

Prüfbericht-Nr.: Test report no.:	60430331 002	Auftrags-Nr.: Order no.:	168288249	Seite 1 von 20 Page 1 of 20										
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2020-10-29											
Auftraggeber: Client:	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: Test item:	Robomaster TT Minor Controller													
Bezeichnung / Typ-Nr.: Identification / Type no.:	RMTTOC													
Auftrags-Inhalt: Order content:	Testing Report													
Prüfgrundlage: Test specification:	CFR47 FCC Part 15: Subpart C Section 15.407 RSS-247 Issue 2 February 2017 CFR47 FCC Part 15: Subpart C Section 15.207 RSS-Gen Issue 5 April 2018 CFR47 FCC Part 15: Subpart C Section 15.209 RSS-102 Issue 5 March 2015 CFR47 FCC Part 2: Section 2.1091													
Wareneingangsdatum: Date of sample receipt:	2020-11-12	Please refer to Photo Document												
Prüfmuster-Nr.: Test sample no.:	A002947497-004 to 005													
Prüfzeitraum: Testing period:	2020-11-13 – 2020-11-30													
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shenzhen) Co., Ltd.													
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.													
Prüfergebnis*: Test result*:	Pass													
geprüft von: tested by:			genehmigt von: authorized by:											
Datum: Date:	2020-12-01 Signed by: Hardy Suo		Ausstellungsdatum: Issue date:	2020-12-01 Signed by: Winnie Hou										
Stellung / Position:	Project Manager		Stellung / Position:	Technical Certifier										
Sonstiges / Other:	FCC ID: SS3-RMTTOC2010 IC: 11805A-RMTTOC2010 HVIN: RMTTOC													
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged													
* Legende:	<table border="0"> <tr> <td>1 = sehr gut</td> <td>2 = gut</td> <td>3 = befriedigend</td> <td>4 = ausreichend</td> <td>5 = mangelhaft</td> </tr> <tr> <td>P(ass) = entspricht o.g. Prüfgrundlage(n)</td> <td>F(ail) = entspricht nicht o.g. Prüfgrundlage(n)</td> <td>N/A = nicht anwendbar</td> <td>N/T = nicht getestet</td> <td></td> </tr> </table>				1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet	
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* Legend:	<table border="0"> <tr> <td>1 = very good</td> <td>2 = good</td> <td>3 = satisfactory</td> <td>4 = sufficient</td> <td>5 = poor</td> </tr> <tr> <td>P(ass) = passed a.m. test specification(s)</td> <td>F(ail) = failed a.m. test specification(s)</td> <td>N/A = not applicable</td> <td>N/T = not tested</td> <td></td> </tr> </table>				1 = very good	2 = good	3 = satisfactory	4 = sufficient	5 = poor	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested	
1 = very good	2 = good	3 = satisfactory	4 = sufficient	5 = poor										
P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	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>														

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TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 MAXIMUM OUTPUT POWER

RESULT: Pass

5.1.3 POWER SPECTRAL DENSITY

RESULT: Pass

5.1.4 FREQUENCY STABILITY

RESULT: Pass

5.1.5 26dB BANDWIDTH AND 99% BANDWIDTH

RESULT: Pass

5.1.6 6dB 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 appendixes:
Appendix A: Photographs of the Test Set-up
Appendix B: Test data of 5GHz bands Wi-Fi
Appendix C: Radio Frequency Exposure

2. Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of China

FCC Accreditation Designation No.: CN1260

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 (TS8997)				
Equipment	Manufacturer	Model	Serial No.	Cal. until
Signal Analyzer	R&S	FSV 40	101441	2021-08-10
OSP	R&S	OSP 150	101017	2020-12-17
Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A
Test Software	R&S	WMS32 (V11.00.00)	N/A	N/A
Power Meter	R&S	NRP2	107105	2020-12-17
Wideband Power Sensor	R&S	NRP-Z81	105350	2020-12-17
Shielding Room 8#	Albatross	SR8	APC17151-SR8	2021-07-23
Unwanted Emission Testing (TS9975)				
Equipment	Manufacturer	Model	Serial No.	Cal. until
EMI Test Receiver	R&S	ESR 7	102021	2021-08-11
Signal Analyzer	R&S	FSV 40	101439	2021-08-10
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	2021-08-10
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2021-08-10
Amplifier	R&S	SCU-18F	180070	2021-08-10
Amplifier	R&S	SCU40A	100475	2021-09-10
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2022-08-08
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2022-08-08
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2022-08-08
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2022-09-13
Wideband Ridged Horn Antenna (12-18 GHz)	Steatite	QMS-00208	18313	2021-09-02
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A

Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2021-07-06
Conducted Emission				
Equipment	Manufacturer	Model No.	Serial No.	Cal. Until
EMI Test Receiver	R&S	ESR3	102680	2021-05-19
Artificial Mains Network	R&S	ENV216	101445	2021-05-19
EMC32 test software	R&S	EMC32(Ver.10.50.01)	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 Uncertainty of Measurement

The value of the measurement uncertainty of each parameter is listed as below:

Table 2: Measurement Uncertainty

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 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, 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 is a Robomaster TT Minor Controller, which supports Bluetooth LE, 2.4G Wi-Fi 802.11 b/g/n and 5.8G Wi-Fi 802.11a/n wireless technology.

Note: This report is for 5.8GHz Bands only.

For details refer to user manual and circuit diagram.

3.2 Ratings and System Details

Table 3: Technical Specification

Technical Specification	Value
Product Name	Robomaster TT Minor Controller
Model	RMTTOC
FCC ID	SS3-RMTTOC2010
IC	11805A-RMTTOC2010
HVIN	RMTTOC
Operating Frequency Range	2400-2483.5MHz 5725-5850MHz
Operating Frequency / Channels / Protocol	Bluetooth BLE: 2402-2480MHz, 40CHs 2.4GHz Wi-Fi: 2412-2462MHz, 11CHs, 802.11b/g/n20 5.8GHz Wi-Fi: 5745-5825MHz, 7CHs, 802.11 a/n20/n40
Channel Spacing	2MHz, 5MHz, 20MHz, 40MHz
Modulation	DSSS (DBPSK, DQPSK, CCK) OFDM (BPSK, QPSK, 16QAM, 64QAM) GFSK
Type of Product	Adaptive equipment and does not support non-adaptive mode; LBT based Detect and Avoid (load based equipment)
Antenna Number	Bluetooth: 1 2.4GHz Wi-Fi and 5.8GHz Wi-Fi: 1
Antenna Type	Integral antenna
Antenna Gain	Bluetooth LE: 0.95 dBi max. 2.4GHz Wi-Fi: 0.95 dBi max. 5.8GHz Wi-Fi: 1.51 dBi max.
Operation Voltage	DC 5V from USB

3.3 Independent Operation Modes

The basic operation modes are:

- A. Tx, (5.8GHz Bands, 802.11a/n/ac)
 - 1. Lowest channel
 - 2. Middle channel
 - 3. Highest channel
- B. WiFi on
- C. Off

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3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- | | |
|----------------------|-------------------------|
| - Application Form | - Technical Description |
| - Circuit Diagram | - Bill of Material |
| - Instruction Manual | - Rating Label |
| - Photo Documents | |

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

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

4.3 Special Accessories and Auxiliary Equipment

Table 4: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N
Laptop	Lenovo	T480	PF-16A6N8
Aircraft	DJI	TLW004	--

