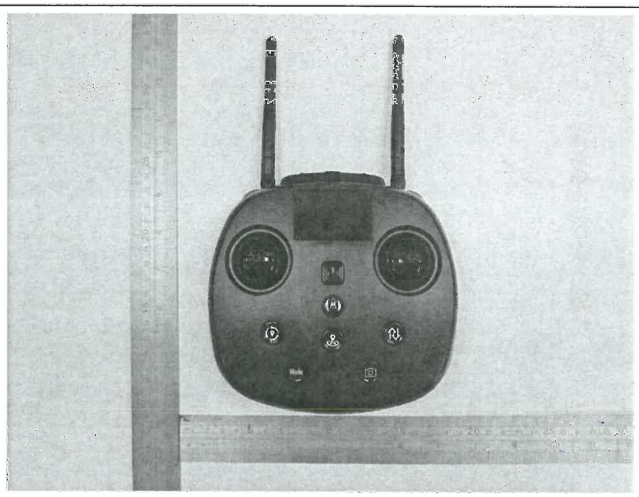
Prüfbericht-Nr.: *Test Report No.:*	**50147141 001**	**Auftrags-Nr.:** *Order No.:*	144184117	**Seite 1 von 16** *Page 1 of 16*
Kunden-Referenz-Nr.: *Client Reference No.:*	N/A	**Auftragsdatum:** *Order date:*	14.05.2018	
Auftraggeber: *Client:*	**GUANGDONG CHEERSON HOBBY TECHNOLOGY CO., LTD. Fengxin No.2 Road&Laimei Road Fengxin Industrial Zone Chenghai Shantou Guangdong Province China**			
Prüfgegenstand: *Test item:*	**Short Range Device - Quadcopter**			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	**CX-39**			
Auftrags-Inhalt: *Order content:*	FCC Cerification			
Prüfgrundlage: *Test specification:*	**FCC Part 15 Subpart C** **FCC Part 15 Subpart B** **ANSI C63.10-2013** **ANSI C63.4-2014**			
Wareneingangsdatum: *Date of receipt:*	16.05.2018			
Prüfmuster-Nr.: *Test sample No.:*	A000741871-001			
Prüfzeitraum: *Testing period:*	27.05.2018 - 08.06.2018			
Ort der Prüfung: *Place of testing:*	TÜV Rheinland Hong Kong Ltd			
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland Hong Kong Ltd			
Prüfergebnis*: *Test result*:*	Pass			



geprüft von / *tested by*:			**kontrolliert von** / *reviewed by*:		
09.07.2018	Kevin Wong / Project Manager		09.07.2018	Mika Chan / Project Manager	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*: **FCC ID: 2AD6L032439**

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	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
Legend:	*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*

Table of Content

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Product information

Manufacturers declarations

	Transmitter
Operating frequency range	2420 - 2460MHz
Type of modulation	GFSK
Number of channels	10
Type of antenna	RP-SMA Antenna
Power level	fix
Connection to public utility power line	No
Nominal voltage	V_{nor}: 3.7 VDC (Rechargeable battery)

Product function and intended use

The equipment under test (EUT) is a radio control toy transceiver operating at 2.4GHz. It is powered by battery only.

FCC ID: 2AD6L032439

Models	Product description
CX-39, CX-39A, CX-39B, CX-39C, CX-39D, CX-8011, CX-8012, CX-8013, CX-8014, CX-8015, CX-35GW, CX-20GW, CX-22GW, CX-23GW	Short Range Device - Quadcopter

Submitted documents

Circuit Diagram
Block Diagram
Technical Description
User manual
Label

Independent Operation Modes

The basic operation modes are:

- Transmitting mode.
- Normal operation mode

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the transmitter.

Remark

The test results in this test report are only relevant to the tested sample and does not involve any assessment in the production.

Test Set-up and Operation Mode

Principle of Configuration Selection

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.

Test Operation and Test Software

Test operation should refer to test methodology.

- Test mode samples with maximum RF output power and duty cycle provided by the applicant are used for testing.

Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

- AC-DC adaptor Model: A1401 Input: 100-240 VAC 50/60 Hz Output: 5.0VDC 1000mA) (Provided by TÜV Rheinland Hong Kong Ltd)

Countermeasures to achieve EMC Compliance

- None

Test Methodology

Radiated Emission

The radiated emission measurements of the transmitter part were performed according to the procedures in ANSI C63.10-2013.

