

FCC Test Report

Report No.: AGC02067180101FE05

FCC ID : ZQ5CXMODEL023A
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : 2.4 GHZ 4 CHANNEL RC QUADCOPTER
BRAND NAME : N/A
MODEL NAME : CX033
SERIAL MODELS : Please to see Page5
CLIENT : CHUANGXIANG TOYS FACTORY
DATE OF ISSUE : Feb. 01, 2018
STANDARD(S) : FCC Part 15 Subpart C Section 15.249
TEST PROCEDURE(S) :
REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

CAUTION:

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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Feb. 01, 2018	Valid	Initial Release

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APPENDIX A: PHOTOGRAPHS OF TEST SETUP..... 29

APPENDIX B: PHOTOGRAPHS OF EUT 30

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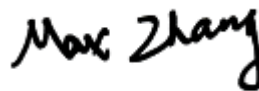
1. VERIFICATION OF CONFORMITY

Applicant	CHUANGXIANG TOYS FACTORY
Address	Middle piece of Laimei Road, Chenghai District, Shantou City, Guangdong, China
Manufacturer	CHUANGXIANG TOYS FACTORY
Address	Middle piece of Laimei Road, Chenghai District, Shantou City, Guangdong, China
Product Designation	2.4 GHZ 4 CHANNEL RC QUADCOPTER
Brand Name	N/A
Test Model	CX033
Series Model	Please to see Page 5.
Model Difference	All the samples are with the same PCB board and circuit, but with the different appearance.
Date of test	Jan 24, 2018 to Feb. 01, 2018
Deviation	None
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.249. The test results of this report relate only to the tested sample identified in this report.

Tested By



Max Zhang(Zhang Yi)

Feb. 01, 2018

Reviewed By



Bart Xie(Xie Xiaobin)

Feb. 01, 2018

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	2.405-2.475GHz
RF Output Power	81.11dBuV/m@3m(AV)
Modulation	GFSK
Number of channels	71
Antenna Gain	0dBi
Antenna Designation	Internal Antenna (Met 15.203 Antenna requirement)
Hardware Version	XG-GH276T-DG
Software Version	N/A
Power Supply	DC 4.5V(AAA battery*3)
Test Frequency	2405MHz, 2440MHz, 2475MHz

2.2. TABLE OF CARRIER FREQUENCIES

Frequency Band	Channel Number	Frequency
2400~2483.5MHz	0	2405MHZ
	1	2406MHZ
	2	2407MHZ
	69	2474 MHZ
	70	2475 MHZ

2.3. SERIAL MODES

Serial modes:

CX001, CX002, CX003, CX005, CX006, CX007, CX008, CX009, CX010, CX011, CX012, CX013, CX015, CX016, CX017, CX018, CX019, CX020, CX021, CX022, CX023, CX025, CX026, CX027, CX028, CX029, CX030, CX031, CX032, CX035, CX036, CX037, CX038, CX039, CX040, CX041, CX042, CX043, CX045, CX046, CX047, CX048, CX049, CX050, CX051, CX052, CX053, CX055, CX056, CX058, CX057, CX059, CX060, CX061, CX068, CX078, CX088, CX098, CX108, CX118, CX128, CX138, CX158, CX168, CX178, CX188, CX198, CX208, CX218, CX228, CX258, CX268, CX278, LS114, 391V, KBA15001, KBA15002, KBA15003, KBA15004

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3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

- Uncertainty of Conducted Emission, $U_c = \pm 3.2$ dB
- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 3.9$ dB
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.8$ dB

4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX

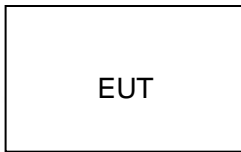
Note:

1. All the test modes can be supply by battery, only the result of the worst case was recorded in the report, if no other cases.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.
3. The EUT used fully-charged battery when tested.

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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	manufacturer	Model	Remark
1	2.4 GHZ 4 CHANNEL RC QUADCOPTER	CX033	ZQ5CXMODEL023A	EUT

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.249&15.209	Radiated Emission	Compliant
§15.249	Band Edges	Compliant
§15.215	20dB bandwidth	Compliant
§15.207	Line Conduction Emission	N/A

N/A: Because of this EUT is powered by DC battery(1.5V AAA Battery *3), so Line Conduction Emission test item is not applicable.

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2F., Bldg.2, No.1-4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District B112-B113, Bldg.12, Baoan Bldg Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen 518012
NVLAP Lab Code	600153-0
Designation Number	CN5028
Test Firm Registration Number	682566
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by National Voluntary Laboratory Accreditation program, NVLAP Code 600153-0

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7. TEST METHOD

All measurements contained in this report were conducted with ANSI C63.10-2013

8. TEST EQUIPMENT LIST

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun.20, 2017	Jun.19, 2018
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec.08, 2017	Dec.07, 2018
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.20, 2017	Sep.19, 2018
preamplifier	ChengYi	EMC184045SE	980508	Sep.15, 2017	Sep.14, 2018
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 18, 2017	May 17, 2019
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun.20, 2017	Jun.19, 2018
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.28, 2017	Sep.27, 2018
Loop Antenna	A.H.Systems,Inc	SAS-562B	--	Mar. 01, 2016	Feb. 28, 2018

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9. RADIATED EMISSION

9.1 TEST LIMIT

Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μ V)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μ V)/m (Peak) 54.0 dB(μ V)/m (Average)	

Remark:

- (1) Emission level $\text{dB}\mu$ V = 20 log Emission level μ V/m
- (2) The smaller limit shall apply at the cross point between two frequency bands.
- (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

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9.2. MEASUREMENT PROCEDURE

1. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Below 1GHz)
2. The measuring distance of 3m shall used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Above 1GHz)
3. The height of the test antenna shall vary between 1m to 4m.Both horizontal and vertical polarization Of the antenna are set to make the measurement.
4. The initial step in collecting radiated emission data is a receive peak detector mode. Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
5. All readings are peak unless otherwise stated QP in column of Note. Peak denoted that the Peak reading compliance with the QP limits and then QP Mode measurement didn't perform(Below 1GHz)
6. All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value compliance with the Peak limits and lower than AVG Limits, the EUT shall be deemed to meet Peak & AVG limits and then only Peak mode was measured, but AVG mode didn't perform.(Above 1GHz)

