ETSI EN 300 440 V2.1.1 (2017-03)

TEST REPORT

For

DONGHUANG TOYS FACTORY

CHENGHAI DISTRICT,SHANTOU CITY,GUANGDONG PROVINCE,CHINA

Tested Model: DH8001D-1
Multiple Models: DH8002D, DH808, DH815, DH831

Report Type:	**Product Type:**
Original Report	2.4G RC HELICOPTER

Report Number: RSZ180717810-22

Report Date: 2019-08-03

Reviewed By: Simon Wang
RF Engineer

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The DONGHUANG TOYS FACTORY's product, model number: DH8001D-1 or the "EUT" in this report was a *2.4G RC HELICOPTER,* which was measured approximately: 24.0 cm (L) * 9.3 cm (W) * 11.6 cm (H) for plane, 14.6 cm (L) * 11.4 cm (W) * 7.0 cm (H) for remote control, rated with input voltage: DC 3.7 for plane and DC 1.5*3 V battery for remote control.

Notes: This series products model: JX01, WX800, WX500, 9527, 888, 866 and DH8001D-1 are electrically identical, the differences between them are their color and model number due to marketing purpose. Model DH8001D-1 was selected for fully testing, the detailed information can be referred to the declaration which was stated and guaranteed by the applicant.

**All measurement and test data in this report was gathered from production sample serial number: 180717810. (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2019-07-17.*

Objective

This report is prepared on behalf of DONGHUANG TOYS FACTORY in accordance with ETSI EN 300 440 V2.1.1 (2017-03), Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

The object is to determine compliance with ETSI EN 300 440 V2.1.1 (2017-03).

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 440.

Measurement uncertainty with radiated emission is 5.81 dB for 30MHz-1GHz.and 4.88 dB for above 1GHz, 1.95dB for conducted measurement.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode provide by manufacturer.

Equipment Modifications

No modifications were made to the EUT.

EUT Exercise Software

No exercise software.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT.

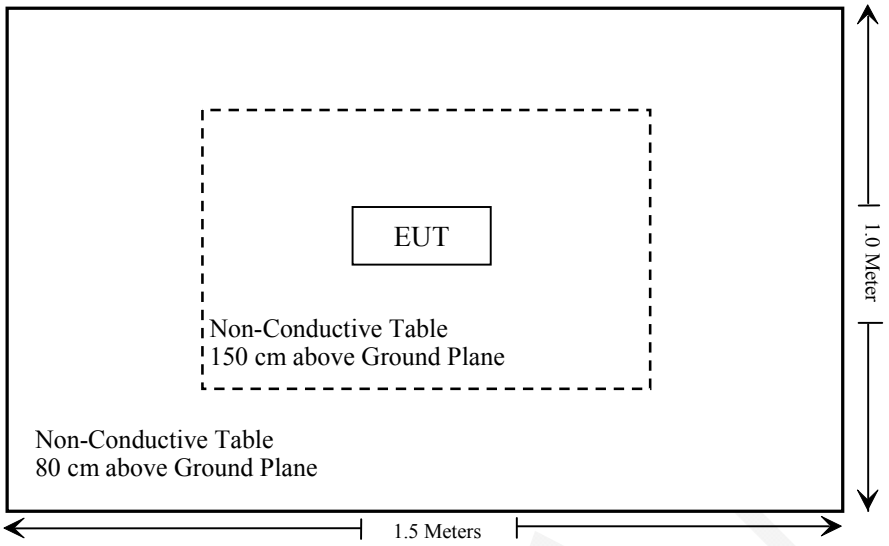
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	Battery	/	/

External I/O Cable

Cable Description	Length (m)	From Port	To
/	/	/	/

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

ETSI EN 300 440 V2.1.1 (2017-03)