For measurement below 1GHz - the equipment under test (EUT) was placed at the middle of the 80 cm height turntable. For measurement above 1GHz - the EUT was placed at the middle of the 1.5 m height turntable and RF absorbing material was placed on ground plane between turntable and measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360 ° , the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in particular parts of this test report.

Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

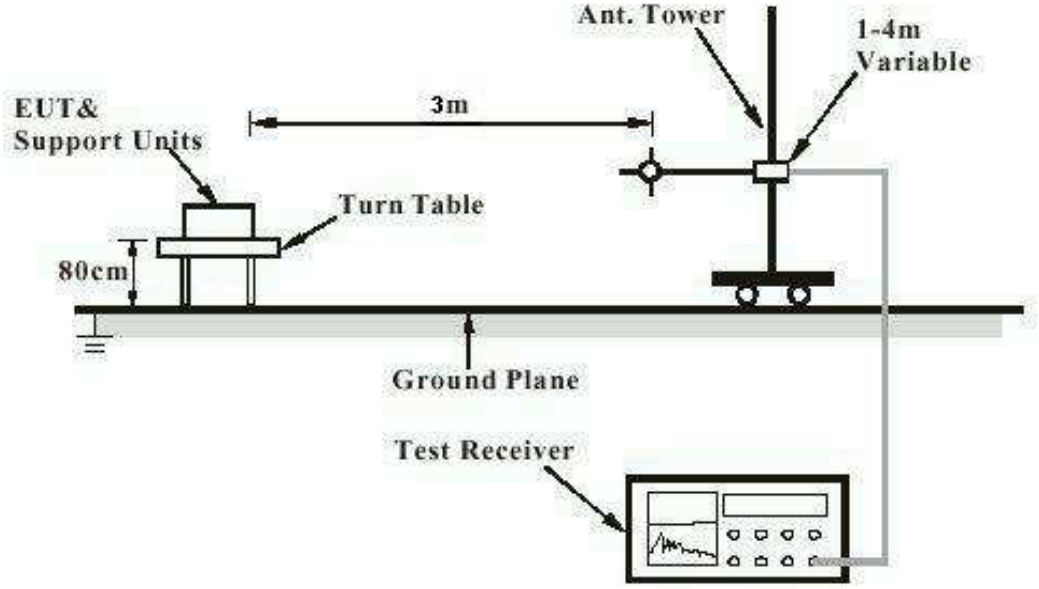
FS = R + AF + CF + FA – PA

Where FS = Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer in dBuV.
AF = Antenna Factor in dB.
CF = Cable Attenuation Factor in dB.
FA = Filter Attenuation Factor in dB.
PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

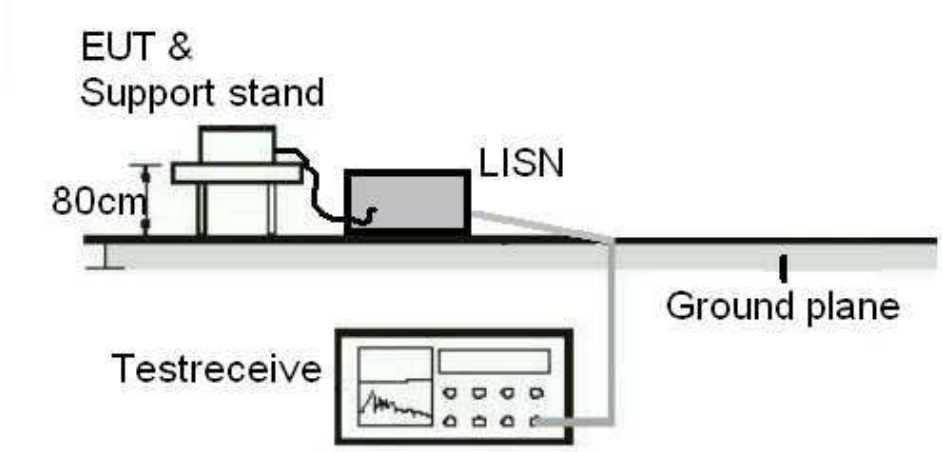
Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)



Test Facility

Test Laboratory Information

TÜV Rheinland Hong Kong Ltd.
Address: 3-4, 11/F., Fou Wah Industrial Building, 10-16 Pun Shan Street, Tsuen Wan, N.T., Hong Kong·
Tel.: +852 2192 1000
Fax: +852 2192 1001
Email service-gc@tuv.com
Web: www.tuv.com

The test facility is recognized or accredited by the following organizations:

FCC

Type	: Accredited Test Firm
Designation Number	: HK0013
Test Firm Registration Number	: 371735
Scope	: Intentional Radiators