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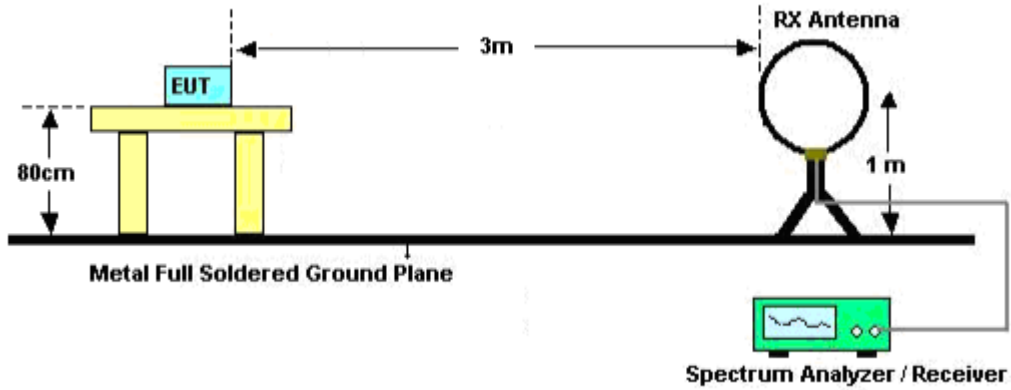
The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz RBW 2MHz/ VBW 6MHz for Peak, RBW 1.5MHz/ VBW 10Hz for Average
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

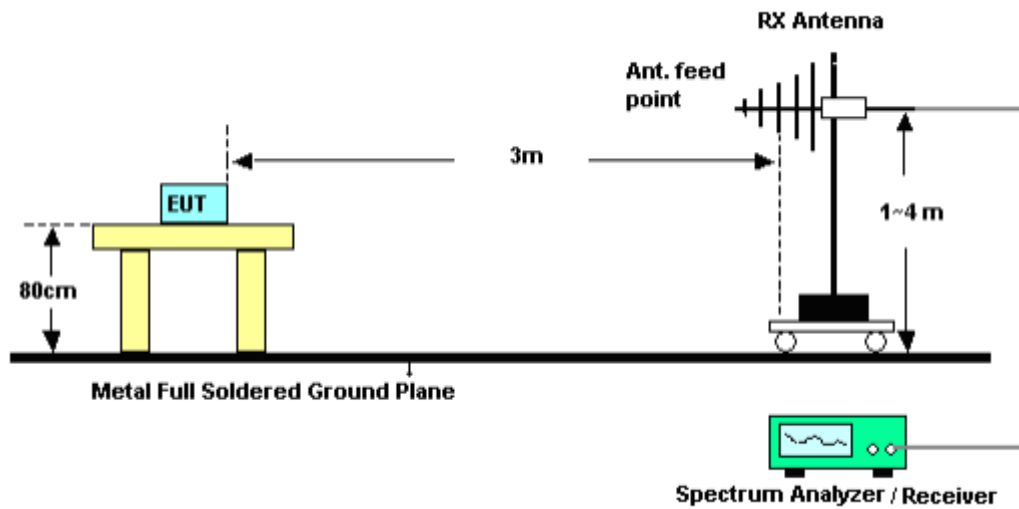
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9.3. TEST SETUP

Radiated Emission Test-Setup Frequency Below 30MHz

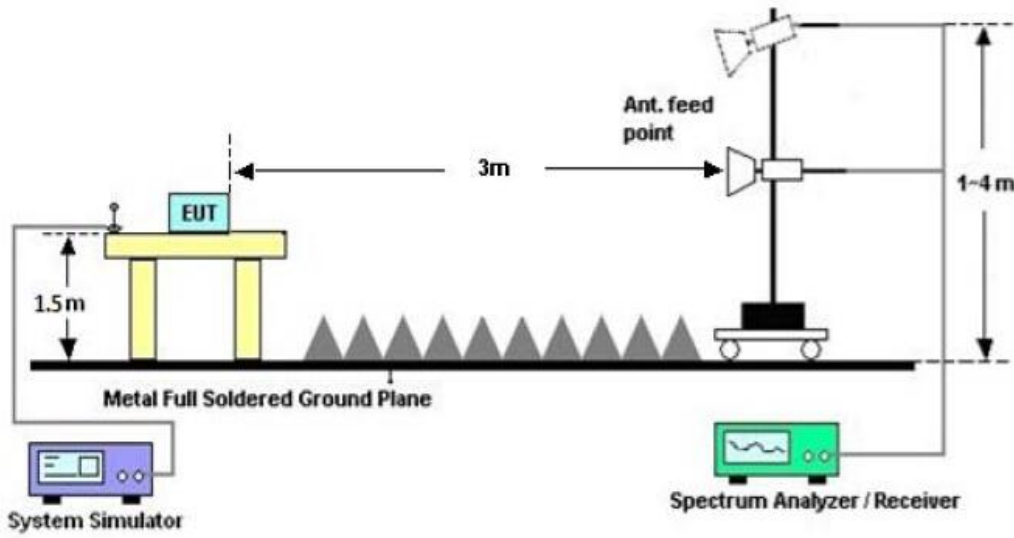


RADIATED EMISSION TEST SETUP 30MHz-1000MHz



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RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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9.4. TEST RESULT

