


Prüfbericht-Nr.: <i>Test report no.:</i>	CN22CBU2 001	Auftrags-Nr.: <i>Order no.:</i>	168342360	Seite 1 von 24 Page 1 of 24	
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2021-11-20		
Auftraggeber: <i>Client:</i>	SZ DJI TECHNOLOGY CO., LTD 14th Floor, West Wing, Skyworth Semiconductor Design Building No.18 Gaoxin South 4th Ave Nanshan District, Shenzhen, P.R. China				
Prüfgegenstand: <i>Test item:</i>	Agras T40, Agras T20P				
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	3WWDZ-40A, 3WWDZ-20A				
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 15.209				
Wareneingangsdatum: <i>Date of sample receipt:</i>	2021-11-24	Refer to photo document			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003168006 007				
Prüfzeitraum: <i>Testing period:</i>	2021-12-28 to 2022-01-10				
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>	 Signed by: Bell Hu		genehmigt von: <i>authorized by:</i>	 Signed by: Lin Lin	
Datum: <i>Date:</i>	2022-02-08	Ausstellungsdatum: <i>Issue date:</i>	2022-02-08		
Stellung / Position:	Project Manager	Stellung / Position:	Reviewer		
Sonstiges / Other:	FCC ID: SS3-T40A2112; IC:11805A-T40A2112; PMN: Agras T40, Agras T20P; HVIN: 3WWDZ-40A, 3WWDZ-20A This report is for 2.4GHz SDR.				
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 F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	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 F(ail) = failed a.m. test specification(s)	4 = sufficient N/A = not applicable	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

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

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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 2.4GHz SDR

Appendix B: 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

A2LA Certificate Number: 5162.01

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

TÜV Rheinland (Shenzhen) Co., Ltd.

Radio Spectrum Testing (TS8997-R&S)					
Equip. No.	Description	Manufacturer	Model	Serial No.	Calibrated until (DD.MM.YYYY)
G1825794	Wireless Connectivity Tester	R&S	CMW270	101375	09.08.2022
G1825795	Signal Analyzer	R&S	FSV 40	101441	09.08.2022
G1825796	Vector Signal Generator	R&S	SMBV100A	263301	09.08.2022
G1825797	Signal Generator	R&S	SMB100A	115186	09.08.2022
G1825798	OSP	R&S	OSP 150	101017	02.12.2022
G1825799	Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A
G1825800	Test Software	R&S	WMS32 (V11.00.00)	N/A	N/A
G1825801	Power Meter	R&S	NRP2	107105	02.12.2022
G1829620	Power Sensor	R&S	NRP-Z81	105677	09.08.2022
G1826483	Humid & Temp Programmable Tester	BOST	NTH090-60	19040801	02.04.2022
G1826431	Shielding Room 8#	Albatross	SR8	APC1715 1-SR8	22.06.2024
Unwanted Emission Testing (TS9975)					
Equip. No.	Description	Manufacturer	Model	Serial No.	Calibrated until (DD.MM.YYYY)
G1826021	EMI Test Receiver	R&S	ESR 7	102021	10.08.2022
G1826023	Signal Analyzer	R&S	FSV 40	101439	09.08.2022
G1826024	System Controller Interface	R&S	SCI-100	S1001003 8	N/A
G1826025	Filterbank	R&S	Wlan	100759	09.08.2022
G1826026	OSP	R&S	OSP 120	102040	N/A
G1826028	Pre-amplifier	R&S	SCU08F1	08320031	09.08.2022
G1826029	Amplifier	R&S	SCU-18F	180070	09.08.2022

G1826030	Amplifier	R&S	SCU40A	100475	09.08.2022
G1826031	Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	08.08.2022
G1826032	Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	08.08.2022
G1826033	Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	08.08.2022
G1826034	Active Loop Antenna	Schwarzbeck	FMZB 1513	302	13.09.2022
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	APC1715 1-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 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. It supports 2.4GHz SDR, 5.8GHz SDR, 24GHz Radar and GNSS functions.