ETSI EN 300 440 V2.1.1 (2017-03)	Description of test	Result
§ 4.2.2	Equivalent isotropically radiated power	Compliance
§ 4.2.3	Permitted range of operating frequencies	Compliance
§ 4.2.4	Unwanted emissions in the spurious domain	Compliance
§ 4.2.5.4	Duty Cycle	Compliance*
§ 4.2.6	Additional requirements for FHSS equipment	Not Applicable***
§ 4.3.3	Adjacent channel selectivity	Not Applicable
§ 4.3.4	Blocking or desensitization	Not Applicable
§ 4.3.5	Spurious radiation	Compliance
§ 4.4	Spectrum access techniques	Not Applicable**
§ 4.6.4	GBSAR antenna pattern	Not Applicable*
Annex F	Limits for GBSAR	Not Applicable*

Note:
Not Applicable: EUT belong to category 3.
Not Applicable*: EUT is not GBSAR system.
Not Applicable**: EUT is not defined as media access.
Not Applicable***: EUT is not belong to FHSS.
Compliance*: Duty cycle is No Restriction or limit for this generic use device.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017-12-22	2020-12-21
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2017-12-13	2020-12-13
Rohde & Schwarz	Signal Analyzer	FSEM	845987/005	2018-04-24	2019-04-24
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2018-05-21	2019-05-21
Anritsu	Signal Generator	68369B	004114	2017-12-24	2018-12-24
HP	Amplifier	HP8447E	1937A01046	2018-11-19	2019-05-17
COM POWER	Dipole Antenna	AD-100	041000	NCR	NCR
A.H. System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2018-01-11	2019-01-11
Agilent	Spectrum Analyzer	8564E	3943A01781	2016-05-09	2019-05-08
Electro-Mechanics	Horn Antenna	3116	9510-2270	2017-10-14	2018-10-13
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-03	2016-11-18	2019-11-18
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-04	2016-11-18	2019-11-18

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

ETSI EN 300 440 V2.1.1 (2017-03) §4.2.2 –EQUIVALENT ISOTROPICALLY RADIATED POWER (e.i.r.p.)

Standard Applicable

According to ETSI EN 300 440 section 5, the effective radiated power applies to equipment with an integral antenna and to equipment supplied with a dedicated antenna.

If the equipment is designed to operate with different carrier powers, the rated power for each level of range of levels shall be declared by the manufacturer.

The transmitter maximum e.i.r.p. under normal and extreme test conditions shall not exceed the values given in table 2.

Table 2: Maximum radiated peak power (e.i.r.p.)

Frequency Bands	Power	Application	Notes
2 400 MHz to 2 483,5 MHz	10 mW e.i.r.p.	Non-specific short range devices	
2 400 MHz to 2 483,5 MHz	25 mW e.i.r.p.	Radio determination devices	
(a) 2 446 MHz to 2 454 MHz	500 mW e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and annex D
(b) 2 446 MHz to 2 454 MHz	4 W e.i.r.p.	Radio Frequency Identification (RFID) devices	See also table 4 and annex D
5 725 MHz to 5 875 MHz	25 mW e.i.r.p.	Non-specific short range devices	
9 200 MHz to 9 500 MHz	25 mW e.i.r.p.	Radio determination devices	
9 500 MHz to 9 975 MHz	25 mW e.i.r.p.	Radio determination devices	
10,5 GHz to 10,6 GHz	500 mW e.i.r.p.	Radio determination devices	
13,4 GHz to 14,0 GHz	25 mW e.i.r.p.	Radio determination devices	
17,1 GHz to 17,3 GHz	400 mW e.i.r.p.	Radio determination devices	See annex F
24,00 GHz to 24,25 GHz	100 mW e.i.r.p.	Non-specific short range devices and Radio determination devices	

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Nancy Wang on 2019-07-20.