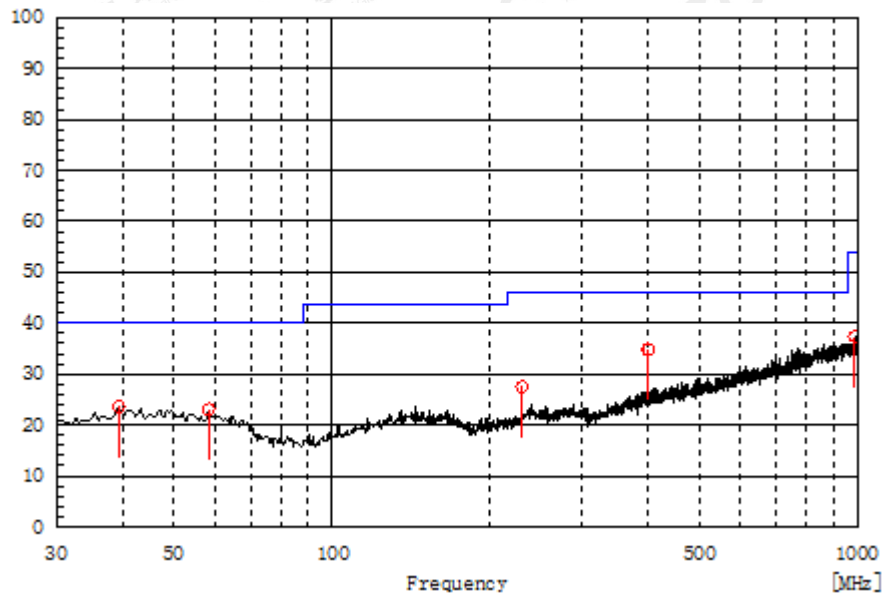
(Worst modulation: GFSK)

RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

RADIATED EMISSION 30MHz- 1GHz

EUT :	2.4 GHZ 4 CHANNEL RC QUADCOPTER	Model Name	CX033
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 4.5V
Test Mode :	Mode 1	Polarization :	Horizontal

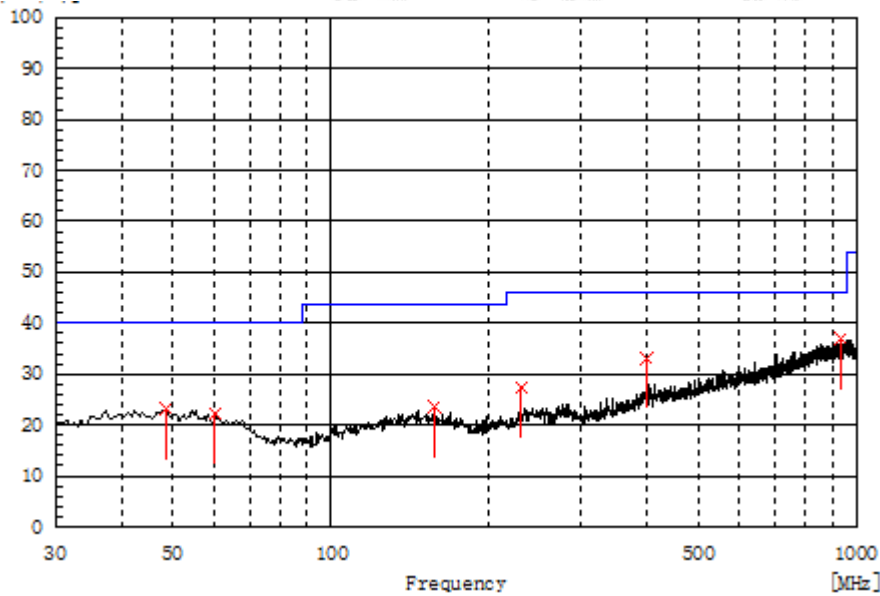


Frequency, MHz	Polarization	Reading, dB(uV/m)	Factor, dB, (1/m)	Level, dB(uV/m) PK	Limit, dB(uV/m) QP	Margin, dB	Pass/Fail	Height, cm	Angle, deg
39.215	H	6.2	17.4	23.6	40.0	16.4	Pass	100.0	107.1
229.820	H	11.8	15.7	27.5	46.0	18.5	Pass	100.0	286.6
399.085	H	14.0	20.8	34.8	46.0	11.2	Pass	150.0	288.7
400.055	H	14.0	20.8	34.8	46.0	11.2	Pass	150.0	143.2
989.330	H	6.4	31.0	37.4	54.0	16.6	Pass	150.0	216.8
58.130	H	6.7	16.4	23.1	40.0	16.9	Pass	100.0	286.6

RESULT: PASS

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EUT :	2.4 GHZ 4 CHANNEL RC QUADCOPTER	Model Name	CX033
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 4.5V
Test Mode :	Mode 1	Polarization :	Vertical



Frequency, MHz	Polarization	Reading, dB(uV)	Factor, dB (1/m)	Level, dB(uV/m) PK	Limit, dB(uV/m) QP	Margin, dB	Pass/Fail	Height, cm	Angle, deg
48.430	V	6.0	17.1	23.1	40.0	16.9	Pass	150.0	289.4
229.820	V	11.6	15.7	27.3	46.0	18.7	Pass	200.0	269.1
399.570	V	12.3	20.8	33.1	46.0	12.9	Pass	100.0	323.2
932.100	V	6.5	30.5	37.0	46.0	9.0	Pass	200.0	269.1
60.070	V	6.0	16.2	22.2	40.0	17.8	Pass	200.0	269.1
157.070	V	6.9	16.6	23.5	43.5	20.0	Pass	100.0	71.9

RESULT: PASS

Note:

Factor=Antenna Factor + Cable loss, Margin=Result-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

The mode 1 is the worst case, and only the data of the worst case recorded in this test report.

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RADIATED EMISSION ABOVE 1GHZ

EUT :	2.4 GHZ 4 CHANNEL RC QUADCOPTER	Model Name	CX033
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 4.5V
Test Mode :	Mode 1	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2405.007	92.21	-9.63	82.58	114	-31.42	peak
2405.007	90.42	-9.63	80.79	94	-13.21	AVG
4810.014	45.74	3.76	49.5	74	-24.5	peak
4810.014	38.67	3.76	42.43	54	-11.57	AVG
7215.021	43.45	8.17	51.62	74	-22.38	peak
7215.021	38.96	8.17	47.13	54	-6.87	AVG

Remark:

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

EUT :	2.4 GHZ 4 CHANNEL RC QUADCOPTER	Model Name	CX033
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 4.5V
Test Mode :	Mode 1	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2405.003	92.33	-9.63	82.7	114	-31.3	peak
2405.003	90.74	-9.63	81.11	94	-12.89	AVG
4810.006	43.47	3.76	47.23	74	-26.77	peak
4810.006	37.94	3.76	41.7	54	-12.3	AVG
7215.009	42.65	8.17	50.82	74	-23.18	peak
7215.009	36.78	8.17	44.95	54	-9.05	AVG

