

FCC - TEST REPORT

Report Number	:	68.950.16.443.01	Date of Issue:	May 13, 2016					
Model	: CX-35, CX-20, CX-22, CX-36, CX-37, CX-23, CX-24, CX-91, CX-92, CX-93								
Product Type	: Quadcopter								
Applicant	:	Guangdong Cheerson Ho	bby Technology	Co., Ltd					
Address	:	Fengxin No.2 Road & Lai	mei Road, Feng	in Industrial Zone					
_		Chenghai 515800 Shanto	ou, Guangdong P	rovince					
_		PEOPLE'S REPUBLIC O	F CHINA						
Production Facility	:	Guangdong Cheerson Ho	bby Technology	Co., Ltd					
Address	:	Fengxin No.2 Road & Lai	mei Road, Feng	rin Industrial Zone					
_		Chenghai 515800 Shanto	ou, Guangdong P	rovince					
Test Result	:	■ Positive □ Negat	ive						
Total pages	:_	29							

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Building 12&13, Zhiheng Wisdomland Business Park,

Nantou Checkpoint Road 2, Nanshan District,

Shenzhen City, 518052,

P. R. China

FCC Registration

Number:

502708

Telephone: 86 755 8828 6998 Fax: 86 755 828 5299

Test Site 2:

Company name: Dongguan Precise Testing Service Co., Ltd.

Building D, Baoding Technology Park, Guangming Road2, Dongcheng

District, Dongguan, Guangdong, China.

FCC Registration

Number:

371540

Remark: All test items were performed at Site 2.



3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product: Quadcopter

Model no.: CX-35

FCC ID: 2AD6LGC032435

Rating Voltage: 7.4VDC supplied by Li-on battery

RF Transmission 5733MHz,5752MHz,5771MHz,5790MHz Frequency: 5809MHz,5828MHz,5847MHz,5866MHz

No. of Operated Channel: 8

Modulation: FM

Antenna Type: Integrated Antenna

Antenna Gain: 3.5dBi

Description of the EUT: The EUT is a quadcopter with a camera which operated at 5.8GHz



4 Summary of Test Standards

	Test Standards
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES
10-1-2015 Edition	Subpart C - Intentional Radiators



5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C					
Test Condition	Pages	Test	Te	st Res	ult
		Site	Pass	Fail	N/A
15.207 Conducted emission AC power port					\boxtimes
§15.205(a), §15.209(a), §15.249(a), §15.249(c) Field strength of emissions and Restricted bands	10	Site 2	\boxtimes		
FCC §15.215(c) 20dB bandwidth	20	Site 2	\boxtimes		
§15.249(d) Out of band emissions	23	Site 2	\boxtimes		
§15.203 Antenna requirement	See n	ote 1	\boxtimes		

Remark 1: N/A - Not Applicable.

Note 1: The EUT uses an integral antenna, which gain is 3.5dBi. According to §15.203, it is considered sufficiently to comply with the provisions of this section.



6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2AD6LGC032435 complies with Section 15.205, 15.209, 15.249 of the FCC Part 15, Subpart C Rules.

SUMMARY:

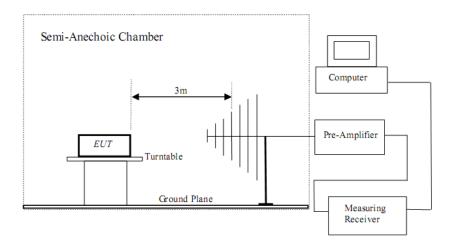
All tests according to the regulations cited on page 5 wer	All tests	according	to the	regulations	cited o	on page	5 were
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■ - Performed									
□ - Not Performed									
The Equipment under Test									
■ - Fulfills the general approva	al requirements.								
☐ - Does not fulfill the general approval requirements.									
Sample Received Date:	May 6, 2016	_							
Testing Start Date:	May 6, 2016	_							
Testing End Date:	May 10, 2016	_							
- TÜV SÜD Certification and Te	esting (China) Co., Ltd. S	Shenzhen Branch -							
Reviewed by:	Prepared by:								
John Zhi EMC Project Manager		Alan Xiong EMC Project Engineer							



7 Test setups

7.1 Radiated test setups



7.2 Conducted RF test setups





8 Systems test configuration

Auxiliary Equipment Used during Test:

Name	Model No	S/N	Manufacturer	FCC

Test software which used to control the EUT in continues transmitting mode

The system was configured to non-hopping mode.