Test Mode: Transmitting

Frequency (MHz)	Receiver Reading (dBµV)	TurnTable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	EN 300 440	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable loss (dB)	Antenna Gain (dBi)		Limit (dBm)	Margin (dB)
2416 MHz										
2416.00	63.03	344	2.2	H	-7.2	2.30	10.10	0.60	10	9.40
2416.00	62.11	40	1.8	V	-7.2	2.30	10.10	0.60	10	9.40
2460 MHz										
2460.00	60.57	200	1.3	H	-8.9	2.60	10.20	-1.30	10	11.30
2460.00	49.15	311	1.4	V	-19.7	2.60	10.20	-12.10	10	22.10
2475 MHz										
2475.00	61.10	199	1.6	H	-8.4	2.60	10.20	-0.80	10	10.80
2475.00	48.95	281	2.3	V	-19.9	2.60	10.20	-12.30	10	22.30

Test Condition			EIRP (dBm)	Limit (dBm)	Result
Frequency (MHz)	Temperature (℃)	Voltage (V_{DC})			
2408	25	4.5	1.20	10	Pass
	-20	3.8	1.18	10	Pass
		4.5	1.19	10	Pass
	55	3.8	1.18	10	Pass
		4.5	1.23	10	Pass
2440	25	4.5	-0.60	10	Pass
	-20	3.8	-0.63	10	Pass
		4.5	-0.72	10	Pass
	55	3.8	-0.54	10	Pass
		4.5	-0.61	10	Pass
2470	25	4.5	0.20	10	Pass
	-20	3.8	0.13	10	Pass
		4.5	0.18	10	Pass
	55	3.8	0.24	10	Pass
		4.5	0.22	10	Pass

ETSI EN 300 440 V2.1.1 (2017-03) § 4.2.3 – PERMITTED RANGE OF OPERATING FREQUENCIES

Applicable Standard

The width of the power spectrum envelope is fH -fL for a given operating frequency. In equipment that allows adjustment or selection of different operating frequencies, the power envelope takes up different positions in the allowed band. The frequency range is determined by the lowest value of fL and the highest value of fH resulting from the adjustment of the equipment to the lowest and highest operating frequencies.

The occupied bandwidth (i.e. the bandwidth in which 99 % of the wanted emission is contained) and the necessary bandwidth of the transmitter shall fall within the assigned frequency band.

For all equipment the frequency range shall lie within the frequency band given by clause4.2.2.4, table 2. For non-harmonized frequency bands the available frequency range may differ between national administrations.

FH is the highest frequency of the power envelope, it is the frequency furthest above the frequency of maximum power where the output power envelope drops below the level of -75 dBm/Hz spectral power density (e.g. -30 dBm if measured in a 30 kHz reference bandwidth) e.i.r.p.

FL is the lowest frequency of the power envelope; it is the frequency furthest below the frequency of maximum power where the output power drops below the level of -75 dBm/Hz spectral power density (e.g. -30 dBm if measured in a 30 kHz reference bandwidth) e.i.r.p.

The power envelope shall contain the occupied bandwidth representing 99 % of the emissions.

The occupied and necessary bandwidths of the transmitter shall be declared. Where differing modes of emission are available, all modes and their associated bandwidths shall be stated.

Test Procedure

a) put the spectrum analyser in video averaging mode with a minimum of 50 sweeps selected;

b) select the lowest operating frequency of the equipment under test and activate the transmitter with modulation applied. The RF emission of the equipment shall be displayed on the spectrum analyser;

c) using the marker of the spectrum analyser, find the lowest frequency below the operating frequency at which the spectral power density drops below the level given in clause 7.2. This frequency shall be recorded in the test report;

d) select the highest operating frequency of the equipment under test and find the highest frequency at which the spectral power density drops below the value given in clause 7.2. This frequency shall be recorded in the test report;

e) the difference between the frequencies measured in steps c) and d) is the operating frequency range. It shall be recorded in the test report.

This measurement shall be repeated for each frequency range declared by the manufacturer.

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Nancy Wang on 2019-07-19.

Test Mode: Transmitting

Test Result: Compliant.

Please refer to following table.