Remark:

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

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EUT :	2.4 GHZ 4 CHANNEL RC QUADCOPTER	Model Name	CX033
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 4.5V
Test Mode :	Mode 2	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2440.014	92.35	-9.63	82.72	114	-31.28	peak
2440.014	90.27	-9.63	80.64	94	-13.36	AVG
4880.028	43.56	3.76	47.32	74	-26.68	peak
4880.028	37.82	3.76	41.58	54	-12.42	AVG
7320.042	42.38	8.17	50.55	74	-23.45	peak
7320.042	37.86	8.17	46.03	54	-7.97	AVG

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

EUT :	2.4 GHZ 4 CHANNEL RC QUADCOPTER	Model Name	CX033
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 4.5V
Test Mode :	Mode 2	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2440.007	91.24	-9.63	81.61	114	-32.39	peak
2440.007	90.32	-9.63	80.69	94	-13.31	AVG
4880.014	42.39	3.76	46.15	74	-27.85	peak
4880.014	37.54	3.76	41.3	54	-12.7	AVG
7320.021	39.66	8.17	47.83	74	-26.17	peak
7320.021	34.62	8.17	42.79	54	-11.21	AVG

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

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EUT :	2.4 GHZ 4 CHANNEL RC QUADCOPTER	Model Name	CX033
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 4.5V
Test Mode :	Mode 3	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2475.012	91.34	-9.63	81.71	114	-32.29	peak
2475.012	89.68	-9.63	80.05	94	-13.95	AVG
4950.024	43.87	3.76	47.63	74	-26.37	peak
4950.024	36.46	3.76	40.22	54	-13.78	AVG
7425.036	43.78	8.17	51.95	74	-22.05	peak
7425.036	37.48	8.17	45.65	54	-8.35	AVG

Remark:

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

EUT :	2.4 GHZ 4 CHANNEL RC QUADCOPTER	Model Name	CX033
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 4.5V
Test Mode :	Mode 3	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Value Type
2475.014	91.34	-9.63	81.71	114	-32.29	peak
2475.014	90.54	-9.63	80.91	94	-13.09	AVG
4950.028	43.74	3.76	47.5	74	-26.5	peak
4950.028	36.12	3.76	39.88	54	-14.12	AVG
7425.042	42.74	8.17	50.91	74	-23.09	peak
7425.042	37.58	8.17	45.75	54	-8.25	AVG

Remark:

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

Note: Other emission from 8G to 25 GHz are considered as ambient noise. No recording in the test report.

Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

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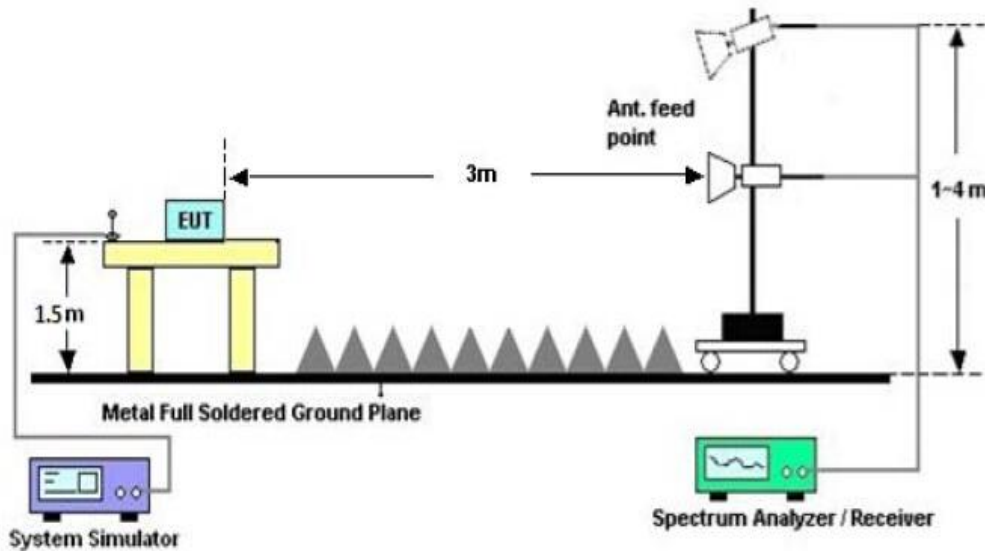
10. BAND EDGE EMISSION

10.1. MEASUREMENT PROCEDURE

1. The EUT operates at transmitting mode. The operate channel is tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.
2. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: (a) PEAK: RBW=1MHz, VBW=3MHz / Sweep=AUTO
(b) AVERAGE: RBW=1MHz ; VBW=1/on time(1KHz) / Sweep=AUTO
3. Other procedures refer to clause 7.2.

10.2 TEST SETUP

RADIATED EMISSION TEST SETUP



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10.3 RADIATED TEST RESULT

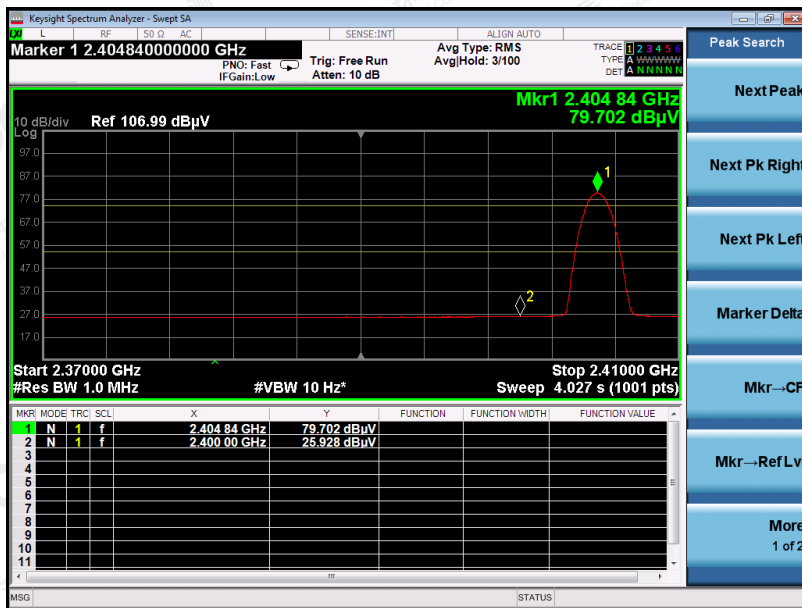
(Worst modulation: GFSK)