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power



9 Technical Requirement

9.1 Field strength of emissions and restricted bands

Test Method

- 1. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 3. Use the following spectrum analyzer settings:

 Span = wide enough to fully capture the emission being measured ,RBW = 1 MHz for f

 ≥ 1GHz, 100 kHz for f < 1 GHz, VBW ≥ RBW, Sweep = auto, Detector function = peak,

 Trace = max hold
- 4. Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from 20log(duty cycle/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limits

According to §15.249 (a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

		Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

According to §15.249 (c), Field strength limits are specified at a distance of 3 meters. According to §15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation. According to §15.205 and Unwanted emissions falling into restricted bands in §15.205 (a) Table 3 shall comply with the limits specified in §15.209.

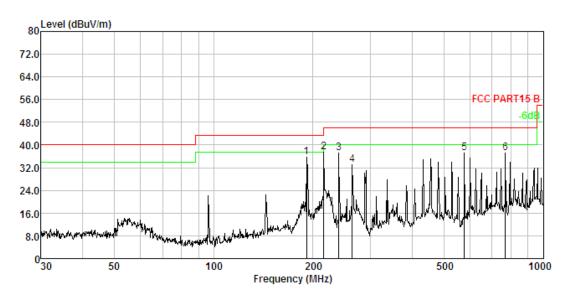


Field strength of emissions and Restricted bands

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5733MHz Test Specification: Horizontal

Remark: 30MHz-1GHz



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	191.745	2.73	10.97	52.62	30.62	35.70	43.50	-7.80	Peak
2.	216.024	2.84	10.69	54.68	30.66	37.55	46.00	-8.45	Peak
3.	239.987	2.94	11.71	53.23	30.69	37.19	46.00	-8.81	Peak
4.	263.819	3.02	12.26	48.51	30.73	33.06	46.00	-12.94	Peak
5.	576.644	3.73	18.55	45.88	31.00	37.16	46.00	-8.84	Peak
6.	768.748	3.99	21.40	42.80	31.10	37.09	46.00	-8.91	Peak

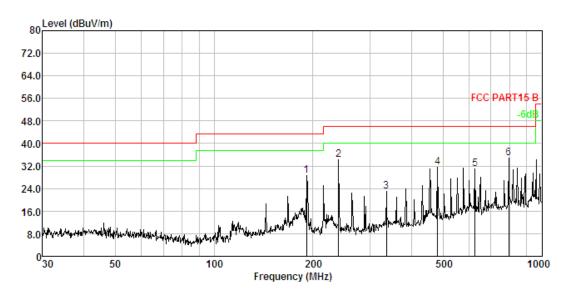


Field strength of emissions and Restricted bands

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5733MHz

Test Specification: Vertical Remark: 30MHz-1GHz



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	191.745	2.73	10.97	45.64	30.62	28.72	43.50	-14.78	Peak
2.	239.987	2.94	11.71	50.39	30.69	34.35	46.00	-11.65	Peak
3.	336.035	3.24	14.00	36.57	30.81	23.00	46.00	-23.00	Peak
4.	480.528	3.57	16.89	42.18	30.94	31.70	46.00	-14.30	Peak
5.	625.078	3.80	19.22	39.08	31.03	31.07	46.00	-14.93	Peak
6.	793.396	4.02	21.67	40.28	31.11	34.86	46.00	-11.14	Peak

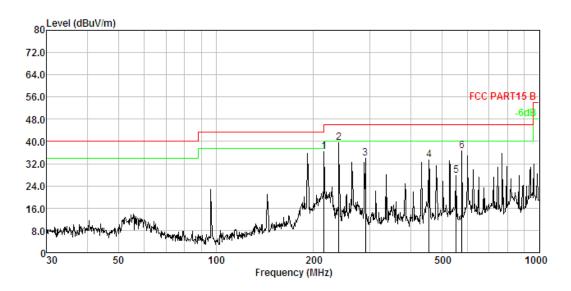


Field strength of emissions and Restricted bands

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5790MHz Test Specification: Horizontal