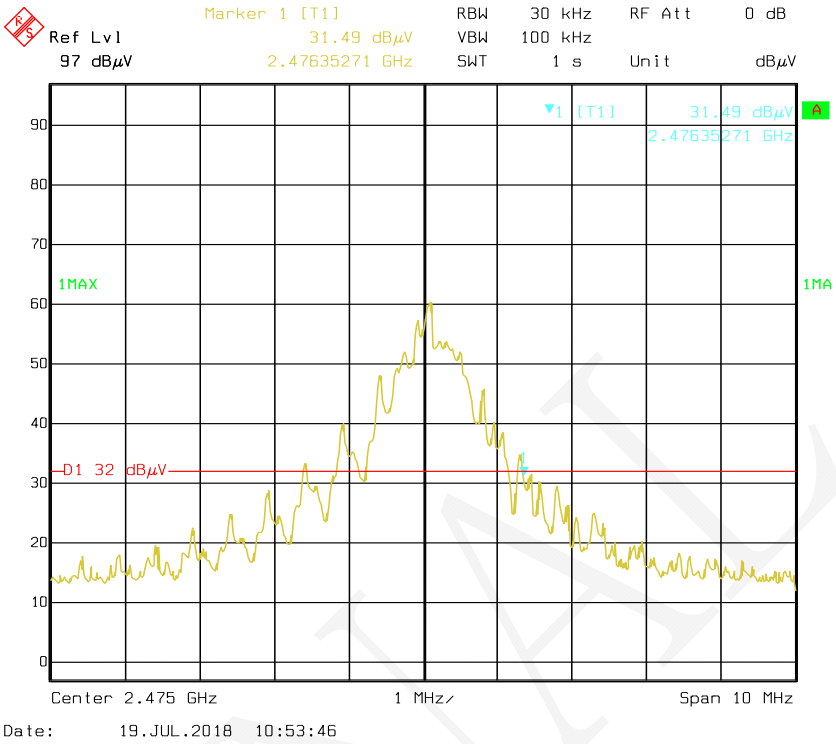
Operating frequency range:

Test Condition		**Frequency (MHz)**			
Temperature (℃)	**Voltage (V_{DC})**	**f_L**	**f_H**	**f_L Limit**	**f_H Limit**
-20	3.8	2414.4049	2476.3548	2400	2483.5
	4.5	2414.4066	2476.3573	2400	2483.5
25	3.8	2414.4115	2476.3563	2400	2483.5
	4.5	2414.4068	2476.3527	2400	2483.5
55	3.8	2414.4097	2476.3577	2400	2483.5
	4.5	2414.4042	2476.3554	2400	2483.5

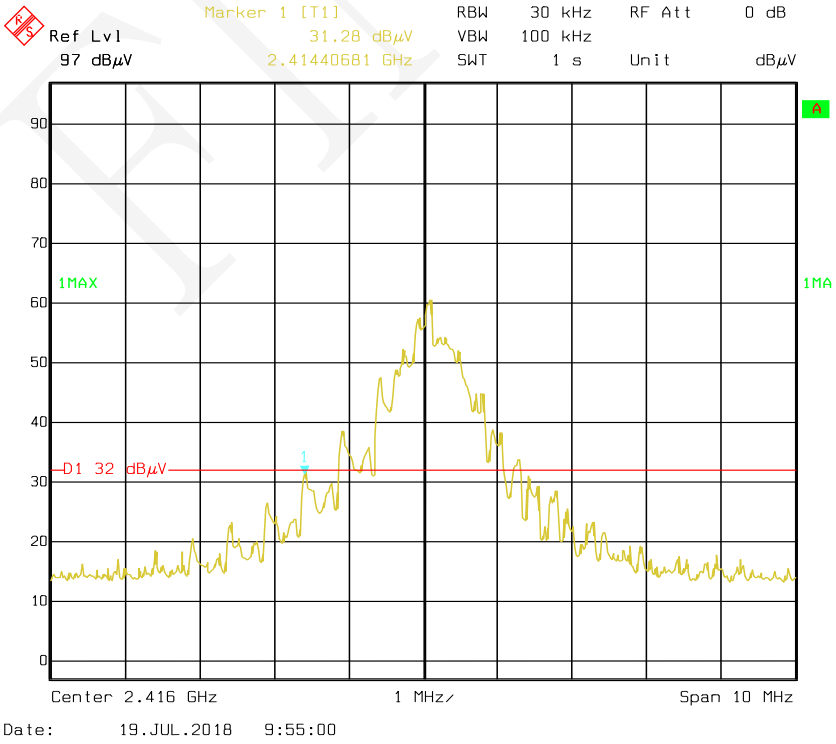
Note:62 dBuV corresponding to -30dBm when Substitution at radiated above 1G