EUT :	2.4 GHZ 4 CHANNEL RC QUADCOPTER	Model Name	CX033
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 4.5V
Test Mode :	Mode 1	Polarization :	Horizontal

PK Value



AV Value



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EUT :	2.4 GHZ 4 CHANNEL RC QUADCOPTER	Model Name. :	CX033
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC4.5V
Test Mode :	Mode 1	Polarization :	Vertical

PK Value



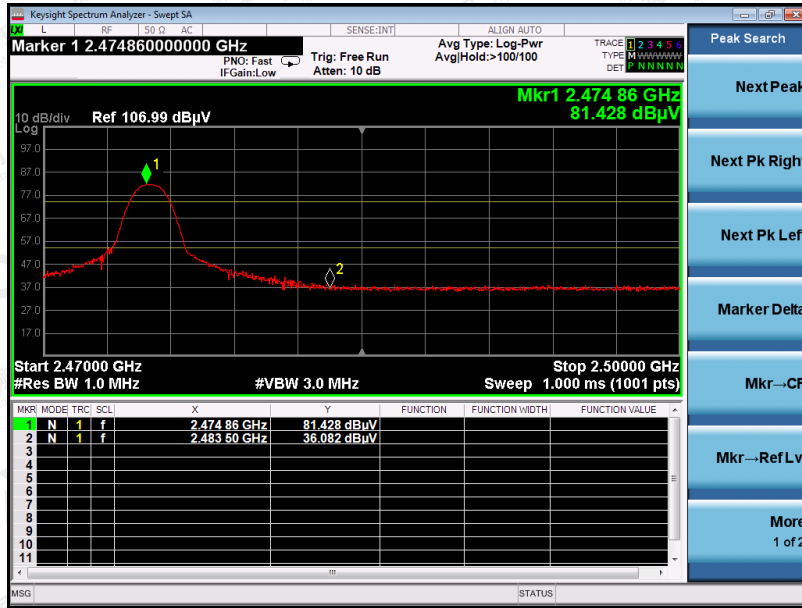
AV Value



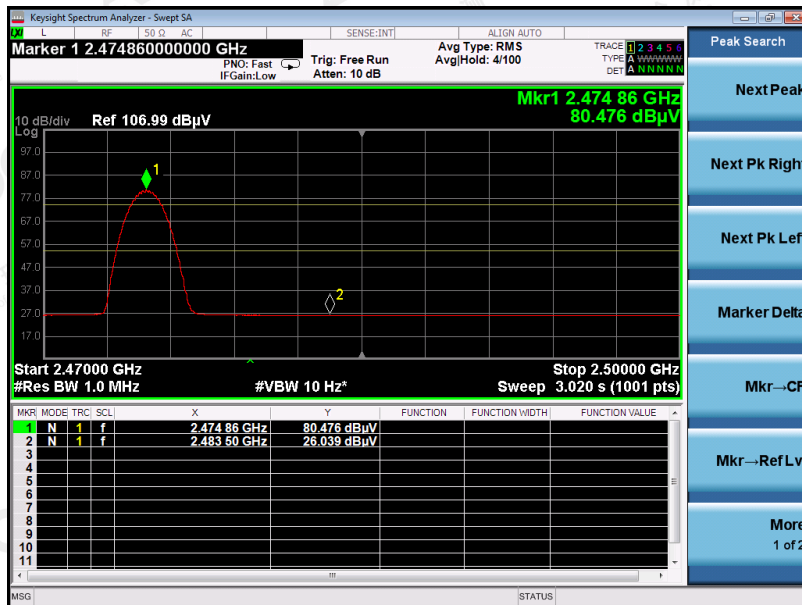
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EUT :	2.4 GHZ 4 CHANNEL RC QUADCOPTER	Model Name. :	CX033
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC4.5V
Test Mode :	Mode 3	Polarization :	Horizontal

PK Value



AV Value



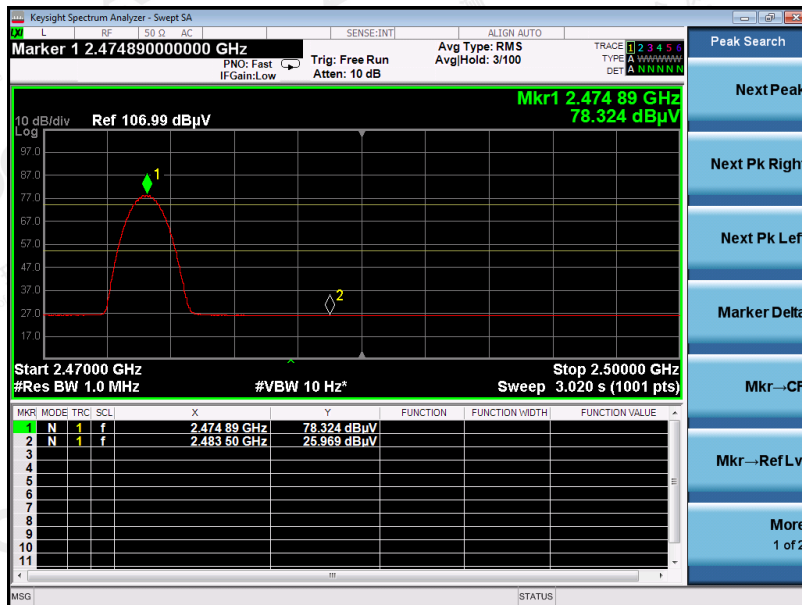
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EUT :	2.4 GHZ 4 CHANNEL RC QUADCOPTER	Model Name. :	CX033
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC4.5V
Test Mode :	Mode 3	Polarization :	Vertical

