandwidth 51 channels for 20MHz Bandwidth 31 channels for 40MHz 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) 1MHz for 10MHz Bandwidth 1MHz for 20MHz Bandwidth 1MHz for 40MHz 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	1.5dBi for ANT0 2dBi for ANT1 2dBi for ANT2 1.5dBi for ANT3
The type of wideband data transmission equipment	DTS
Technical Specification of 2.4GHz Wi-Fi	
Operating Frequency	2412 - 2462MHz for 802.11b/g/n(HT20)/ax20(HE20) 2422 - 2452MHz for 802.11n(HT40)/ax40(HE40)
Type of Modulation	DSSS(DBPSK/DQPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM) OFDMA(BPSK/QPSK/16QAM/64QAM/256QAM/1024QAM)
Data Rate	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0 ~ MCS15 for 802.11n MCS0 ~ MCS11 for 802.11ax
Multi-RU	No, full RU
Channel Number	11 channels for 802.11b/g/n(HT20)/ax20(HE20) 7 channels for 802.11n(HT40)/ax40(HE40)

Channel Separation	5 MHz
Antenna Type	Integral Antenna
Antenna Number	1Tx1Rx for SISO mode (ANT0 or ANT1) 2Tx2Rx for MIMO mode (ANT0+ANT1)
Antenna Gain	-2.5dBi for ANT0 -2.5dBi for ANT1
The type of wideband data transmission equipment	DTS

Table 3: RF Channel and Frequency of BLE

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 4: RF Channel and Frequency of 2.4GHz SDR

2.4GHz 1.4MHz Bandwidth (2403.5MHz-2469.5MHz)			
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	34	2469.5

2.4GHz 1.4MHz Bandwidth (CA Mode) (2405.12MHz-2471.12MHz)			
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	34	2471.12

2.4GHz 3MHz Bandwidth (2405.5MHz-2468.5MHz)			
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	22	2468.5

2.4GHz 3MHz Bandwidth (CA mode) (2408.2MHz-2471.2MHz)			
RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
1	2408.2	12	2441.2
2	2411.2	13	2444.2
3	2414.2	14	2447.2
4	2417.2	15	2450.2
5	2420.2	16	2453.2
6	2423.2	17	2456.2

7	2426.2	18	2459.2
8	2429.2	19	2462.2
9	2432.2	20	2465.2
10	2435.2	21	2468.2
11	2438.2	22	2471.2

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

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		

Table 5: RF Channel and Frequency of 2.4GHz Wi-Fi 802.11 b/g/n/ax

RF Channel	802.11 b/g/n(HT20)/ax20	802.11 n(HT40)/ax40
	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 BLE 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, Wi-Fi 802.11 b/g/n/ax wireless transmitting mode
 - 1) Low Channel

- 2) Middle Channel
- 3) High Channel
- D. On, Normal Operation
- E. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form

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 tests were performed according to the procedures in ANSI C63.10: 2013 and ANSI C63.4: 2014.

According to clause 3.1, all tests were performed on model L2E in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 6: Auxiliary Equipment Used during Test

Description	Manufacturer	Model	S/N	Rating
Laptop	Lenovo	T480	PF-16A6N8	N/A

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)