List of Test and Measurement Instruments

TÜV Rheinland Hong Kong Ltd

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Semi-anechoic Chamber	Frankonia	Nil	23-Apr-18	23-Apr-19
Test Receiver	R & S	ESU40	7-Sep-17	7-Sep-18
Active Loop Antenna	EMCO	6502	30-Oct-17	30-Oct-18
Bi-conical Antenna	R & S	HK116	21-Mar-18	21-Mar-20
Log Periodic Antenna	R & S	HL223	22-May-18	22-May-20
Horn Antenna	EMCO	3115	28-Mar-18	28-Mar-20
Double-Ridged Waveguide Horn	EMCO	3116	17-Jun-16	17-Jun-18
Double-Ridged Waveguide Horn	EMCO	3117	22-Jun-16	22-Jun-18
Coaxial cable	Harbour	LL335	10-Jun-18	10-Jun-20
High Frequency Cable	Pasternack	PE3VNA4001-3M	27-Jan-17	27-Jan-19
Microwave amplifer 0.5-26.5GHz, 25dB gain	HP	83017A	18-Jul-16	18-Jul-18
Preamplifier 18GHz to 40GHz with cable	A.H. Systems, Inc.	PAM-1840VH	27-Jan-17	27-Jan-19
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	30-Oct-17	30-Oct-19

AC Mains Conducted Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Test Receiver	R & S	ESU26	11-Jul-17	11-Jul-18
LISN	R&S	ENV216	19-Jul-17	19-Jul-18
Double Shield Cable	Radiall	RG223/U-01	18-May-17	18-May-19

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Spectrum Analyzer	R & S	FSP30	03-May-18	02-May-19

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is ±2.42dB.

The estimated combined standard uncertainty for radiated emissions measurements is ±4.81dB (9kHz to 30MHz) and ±4.62dB (30MHz to 200MHz) and ±5.67dB (200MHz to 1000MHz) and is ±5.07dB (1GHz to 8.2GHz) and ±4.58dB (8.2GHz to 12.4GHz) and ±4.78dB (12.4GHz to 18GHz)

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of k=2, which for the level of confidence is approximately 95%.

Results FCC Part 15 – Subpart C

FCC 15.203 – Antenna Requirement 1	**Pass**
FCC Requirement:	No antenna other than that furnished by the responsible party shall be used with the device
Results:	a) Antenna type: RP-SMA Antenna b) Manufacturer and model no: N/A c) Peak Gain: N/A
Verdict:	Pass (Glued with epoxy to a standard connector)

FCC 15.204 – Antenna Requirement 2	**Pass**
FCC Requirement:	An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.
Results:	Only one integral antenna can be used.
Verdict:	N/A

FCC 15.207 – Conducted Emission on AC Mains	**N/A**
The EUT do not transmit signal when connected to the AC Mains.	

Subclause 15.215 (c) – 20 dB Bandwidth	**Pass**
Test Specification : ANSI C63.10 – 2013 Test date : 17.05.2018 Mode of operation : Tx mode Port of testing : Temporary antenna port Supply voltage : 3.7VDC Temperature : 23ºC Humidity : 50%	
Requirement:	The intentional radiators must be designed to ensure that the 20dB bandwidth of the emission, is contained within the frequency band designated in the rule section under which the equipment is operated.
Results:	Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types. For test protocols refer to Appendix 1.

Frequency (MHz)	**20 dB left (MHz)**	**Limit (MHz)**	**20 dB right (MHz)**	**Limit (MHz)**
2420	2418.020	> 2400	2420.516	< 2483.5
2440	2439.360	> 2400	2441.196	< 2483.5
2460	2458.764	> 2400	2460.516	< 2483.5

Subclause 15.249 (a) – Field Strength of Fundamental and Harmonics **Pass**

Test Specification : ANSI C63.10 – 2013
Test Specification : 27.05.2018
Mode of operation : Tx mode
Port of testing : Enclosure
Frequency range : 9kHz – 25GHz
Supply voltage : 3.7VDC
Temperature : 23ºC
Humidity : 50%

Requirement: The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following limit.

Results: PASS.