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

This report is only for 2.4GHz SDR.

According to the declaration of the applicant, the electrical circuit design and PCB layout are identical, only the model number, battery capacity and overall size are different for market strategy.

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:	Agras T40, Agras T20P
Type Designation:	3WWDZ-40A, 3WWDZ-20A
FCC ID:	SS3-T40A2112
IC:	11805A-T40A2112
Trademark:	DJI
Operating Temperature Range:	0 °C ~ 45 °C
Operating Voltage:	Battery operated 52.2V DC. Intelligent Flight Battery in Agras T40: Model: BAX601-30000mAh 52.22V Capacity: 30000 mAh Intelligent Flight Battery in Agras T20P: Model: BAX601-13000mAh 52.22V Capacity: 13000 mAh
Testing Voltage:	Built-in battery
Radiofrequency operating mode	1) 2.4GHz SDR: operating within 2400-2483.5MHz, supports 1.4MHz/3MHz/10MHz/20MHz/40MHz Bandwidth 2) 5.8GHz SDR: operating within 5725-5850MHz, supports 1.4MHz/3MHz/10MHz/20MHz/40MHz Bandwidth 3) GPS & BDS & Galileo & Glonass (receiver): operating within 1559-1610MHz 4) Phased Array Omnidirectional Radar & Downward Rear Radar: Operating within 24.05-24.25 GHz band.
Technical Specification of 2.4GHz SDR	
Operating Frequency	2403.5-2473.5MHz for 1.4MHz Bandwidth 2405.5-2474.5MHz for 3MHz Bandwidth 2405.5-2475.5MHz for 10MHz Bandwidth 2410.5-2471.5MHz for 20MHz Bandwidth 2420.5-2462.5MHz for 40MHz Bandwidth

Type of Modulation	OFDM (QPSK, 16QAM, 64QAM)
Channel Number	38 channels for 1.4MHz Bandwidth 24 channels for 3MHz Bandwidth 71 channels for 10MHz Bandwidth 62 channels for 20MHz Bandwidth 43 channels for 40MHz Bandwidth
Channel Separation	1.4MHz Bandwidth: 2MHz channel separation for 2403.5~2469.5MHz 1MHz channel separation for 2469.5~2473.5MHz 3MHz Bandwidth: 3MHz channel separation 10MHz Bandwidth: 1MHz channel separation 20MHz Bandwidth: 1MHz channel separation 40MHz Bandwidth: 1MHz channel separation
Antenna Type	Integral Antennas
Antenna Number	1Tx1Rx for SISO mode (ANT1 or ANT2) 2TxTRx for MIMO mode (ANT1+ANT2), Un-correlated signals.
Antenna Gain	Max 2.0dBi for 2.4GHz Band, Max 0.5dBi for 5.8GHz Band.
The type of wideband data transmission equipment	Non-FHSS

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, 2.4GHz SDR wireless transmitting mode
 - 1) Low Channel
 - 2) Middle Channel
 - 3) High Channel
- B. On, Normal Operation
- C. 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 3WWDZ-20A in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 3: 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)