Remark: 30MHz-1GHz



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	O∨er Limit dB	Remark
1.	216.024	2.84	10.69	53.37	30.66	36.24	46.00	-9.76	Peak
2.	239.987	2.94	11.71	55.46	30.69	39.42	46.00	-6.58	Peak
3.	290.017	3.11	13.00	48.45	30.76	33.80	46.00	-12.20	Peak
4.	455.906	3.52	16.45	44.42	30.92	33.47	46.00	-12.53	Peak
5.	552.883	3.69	18.00	36.90	30.98	27.61	46.00	-18.39	Peak
6.	576.644	3.73	18.55	45.19	31.00	36.47	46.00	-9.53	Peak

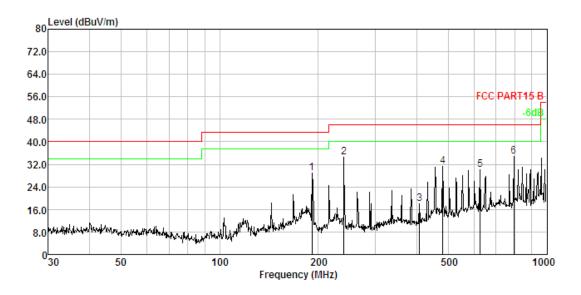


Field strength of emissions and Restricted bands

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5790MHz

Test Specification: Vertical Remark: 30MHz-1GHz



No.	Freq MHz	Cable Loss dB		Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	O∨er Limit dB	Remark
1.	191.745	2.73	10.97	45.76	30.62	28.84	43.50	-14.66	Peak
2.	239.987	2.94	11.71	50.49	30.69	34.45	46.00	-11.55	Peak
3.	408.946	3.42	15.49	29.92	30.88	17.95	46.00	-28.05	Peak
4.	480.528	3.57	16.89	41.78	30.94	31.30	46.00	-14.70	Peak
5.	625.078	3.80	19.22	38.01	31.03	30.00	46.00	-16.00	Peak
6.	793.396	4.02	21.67	40.40	31.11	34.98	46.00	-11.02	Peak

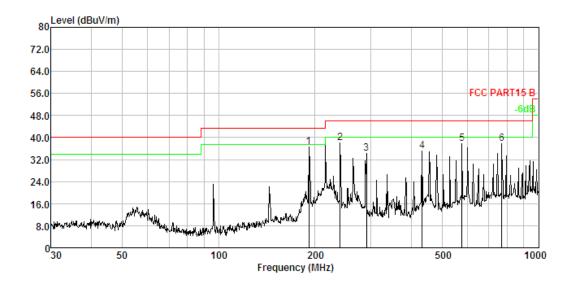


Field strength of emissions and Restricted bands

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5866MHz Test Specification: Horizontal

Remark: 30MHz-1GHz



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBu√/m	O∨er Limit dB	Remark
1.	191.745	2.73	10.97	53.41	30.62	36.49	43.50	-7.01	Peak
2.	239.987	2.94	11.71	54.18	30.69	38.14	46.00	-7.86	Peak
3.	290.017	3.11	13.00	49.01	30.76	34.36	46.00	-11.64	Peak
4.	432.546	3.47	16.02	46.64	30.90	35.23	46.00	-10.77	Peak
5.	576.644	3.73	18.55	46.61	31.00	37.89	46.00	-8.11	Peak
6.	768.748	3.99	21.40	43.47	31.10	37.76	46.00	-8.24	Peak

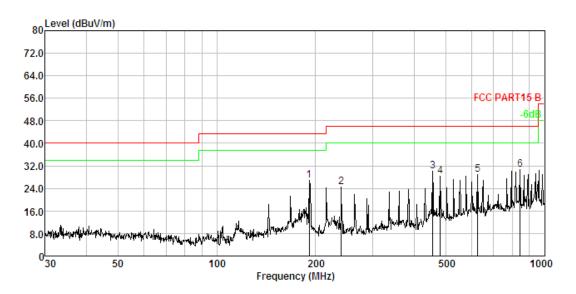


Field strength of emissions and Restricted bands

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5866MHz

Test Specification: Vertical Remark: 30MHz-1GHz



No.	Freq MHz	Cable Loss dB	ANT Factor dB/m	Receiver Reading dBuV	Preamp Factor dB	Emission Level dBuV/m	Limit dBuV/m	Over Limit dB	Remark
1.	191.745	2.73	10.97	43.70	30.62	26.78	43.50	-16.72	
2.	239.987	2.94	11.71	40.47	30.69	24.43	46.00	-21.57	Peak
3.	455.906	3.52	16.45	40.94	30.92	29.99	46.00	-16.01	Peak
4.	480.528	3.57	16.89	38.72	30.94	28.24	46.00	-17.76	Peak
5.	625.078	3.80	19.22	36.98	31.03	28.97	46.00	-17.03	Peak
6.	842.130	4.07	22.02	35.72	31.13	30.68	46.00	-15.32	Peak