PK Value



AV Value



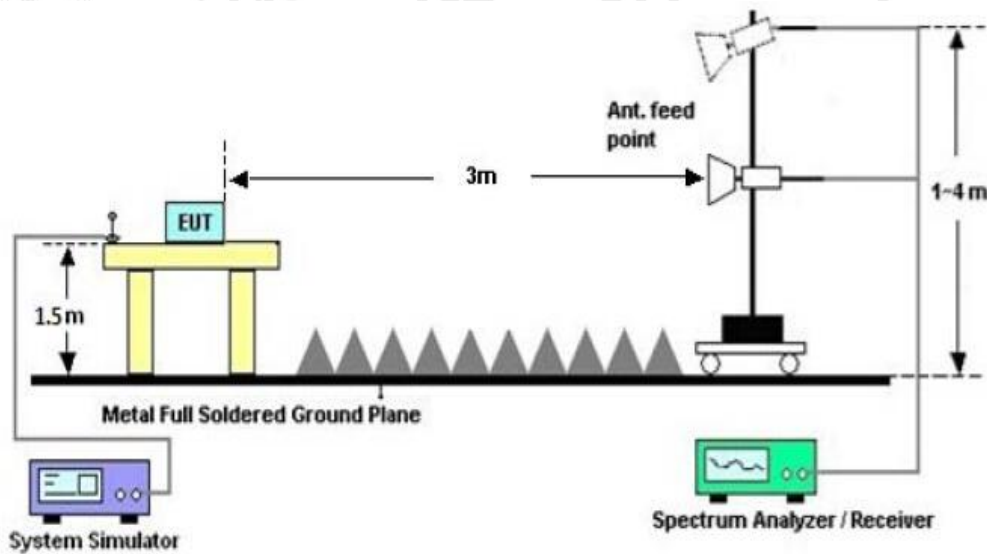
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11. 20DB BANDWIDTH

11.1. MEASUREMENT PROCEDURE

1. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
2. Set Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hoping channel
RBW \geq 1% of the 20 dB bandwidth, VBW \geq 3RBW; Sweep = auto; Detector function = peak
3. Set SPA Trace 1 Max hold, then View.

11.2. TEST SET-UP



11.3. LIMITS AND MEASUREMENT RESULTS

TEST ITEM	20DB BANDWIDTH
TEST MODULATION	GFSK

Channel	KHz	Criteria
Low Channel	821.9	PASS
Middle Channel	822.1	PASS
High Channel	825.3	PASS

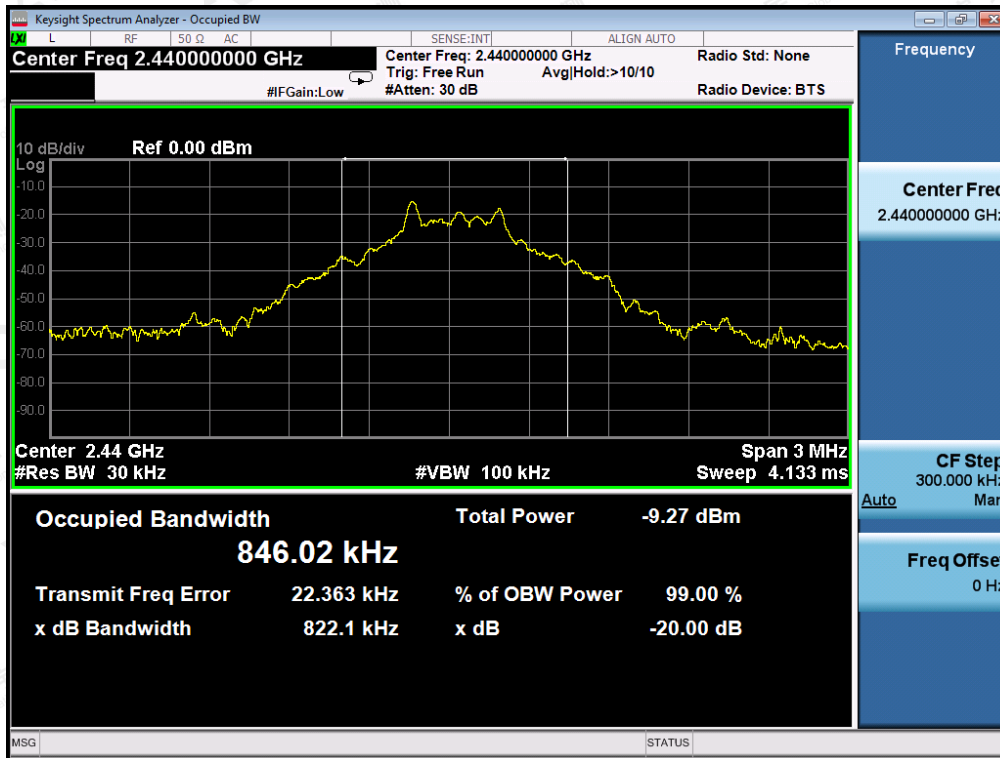
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TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