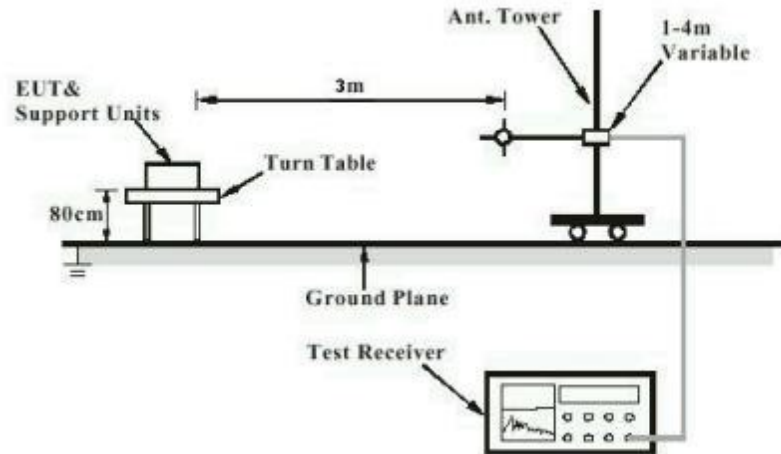


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

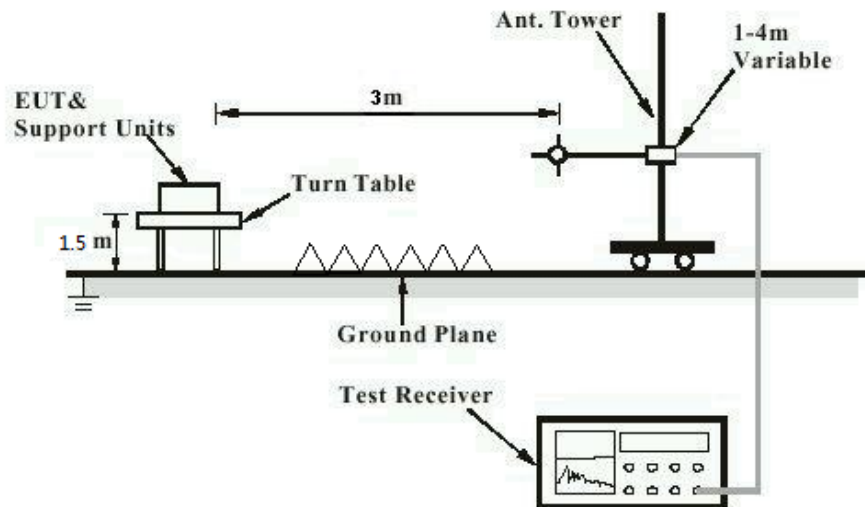


Diagram of Measurement Configuration for Mains Conduction Measurement

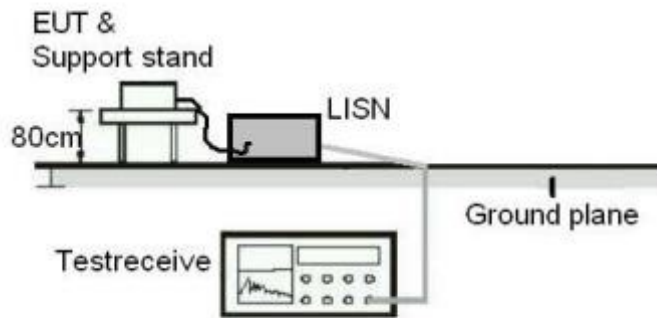
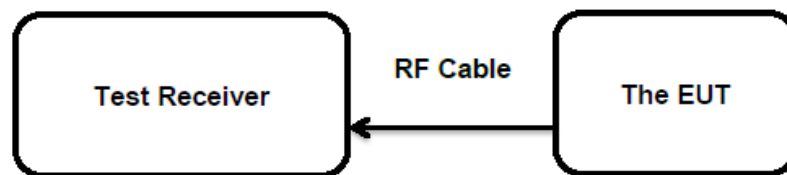


Diagram of Measurement Configuration for Conducted Transmitter Measurement



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

According to the manufacturer declared, the EUT has integral antennas, the max. Un-correlated antenna gain antenna is 0.5dBi, 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.