4.4 Countermeasures to Achieve ERM 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)

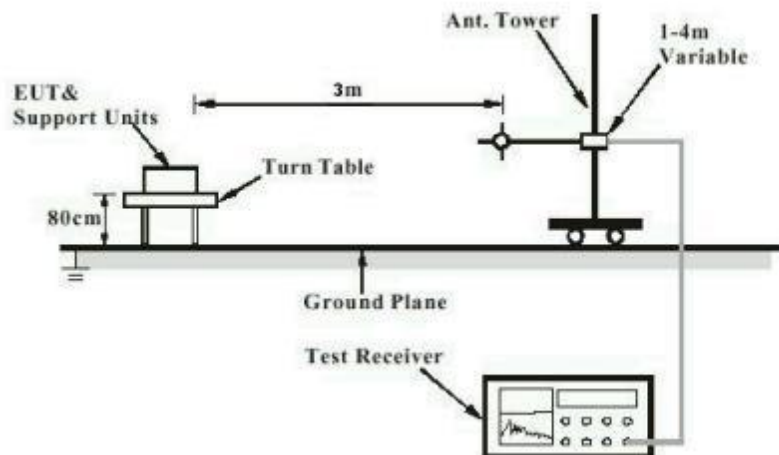


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

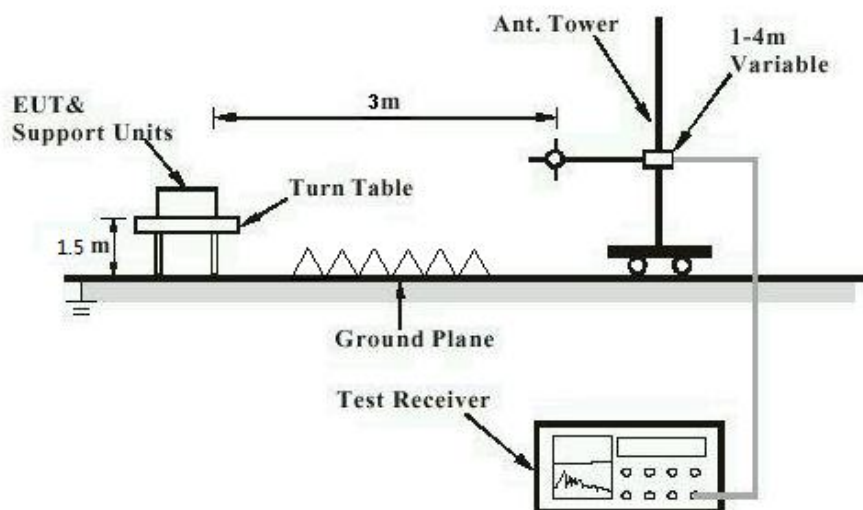


Diagram of Measurement Configuration for Mains Conduction Measurement

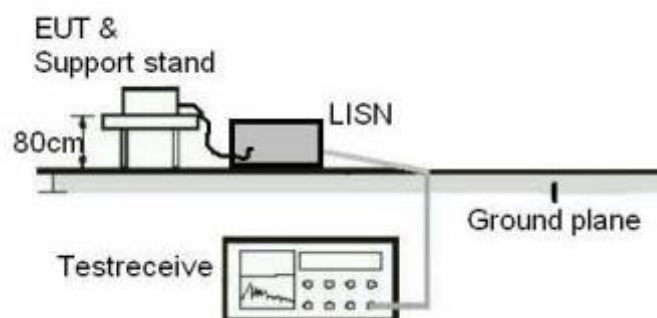
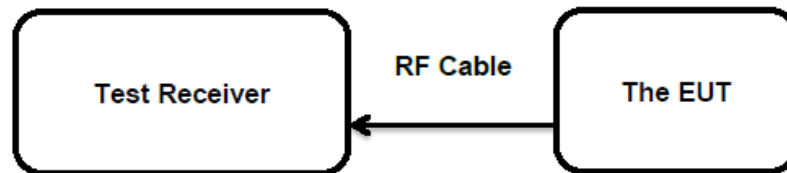


Diagram of Measurement Configuration for Conducted Transmitter Measurement



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5. Test Results

5.1 Radio Test Requirement & Test Suites (5GHz Bands)

5.1.1 Antenna Requirement

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.203

The EUT has two integral antennas, the maximum gain of antenna is 0.95dBi for Bluetooth, 0.95dBi for 2.4GHz Wi-Fi and 1.51dBi for 5.8GHz Wi-Fi, and the antenna connector is designed with 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.