Field strength of emissions and Restricted bands

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5733MHz Test Specification: Horizontal

Remark: Above 1GHz

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
5733.013	86.12	4.42	90.54	114	-23.46	peak
5733.013	82.37	4.42	86.79	94	-7.21	AVG
11466.026	41.86	9.42	51.28	74	-22.72	peak
11466.026	34.43	9.42	43.85	54	-10.15	AVG
17199.039	39.58	10.51	50.09	74	-23.91	peak
17199.039	33.87	10.51	44.38	54	-9.62	AVG

Remark:

Factor = Antenna Factor + Cable Loss - Pre-amplifier.

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5733MHz

Test Specification: Vertical Remark: Above 1GHz

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	\/alua Tura
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
5733.013	84.31	4.42	88.73	114	-25.27	peak
5733.013	80.52	4.42	84.94	94	-9.06	AVG
11466.026	40.26	9.42	49.68	74	-24.32	peak
11466.026	33.71	9.42	43.13	54	-10.87	AVG
17199.039	38.56	10.51	49.07	74	-24.93	peak
17199.039	33.43	10.51	43.94	54	-10.06	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark 1: According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Remark 2: Testing is carried out with frequency rang 30MHz to 40GHz, which above 1GHz are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.



Field strength of emissions and Restricted bands

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5790MHz Test Specification: Horizontal

Remark: Above 1GHz

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
5790.016	84.25	4.67	88.92	114	-25.08	peak
5790.016	80.47	4.67	85.14	94	-8.86	AVG
11580.032	41.36	9.46	50.82	74	-23.18	peak
11580.032	34.89	9.46	44.35	54	-9.65	AVG
17370.048	38.56	10.68	49.24	74	-24.76	peak
17370.048	34.27	10.68	44.95	54	-9.05	AVG

Remark:

Factor = Antenna Factor + Cable Loss - Pre-amplifier.

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5790MHz

Test Specification: Vertical Remark: Above 1GHz

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
5790.016	82.08	4.67	86.75	114	-27.25	peak
5790.016	78.65	4.67	83.32	94	-10.68	AVG
11580.032	40.49	9.46	49.95	74	-24.05	peak
11580.032	34.32	9.46	43.78	54	-10.22	AVG
17370.048	38.14	10.68	48.82	74	-25.18	peak
17370.048	33.77	10.68	44.45	54	-9.55	AVG

Remark:

Factor = Antenna Factor + Cable Loss - Pre-amplifier.

Remark 1: According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Remark 2: Testing is carried out with frequency rang 30MHz to 40GHz, which above 1GHz are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.



Field strength of emissions and Restricted bands

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5866MHz Test Specification: Horizontal

Remark: Above 1GHz

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
5866.021	83.86	4.72	88.58	114	-25.42	peak
5866.021	80.24	4.72	84.96	94	-9.04	AVG
11732.042	44.84	9.68	54.52	74	-19.48	peak
11732.042	38.56	9.68	48.24	54	-5.76	AVG
17598.063	40.25	10.87	51.12	74	-22.88	peak
17598.063	36.87	10.87	47.74	54	-6.26	AVG

Remark:

Factor = Antenna Factor + Cable Loss - Pre-amplifier.

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5866MHz

Test Specification: Vertical Remark: Above 1GHz

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	- Value Type
5866.021	82.07	4.72	86.79	114	-27.21	peak
5866.021	78.72	4.72	83.44	94	-10.56	AVG
11732.042	43.34	9.68	53.02	74	-20.98	peak
11732.042	37.54	9.68	47.22	54	-6.78	AVG
17598.063	41.54	10.87	52.41	74	-21.59	peak
17598.063	36.07	10.87	46.94	54	-7.06	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark 1: According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Remark 2: Testing is carried out with frequency rang 30MHz to 40GHz, which above 1GHz are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.



9.2 20dB Bandwidth

Test Method

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- 3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

Limits:

According to 15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.