Fundamental Frequency 2420MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2419.865	94.5	114.0 / PK
2419.865	74.5	94.0 / AV

Fundamental Frequency 2420MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2420.250	80.2	114.0 / PK
2420.250	59.7	94.0 / AV

Harmonics 2420MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4840.323	57.0	74.0 / PK
4840.323	41.1	54.0 / AV
7259.227	60.5	74.0 / PK
7259.227	45.4	54.0 / AV

Harmonics 2420MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4840.500	53.3	74.0 / PK
4840.500	44.2	54.0 / AV
7260.750	45.4	74.0 / PK
7260.750	31.8	54.0 / AV

Fundamental Frequency 2440MHz Vertical Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2440.000	89.6	114.0 / PK
2440.000	74.7	94.0 / AV

Fundamental Frequency 2440MHz Horizontal Polarization

Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2439.750	78.7	114.0 / PK
2439.750	64.7	94.0 / AV

Harmonics 2440MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4880.352	55.1	74.0 / PK
4880.352	40.1	54.0 / AV
7320.544	59.6	74.0 / PK
7320.544	44.2	54.0 / AV
Harmonics 2440MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4879.500	52.8	74.0 / PK
4879.500	39.2	54.0 / AV
7319.250	57.1	74.0 / PK
7319.250	43.9	54.0 / AV
Fundamental Frequency 2460MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2460.250	92.7	114.0 / PK
2460.250	72.9	94.0 / AV
Fundamental Frequency 2460MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2459.849	79.6	114.0 / PK
2459.849	63.7	94.0 / AV
Harmonics 2460MHz	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4920.307	55.9	74.0 / PK
4920.307	40.6	54.0 / AV
7380.557	58.9	74.0 / PK
7380.557	44.2	54.0 / AV
Harmonics 2460MHz	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
4919.698	52.2	74.0 / PK
4919.698	38.6	54.0 / AV
7379.954	57.3	74.0 / PK
7379.954	43.7	54.0 / AV

Subclause 15.249 (d), 15.205 – Out Of Band Radiated Emission **Pass**

Test Specification : ANSI C63.10 – 2013
Test Specification : 27.05.2018
Mode of operation : Tx mode
Port of testing : Enclosure
Frequency range : 9kHz – 25GHz
Supply voltage : 3.7VDC
Temperature : 23ºC
Humidity : 50%

Requirement: Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Results: All three transmit frequency modes comply with the field strength limit of section 15.209. There is no spurious found below 30MHz.

Tx frequency 2420MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
298.987	31.3	46.0 / QP
2400.000	47.9	74.0 / PK
2400.000	31.9	54.0 / AV

Tx frequency 2420MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
304.010	25.1	46.0 / QP
2400.000	45.4	74.0 / PK
2400.000	31.8	54.0 / AV

Tx frequency 2440MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
311.360	32.2	46.0 / QP
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV

Tx frequency 2440MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
307.010	26.2	46.0 / QP
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV

Tx frequency 2460MHz Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
293.840	29.4	46.0 / QP
2483.500	46.5	74.0 / PK
2483.500	31.7	54.0 / AV

Tx frequency 2460MHz Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2483.500	44.6	74.0 / PK
2483.500	31.6	54.0 / AV

Results FCC Part 15 – Subpart B

FCC 15.107 – Conducted Emission on AC Mains **Pass**

Test Specification : ANSI C63.4 – 2014
Mode of operation : Charging mode
Port of testing : AC Mains input port of power supply
Supply voltage : 120Vac 60Hz
Temperature : 23ºC
Humidity : 50%

Requirement: 15.107(a)

Live measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0152	42.8	32.3	66 - 56	56 - 46	Pass
	0.200	41.5	31.9	66 - 56	56 - 46	Pass
	0.250	38.6	29.7	66 - 56	56 - 46	Pass
> 0,5 - 5	No peak found	---	---	56	46	Pass
> 5 - 30	No peak found	---	---	60	50	Pass

Neutral measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0.150	44.0	33.7	66 - 56	56 - 46	Pass
	0.200	41.9	30.6	66 - 56	56 - 46	Pass
	0.249	39.8	27.8	66 - 56	56 - 46	Pass
> 0,5 - 5	0.609	31.8	20.0	56	46	Pass
> 5 - 30	No peak found	---	---	60	50	Pass

FCC 15.109 – Radiated Emission		**Pass**
Test Specification : ANSI C63.4 – 2014 Mode of operation : Charging mode Port of testing : Enclosure Supply voltage : 120VAC Frequency range : 30MHz to 1GHz Temperature : 23ºC Humidity : 50%		
FCC Requirement: 15.109(a)		
Results:		
Vertical Polarization		
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
No peak found	---	40.0 / QP
No peak found	---	43.5 / QP
No peak found	---	46.0 / QP
No peak found	---	54.0 / QP
Horizontal Polarization		
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
No peak found	---	40.0 / QP
No peak found	---	43.5 / QP
No peak found	---	46.0 / QP
No peak found	---	54.0 / QP