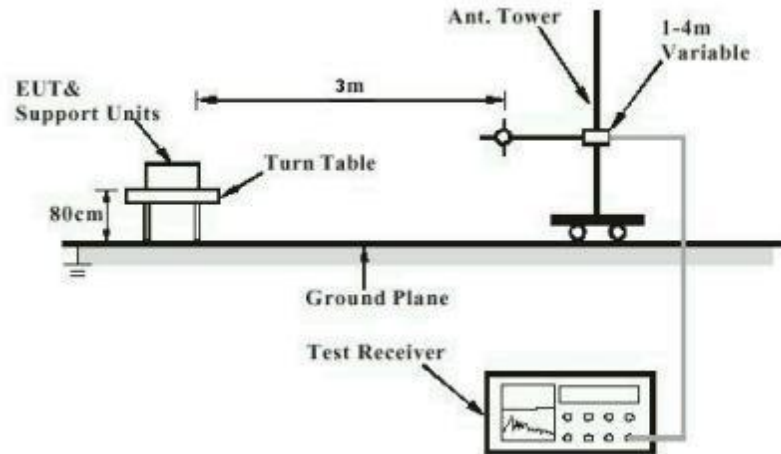


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

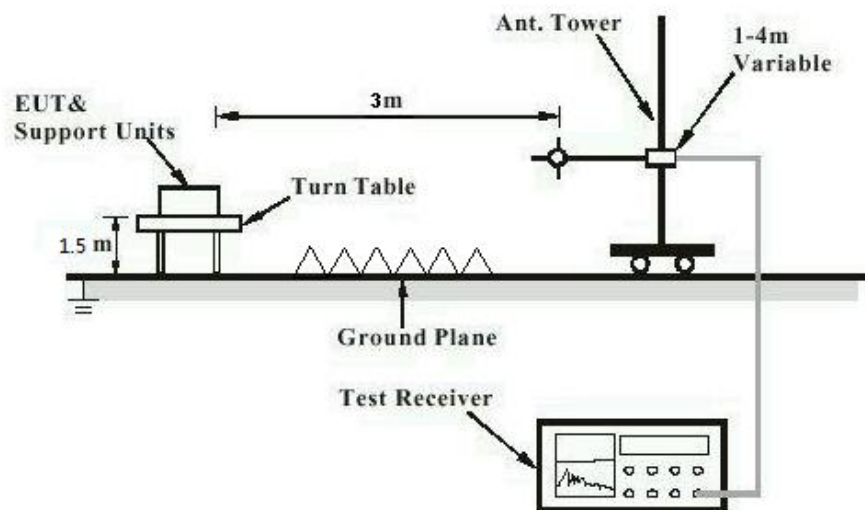
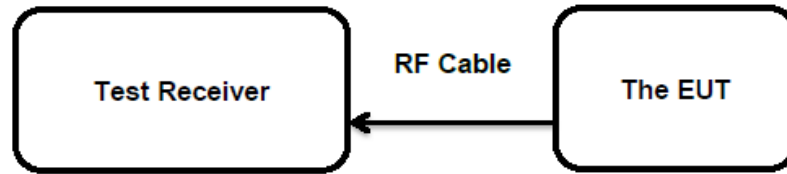


Diagram of Measurement Configuration for Conducted Transmitter Measurement



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

According to the manufacturer declared, the EUT has internal antennas, the max. uncorrelated antenna gain antenna is -2.5dBi for Bluetooth BLE, -2.5dBi for 2.4GHz Wi-Fi, 2dBi for 2.4GHz SDR, permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

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	:	0.125W, 1.0 Watts, 4W
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-12-06 to 2023-01-13
Input voltage	:	Full Battery
Operation mode	:	A, B, C
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Table 7: Test Result of Maximum Conducted Output Power, BLE

Test Mode	Data Rate	Test Channel (MHz)	Measured Peak Power		Limit (W)
			(dBm)	(W)	
GFSK (BLE)	1 Mbps	2402	8.61	0.0073	< 1.0
		2440	8.75	0.0075	
		2480	9.59	0.0091	
Maximum Measured Value			9.59	0.0091	
Test Mode	Data Rate	Test Channel (MHz)	Measured Peak Power		Limit (W)
			(dBm)	(W)	
GFSK (BLE)	2 Mbps	2402	8.56	0.0072	< 1.0
		2440	9.32	0.0086	
		2480	10.13	0.0103	
Maximum Measured Value			10.13	0.0103	
Max. e.i.r.p.=10.13dBm-2.5dBi=7.63dBm, which is less than 36dBm=4W.					

Table 8: Test Result of Maximum Conducted Output Power, Wi-Fi 802.11 b/g/n/ax20/ax40

Worst case for SISO mode

Test Mode	Data Rate	Test Channel	Measured Peak Power		Limit (W)
			(dBm)	(W)	
802.11b	1 Mbps	1	21.86	0.1535	< 1.0
		6	22.16	0.1644	
		11	21.90	0.1549	
802.11g	6 Mbps	1	25.39	0.3459	
		6	25.34	0.3420	
		11	23.54	0.2259	
802.11n (HT20)	MCS0	1	24.02	0.2523	
		6	24.67	0.2931	

		11	24.43	0.2773	
802.11n (HT40)	MCS0	3	21.01	0.1262	
		6	25.71	0.3724	
		9	20.94	0.1242	
802.11ax (HE20)	MCS0	1	24.52	0.2831	
		6	25.31	0.3396	
		11	25.04	0.3192	
802.11ax (HE40)	MCS0	3	21.70	0.1479	
		6	26.11	0.4083	
		9	21.55	0.1429	

Max. e.i.r.p.=26.11dBm-2.5dBi=23.61dBm, which is less than 36dBm=4W.

Worst case for MIMO mode

Test Mode	Data Rate	Test Channel	Measured Peak Power		Limit (W)
			(dBm)	(W)	
802.11b	1 Mbps				< 1.0
802.11g	6 Mbps				
802.11n (HT20)	MCS0	1	26.45	0.4416	
		6	27.26	0.5321	
		11	27.29	0.5358	
802.11n (HT40)	MCS0	3	23.40	0.2188	
		6	28.06	0.6397	
		9	23.30	0.2138	
802.11ax (HE20)	MCS0	1	27.69	0.5875	
		6	28.84	0.7656	
		11	28.74	0.7482	
802.11ax (HE40)	MCS0	3	25.10	0.3236	
		6	29.70	0.9333	
		9	25.03	0.3184	

Max. e.i.r.p.=29.70dBm-2.5dBi=27.20dBm, which is less than 36dBm=4W.