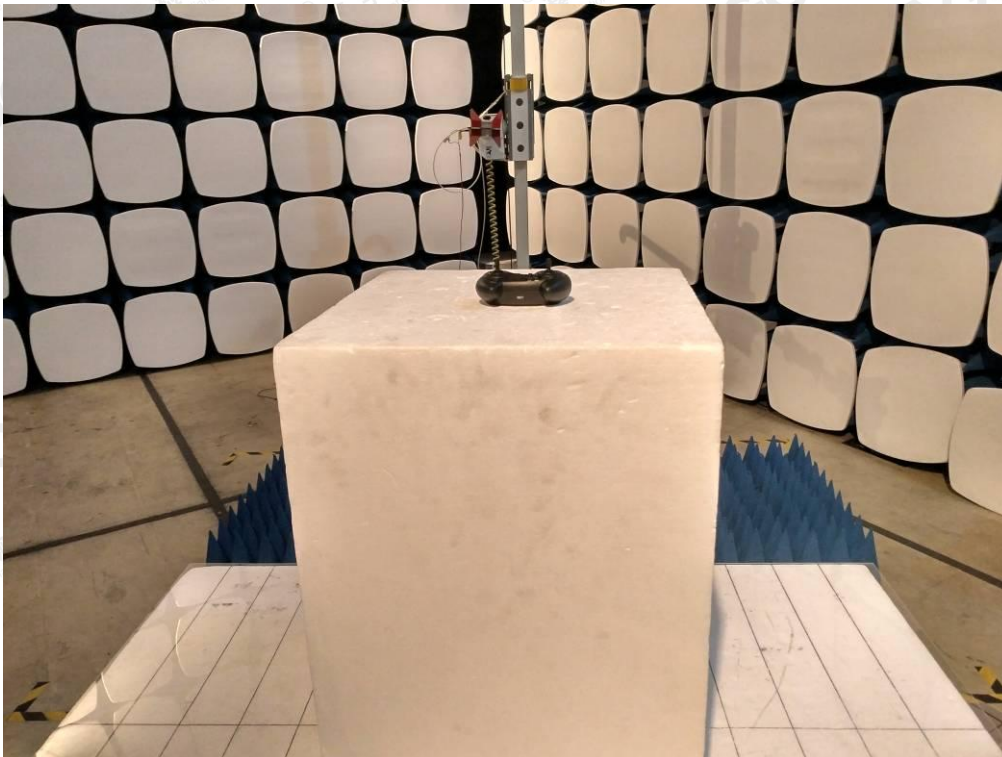
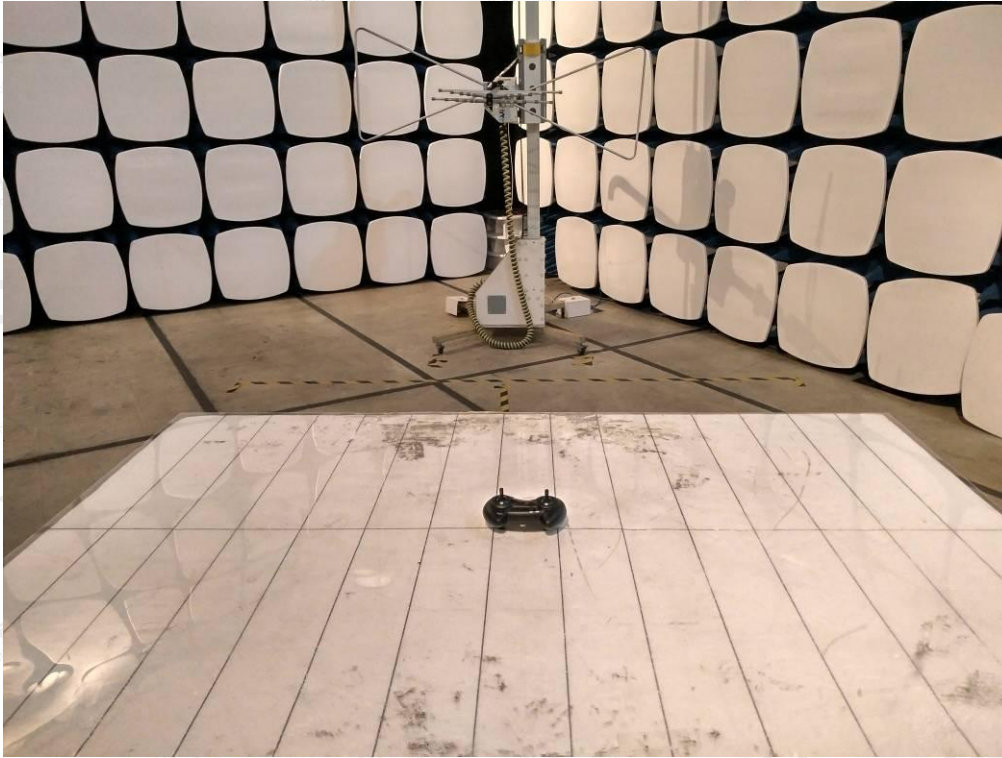


TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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APPENDIX A: PHOTOGRAPHS OF TEST SETUP
FCC RADIATED EMISSION TEST SETUP



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APPENDIX B: PHOTOGRAPHS OF EUT