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Page 13 of 20**5.1.2 Maximum output power****RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.407 (a)
	:	RSS-247 clause 6.2
Basic standard	:	ANSI C63.10:2013
	:	FCC:
	:	<1W (30dBm) (5725-5850MHz)
Limits	:	IC:
	:	Max conducted output power <1W (30dBm) (5725-5850MHz)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2020-11-20 ~ 2020-11-26
Input voltage	:	DC 5V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Note: Per RSS-247 section 6.2.3, transmission on channels which overlap 5600-5650MHz is prohibited. This device operates under these frequencies only under the control of a certified master device and does not support active scanning on these channels. This device does not transmit any beacons or initiate any transmissions in 5250-5350MHz or 5470-5725MHz.

Refer to attached Appendix B for details of test data.

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5.1.3 Power Spectral Density**RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.407 (a)
	:	RSS-247 clause 6.2
Basic standard	:	ANSI C63.10:2013
	:	FCC:
	:	<30dBm/500KHz (5725-5850MHz)
Limits	:	IC:
	:	<30dBm/500KHz (5725-5850MHz)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2020-11-20 ~ 2020-11-26
Input voltage	:	DC 5V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Refer to attached Appendix B for details of test data.

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5.1.4 Frequency Stability**RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.407 (g)
	:	RSS-Gen Clause 6.11
Basic standard	:	ANSI C63.10:2013
Limits	:	Within assigned bands
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2020-11-20 ~ 2020-11-26
Input voltage	:	DC 5V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Refer to attached Appendix B for details of test data.

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5.1.5 26dB Bandwidth and 99% Bandwidth**RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.407
	:	RSS-Gen Clause 6.6
Basic standard	:	ANSI C63.10:2013
Limits	:	N/A
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2020-11-20 ~ 2020-11-26
Input voltage	:	DC 5V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Refer to attached Appendix B for details of test data.

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5.1.6 6dB Bandwidth

RESULT:

Pass

Test Specification

Test standard	:	FCC Part 15.407 (e)
	:	RSS-247 clause 6.2.4.1
Basic standard	:	ANSI C63.10:2013
Limits	:	At least 500KHz (5725-5850MHz)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2020-11-20 ~ 2020-11-26
Input voltage	:	DC 5V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Refer to attached Appendix B for details of test data.

Prüfbericht - Nr.: 60430331 002
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Page 18 of 20**5.1.7 Radiated Spurious Emission****RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.407(b) & FCC Part 15.205 & FCC Part 15.209 RSS-247 clause 6.2 & RSS-GEN clause 8.9 and 8.10
Basic standard	:	ANSI C63.10:2013
Limits	:	• For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. • Restricted Bands meet the requirement of 15.209 limit and RSS-GEN
Kind of test site	:	3m Semi-Anechoic Chamber (below 1GHz) 3m Anechoic Chamber (above 1GHz)

Test Setup

Date of testing	:	2020-11-20 ~ 2020-11-26
Input voltage	:	DC 5V
Operation mode	:	A
Test channel	:	Low / Middle / High
Ambient temperature	:	23 °C
Relative humidity	:	48 %
Atmospheric pressure	:	101 kPa

Refer to attached Appendix B for details of test data.

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Page 19 of 20**5.1.8 Conducted Emission on AC Mains****RESULT:****Pass****Test Specification**

Test standard	:	FCC Part 15.207
	:	RSS-GEN clause 8.8
Basic standard	:	ANSI C63.10:2013
Frequency range	:	0.15 - 30MHz
Limits	:	FCC Part 15.207
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2020-11-20 ~ 2020-11-26
Input voltage	:	DC 5V
Operation mode	:	B
Earthing	:	Not connected
Ambient temperature	:	25 °C
Relative humidity	:	56 %
Atmospheric pressure	:	101 kPa

Refer to attached Appendix B for details of test data.

6. List of Tables

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