Table 9: Test Result of Maximum Conducted Output Power, 2.4GHz SDR

Worst case for SISO mode

Test Mode	Test Channel (MHz)	Measured Average Power		Limit (W)
		(dBm)	(W)	
1.4MHz BW	2403.5	15.83	0.0383	< 1.0
	2435.5	16.28	0.0425	
	2469.5	15.31	0.0340	
1.4MHz BW CA	2405.12	16.29	0.0426	
	2437.12	16.47	0.0444	
	2471.12	15.36	0.0344	
3MHz BW	2405.5	15.82	0.0382	
	2435.5	16.3	0.0427	
	2468.5	15.32	0.0340	
3MHz BW CA	2408.2	16.15	0.0412	
	2438.2	16.58	0.0455	
	2471.2	15.32	0.0340	
10MHz BW	2407.5	26.08	0.4055	

	2437.5	26.41	0.4375	
	2467.5	25.62	0.3648	
20MHz BW	2412.5	23.32	0.2148	
	2424.5	25.86	0.3855	
	2437.5	26.14	0.4111	
	2451.5	25.50	0.3548	
	2457.5	23.86	0.2432	
	2462.5	21.62	0.1452	
40MHz BW	2422.5	22.36	0.1722	
	2427.5	25.60	0.3631	
	2437.5	26.06	0.4036	
	2440.5	24.94	0.3119	
	2447.5	22.78	0.1897	
	2452.5	21.58	0.1439	

Max. e.i.r.p.=26.41dBm+2dBi=28.41dBm, which is less than 36dBm=4W.

Worst case for MIMO mode

Test Mode	Test Channel (MHz)	Measured Average Power		Limit (W)
		(dBm)	(W)	
1.4MHz BW	2403.5	18.67	0.0736	< 1.0
	2435.5	18.11	0.0647	
	2469.5	17.5	0.0562	
1.4MHz BW CA	2405.12	17.85	0.0610	
	2437.12	18.58	0.0721	
	2471.12	17.5	0.0562	
3MHz BW	2405.5	18.35	0.0684	
	2435.5	18.32	0.0679	
	2468.5	17.34	0.0542	
3MHz BW CA	2408.2	18.35	0.0684	
	2438.2	18.57	0.0719	
	2471.2	17.28	0.0535	
10MHz BW	2407.5	27.66	0.5834	
	2437.5	28.06	0.6397	
20MHz BW	2467.5	27.03	0.5047	
	2412.5	25.06	0.3206	
	2424.5	27.94	0.6223	
	2437.5	27.77	0.5984	
	2451.5	27.53	0.5662	
	2457.5	26.08	0.4055	
40MHz BW	2462.5	24.66	0.2924	
	2422.5	24.29	0.2685	
	2427.5	26.11	0.4083	
	2437.5	26.61	0.4581	
	2440.5	25.45	0.3508	
	2447.5	23.08	0.2032	
	2452.5	21.54	0.1426	

Max. e.i.r.p.=28.06dBm+2dBi=30.06dBm, 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 Bluetooth BLE: -2.5dBi
 Antenna gain(G) of 2.4GHz SDR: 2dBi (uncorrelated antenna gain)
 Antenna gain(G) of 2.4GHz Wi-Fi: -2.5dBi (uncorrelated antenna gain)

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	:	Refer to test result
Input voltage	:	Full Battery
Operation mode	:	A, B, C
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

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

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	:	Refer to test result
Input voltage	:	Full Battery
Operation mode	:	A, B, C
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

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

Prüfbericht - Nr.: CN23PXI2 001

Test Report No.

Seite 23 von 26

Page 23 of 26

5.1.5 99% Bandwidth

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

Test standard : FCC Part 15.247(a)
RSS-Gen Clause 6.6

Basic standard : ANSI C63.10: 2013

Kind of test site : Shielded Room

Test Setup

Date of testing : Refer to test result

Input voltage : Full Battery

Operation mode : A, B, C

Test channel : Low / Middle / High

Ambient temperature : 25 °C

Relative humidity : 56 %

Atmospheric pressure : 101 kPa

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

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	: Refer to test result
Input voltage	: Full Battery
Operation mode	: A, B, C
Test channel	: Low / Middle / High
Ambient temperature	: 25 °C
Relative humidity	: 56 %
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.

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
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	:	2022-12-06 to 2023-01-13
Input voltage	:	Full 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.

6 Photographs of the Test Set-Up

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

7 List of Tables

Table 1: List of Test and Measurement Equipment.....	5
Table 2: Technical Specification of EUT	7
Table 3: RF Channel and Frequency of BLE	9
Table 4: RF Channel and Frequency of 2.4GHz SDR.....	9
Table 5: RF Channel and Frequency of 2.4GHz Wi-Fi 802.11 b/g/n/ax.....	12
Table 6: Auxiliary Equipment Used during Test	14
Table 7: Test Result of Maximum Conducted Output Power, BLE	18
Table 8: Test Result of Maximum Conducted Output Power, Wi-Fi 802.11 b/g/n/ax20/ax40.....	18
Table 9: Test Result of Maximum Conducted Output Power, 2.4GHz SDR	19