20dB Bandwidth

Frequency	20dB Bandwidth	Limit	Result
MHz	MHz	kHz	
5733	12.57		Pass
5790	11.15		Pass
5866	11.07		Pass





20dB Bandwidth







9.3 Band edge testing

Test Method

- 1. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- Use the following spectrum analyzer settings:
 Span = wide enough to fully capture the emission being measured, RBW = 1 MHz,
 VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
- 4. Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from 20log(duty cycle/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit:

According to §15.249(d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

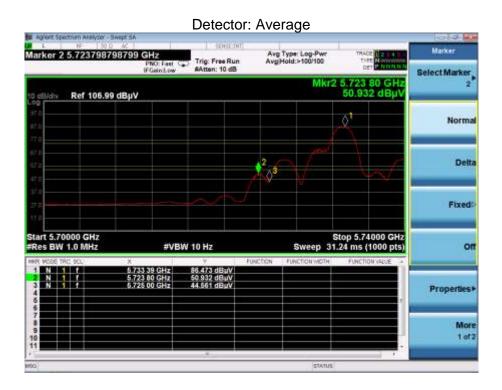


Band edge testing

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5733MHz Test Specification: Horizontal







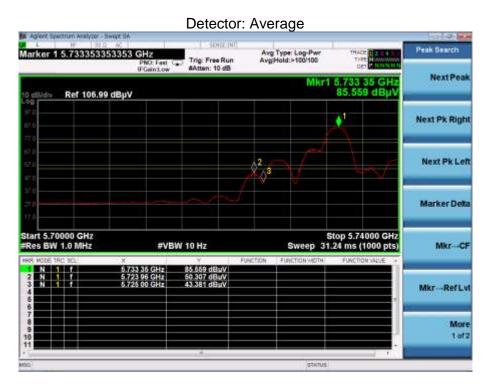
Band edge testing

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5733MHz

Test Specification: Vertical



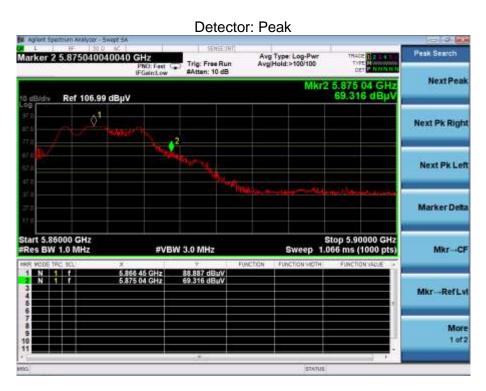


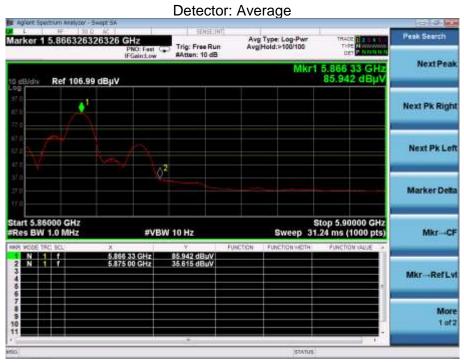


Band edge testing

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5866MHz Test Specification: Horizontal







Band edge testing

EUT: Quadcopter M/N: CX-35

Operating Condition: Tx; 5866MHz

Test Specification: Vertical







10 Test equipment list

List of Test Instruments

List of Test Ilisti differits								
	Radiated Emission Test Site							
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration			
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 4, 2015	July 3, 2016			
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 4, 2015	July 3, 2016			
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 4, 2015	July 3, 2016			
RF Cable	SCHWARZBECK	AK9515E	96221	July 4, 2015	July 3, 2016			
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 6, 2015	June 5, 2016			
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A			
Active loop antenna (9K- 30MHz)	Schwarzbeck	FMZB1519	1519-038	June 6, 2015	June 5, 2016			
Spectrum analyzer	Agilent	N9010A	MY53470504	June 6, 2015	June 5, 2016			
Temporary antenna connector	Sat	CE001	N/A	June 6, 2015	June 5, 2016			
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	June 6, 2015	June 5, 2016			
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 6, 2015	June 5, 2016			



11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

System Measurement Uncertainty						
Items	Extended Uncertainty					
Radiated Emissions Electric field 3 m distance	+/-3.8dB					
Band Width	+/-1.6kHz					
Band Edge	+/-3.8dB					