TOP VIEW OF EUT



BOTTOM VIEW OF EUT



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FRONT VIEW OF EUT



BACK VIEW OF EUT



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LEFT VIEW OF EUT

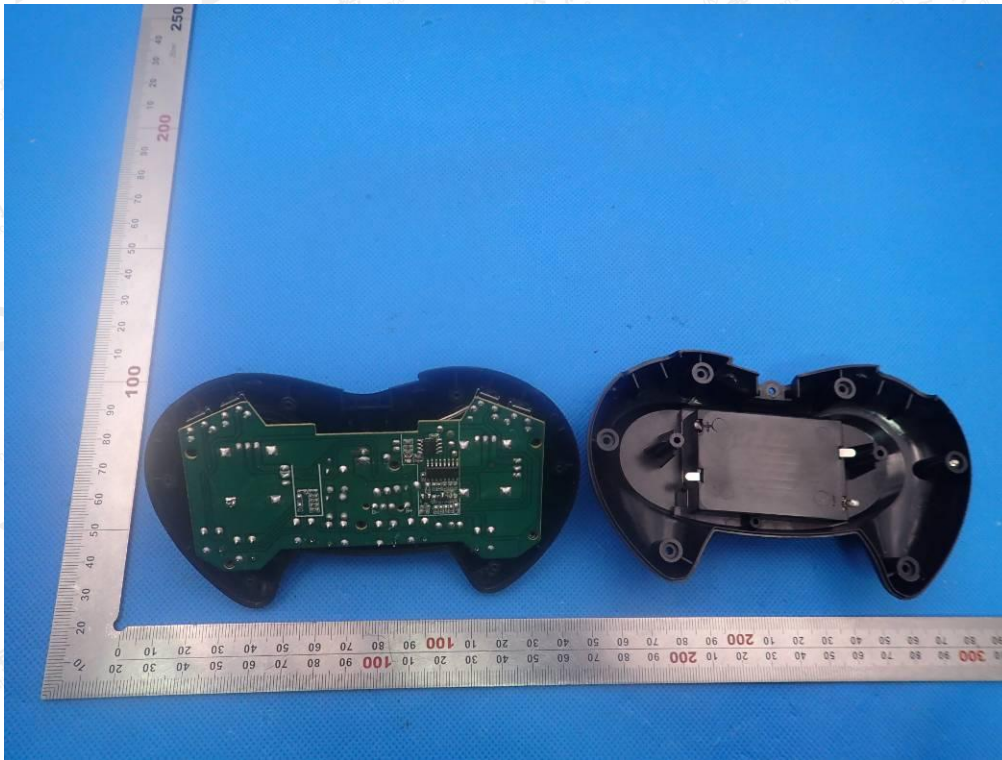


RIGHT VIEW OF EUT

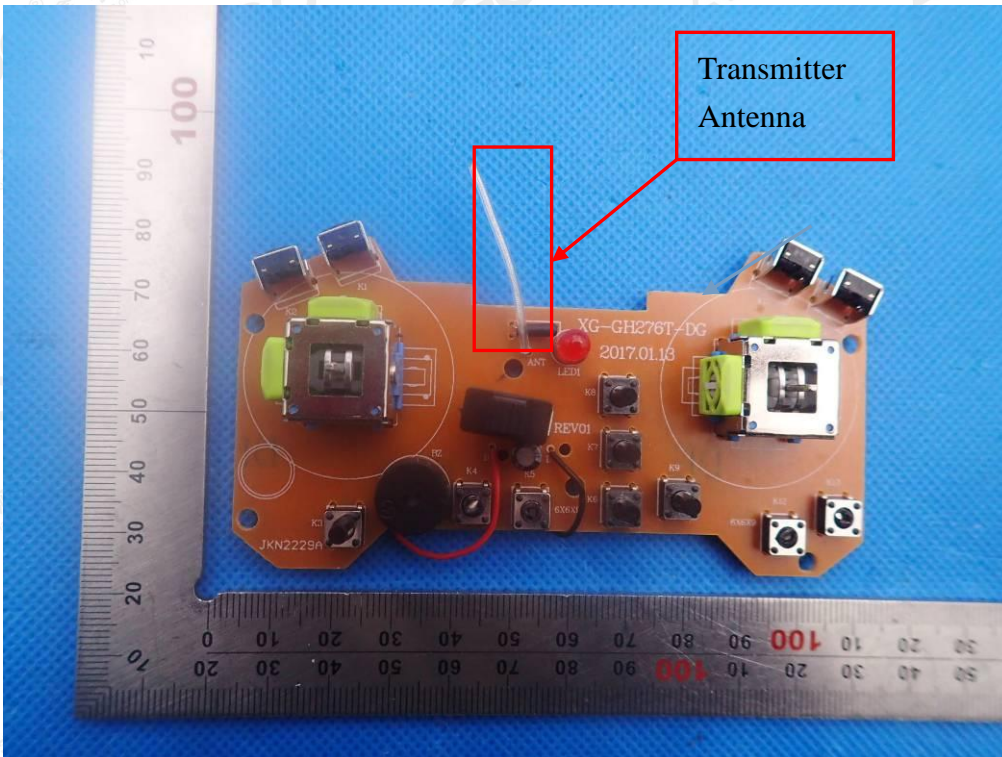


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OPEN VIEW OF EUT

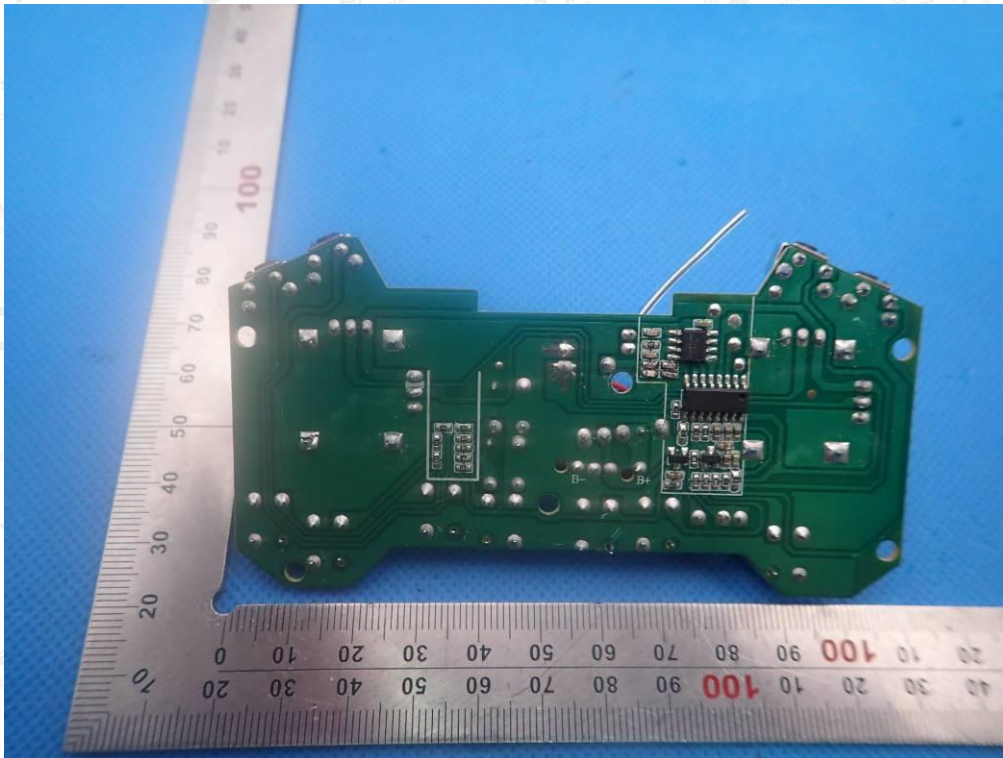


INTERNAL VIEW OF EUT-1



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INTERNAL VIEW OF EUT-2



----END OF REPORT----

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