5.1.2 Maximum Peak Conducted Output Power

Test Specification

Test standard	: FCC Part 15.247(b)(3)
Basic standard	: ANSI C63.10: 2013
Limits	: 1.0 Watts
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2021-12-29 to 2022-01-06
Input voltage	: Full Battery
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 25 °C
Relative humidity	: 56 %
Atmospheric pressure	: 101 kPa

Table 4: Test Result of Maximum Average Conducted Output Power

Worst case for SISO mode (Ant 1)

Test Mode	Test Channel (MHz)	Measured Average Power		Limit (W)
		(dBm)	(W)	
1.4MHz BW	2403.5	17.98	0.0628	< 1.0
	2439.5	17.96	0.0625	
	2473.5	18.42	0.0695	
3MHz BW	2405.5	18.04	0.0637	
	2438.5	17.94	0.0622	
	2474.5	18.36	0.0685	
10MHz BW	2405.5	6.94	0.0049	
	2435.5	25.16	0.3281	
	2475.5	2.92	0.0020	
20MHz BW	2410.5	11.53	0.0142	
	2440.5	25.39	0.3459	
	2471.5	2.95	0.0020	
40MHz BW	2420.5	4.91	0.0031	
	2441.5	25.66	0.3681	
	2462.5	4.86	0.0031	

Max. e.i.r.p.=25.66dBm+2dBi=27.66dBm, 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	17.06	0.0461	< 1.0
	2439.5	16.76	0.0526	
	2473.5	17.01	0.0575	
3MHz BW	2405.5	16.70	0.0396	
	2438.5	17.49	0.0447	
	2474.5	17.00	0.0478	
10MHz BW	2405.5	22.56	0.1803	
	2406.5	23.50	0.2239	
	2410.5	26.51	0.4477	
	2415.5	27.54	0.5675	
	2420.5	27.98	0.6281	
	2423.5	27.92	0.6194	
	2425.5	27.90	0.6166	
	2435.5	27.30	0.5370	
	2449.5	25.09	0.3228	
	2450.5	23.53	0.2254	
	2460.5	26.75	0.4732	
20MHz BW	2470.5	19.94	0.0986	
	2475.5	15.00	0.0316	
	2410.5	13.55	0.0226	
	2411.5	14.41	0.0276	
	2412.5	15.71	0.0372	
	2440.5	27.78	0.5998	
	2468.5	17.14	0.0518	
40MHz BW	2469.5	15.85	0.0385	
	2470.5	14.74	0.0298	
	2471.5	13.05	0.0202	
	2420.5	9.16	0.0082	
	2421.5	10.17	0.0104	
40MHz BW	2441.5	26.98	0.4989	
	2461.5	12.43	0.0175	
40MHz BW	2462.5	11.38	0.0137	

Max. e.i.r.p.=27.98dBm+2dBi=29.98dBm, which is less than 36dBm=4W.

Note:

- 1) The cable loss is taken into account in results.
- 2) Max. Antenna gain(G) of 2.4GHz SDR: 2dBi (uncorrelated antenna gain)
 e.i.r.p.= $P_{(Peak\ power)} + G$, which is far below the 4 W

5.1.3 Conducted Power Spectral Density

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

Test standard	:	FCC Part 15.247(e)
Basic standard	:	ANSI C63.10: 2013
Limits	:	< 8 dBm / 3kHz
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2022-01-04 to 2022-01-07
Input voltage	:	Full Battery
Operation mode	:	A
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.

5.1.4 6dB Bandwidth

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

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

Test Setup

Date of testing	:	2022-01-04 to 2022-01-07
Input voltage	:	Full Battery
Operation mode	:	A
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.

5.1.5 99% Bandwidth

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

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

Test Setup

Date of testing : 2022-01-04 to 2022-01-07
Input voltage : Full Battery
Operation mode : A
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.

5.1.6 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

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

Test standard	: FCC Part 15.247(d)
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	: 2022-01-04 to 2022-01-07
Input voltage	: Full Battery
Operation mode	: A
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.

5.1.7 Radiated Spurious Emission

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

Test standard	:	FCC Part 15.247(d) & FCC Part 15.205
Basic standard	:	ANSI C63.10: 2013
Limits	:	Refer to 15.209(a) of FCC part 15.247(d)
Kind of test site	:	3m Semi-anechoic Chamber

Test Setup

Date of testing	:	2022-01-06 to 2022-01-10
Input voltage	:	Full Battery
Operation mode	:	A
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.

6 Photographs of the Test Set-Up

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

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