Operating frequency range for normal condition:

High Channel, 2475 MHz



Low Channel, 2416 MHz

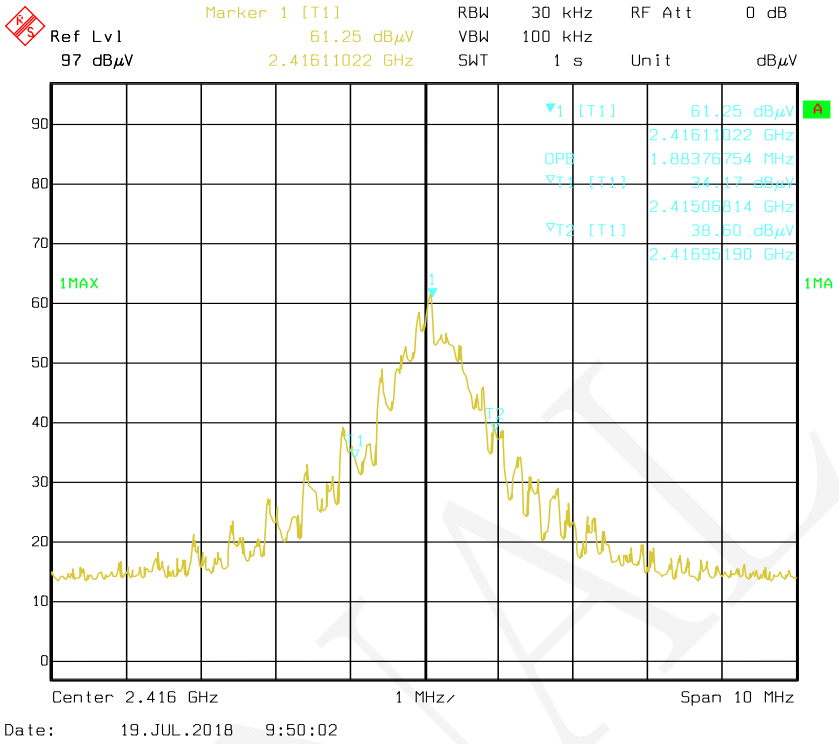


Occupied bandwidth:

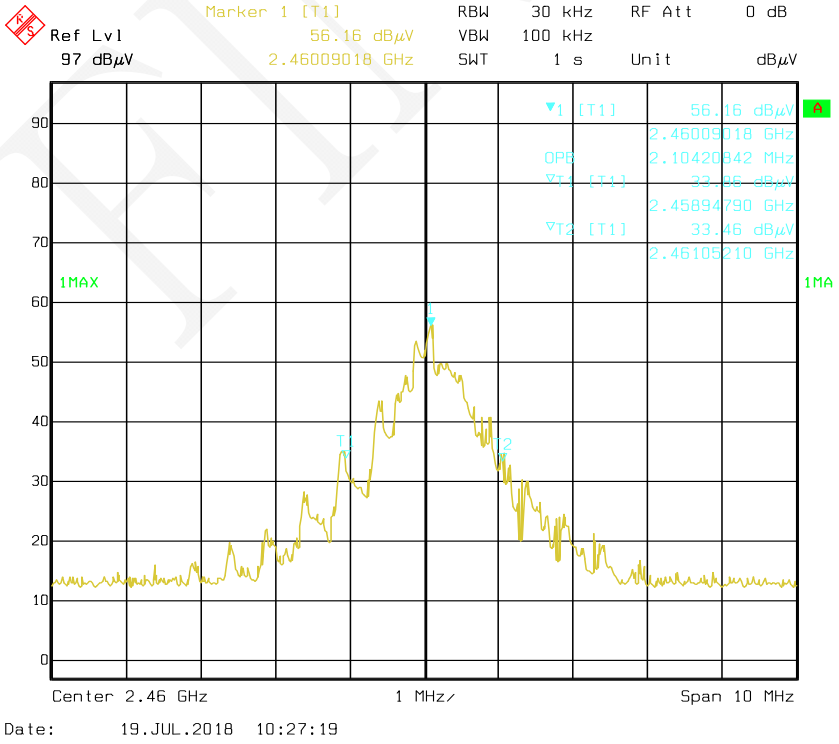
Test Condition			Frequency (MHz)			
Frequency (MHz)	Temperature (℃)	Voltage (V_{DC})	f_L	f_H	f_L Limit	f_H Limit
2408	-20	3.8	2415.0712	2416.9599	2400	2483.5
		4.5	2415.0673	2416.9609	2400	2483.5
	25	3.8	2415.0667	2416.9660	2400	2483.5
		4.5	2415.0681	2416.9619	2400	2483.5
	+55	3.8	2415.0689	2416.9636	2400	2483.5
		4.5	2415.0731	2416.9620	2400	2483.5
2440	-20	3.8	2458.9469	2461.0511	2400	2483.5
		4.5	2458.9455	2461.0539	2400	2483.5
	25	3.8	2458.9453	2461.0567	2400	2483.5
		4.5	2458.9479	2461.0521	2400	2483.5
	+55	3.8	2458.9488	2461.0550	2400	2483.5
		4.5	2458.9491	2461.0503	2400	2483.5
2470	-20	3.8	2473.9461	2476.0308	2400	2483.5
		4.5	2473.9481	2476.0322	2400	2483.5
	25	3.8	2473.9459	2476.0295	2400	2483.5
		4.5	2473.9479	2476.0321	2400	2483.5
	+55	3.8	2473.9508	2476.0293	2400	2483.5
		4.5	2473.9524	2476.0351	2400	2483.5

Occupied bandwidth for normal condition:

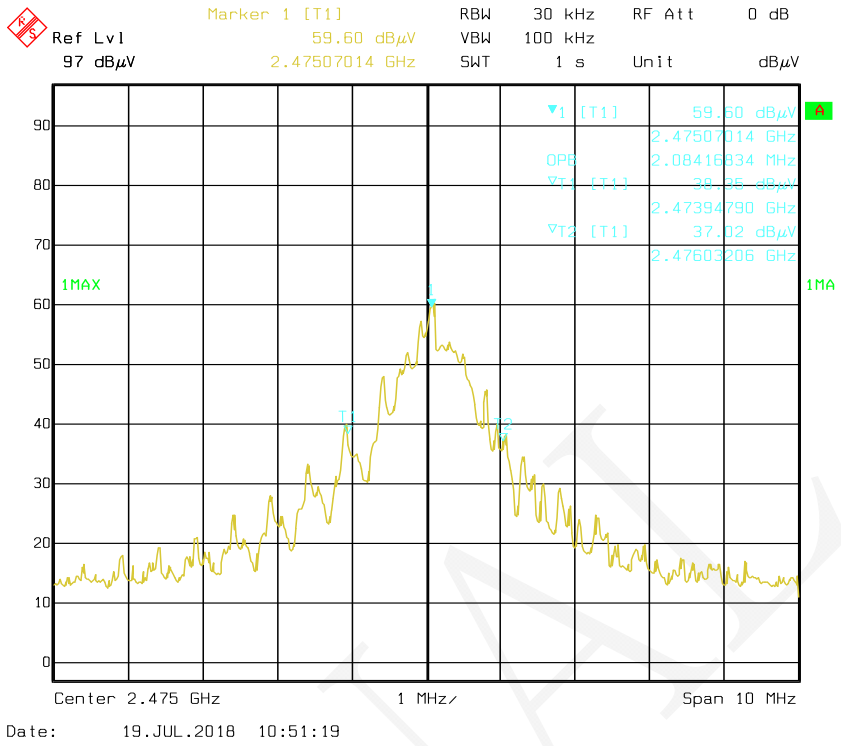
Low Channel 2416 MHz



Middle Channel 2446 MHz



High Channel 2475 MHz



ETSI EN 300 440 V2.1.1 (2017-03) § 4.2.4 – UNWANTED EMISSION IN THE SPURIOUS EMISSIONS DOMAIN

Applicable Standard

The level of spurious emissions shall be measured as either:

a)
i) their power level in a specified load (conducted emission); and
ii) their effective radiated power when radiated by the cabinet and structure of the equipment (cabinet radiation); or

b) their effective radiated power when radiated by the cabinet and the integral or dedicated antenna, in the case of equipment fitted with such an antenna and no permanent RF connector.

For measurements above 1 000 MHz the peak value shall be measured using a spectrum analyser. The "max hold" function of a spectrum analyser shall be used. For measurements up to 1 000 MHz the quasi-peak detector set in accordance with the specification of CISPR 16 [1], [2] and [3] shall be used.

The correction for RBW described in clause 5.8.5 is to be applied to the measured results as applicable.

The maximum power limits of any unwanted emissions in the spurious domain are given in table 3.

Table 3: Spurious emissions

Frequency ranges / State	47 MHz to 74 MHz 87,5 MHz to 108 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies ≤ 1 000 MHz	Frequencies > 1 000 MHz
Operating	4 nW	250 nW	1 µW
Standby	2 nW	2 nW	20 nW

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is 5.91 dB for 30MHz-1GHz.and 4.92 dB for above 1GHz, and it will not be taken into consideration for the test data recorded in the report.

EUT Setup

The radiated emission tests were performed in the 3-meter Chamber, using the setup accordance with ETSI EN 300 440. The specifications used were the ETSI EN 300 440 limits.

Spectrum Analyzer Setup

According to ETSI EN 300 440, the EUT was tested from 25 MHz to 25 GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	RBW	Video B/W	Detector
Below 30 MHz	10 kHz	30 kHz	Peak
30 MHz – 1000 MHz	100 kHz	300 kHz	Peak
Above 1 GHz	1 MHz	3 MHz	Peak

Test Procedure

1）Method of measurement cabinet spurious radiation

This method of measurement applies to transmitters having a permanent antenna connector. For equipment without a permanent antenna connector see clause 4.2.4.3.3.

Additional requirements for equipment employing FHSS modulation are given in clause 4.2.4.3.4.

a) A test site selected from annex B which fulfils the requirements of the specified frequency range of this measurement shall be used. The test antenna shall be oriented initially for vertical polarization and connected to a measuring receiver. The bandwidth of the measuring receiver shall be adjusted until the sensitivity of the measuring receiver, after allowing for the coupling loss, is at least 6 dB below the spurious emission limit given in table 3, see clause 4.2.4.4. This bandwidth shall be recorded in the test report.

The transmitter under test shall be placed on the support in its standard position, connected to an artificial antenna (see clause 5.8.2) and switched on without modulation. If modulation cannot be inhibited then the test shall be carried out with modulation, (see clause 5.8.1), and this fact shall be recorded in the test report.

b) For carrier frequencies in the range 1 GHz to 20 GHz the frequency of the measuring receiver shall be adjusted over the frequency range 25 MHz to 10 times the carrier frequency, not exceeding 40 GHz. For carrier frequencies above 20 GHz the measuring receiver shall be tuned over the range 25 MHz up to twice the carrier frequency, not exceeding 66 GHz, except for the channel on which the transmitter is intended to operate and for channelized systems, its adjacent channels. The frequency of each spurious emission detected shall be noted. If the test site is disturbed by interference coming from outside the site, this qualitative search may be performed in a screened room, with a reduced distance between the transmitter and the test antenna.

c) At each frequency at which an emission has been detected, the measuring receiver shall be tuned and the test antenna shall be raised or lowered through the specified height range until the maximum signal level is detected on the measuring receiver.

d) The transmitter shall be rotated through 360° about a vertical axis, to maximize the received signal.

e) The test antenna shall be raised or lowered again through the specified height range until a maximum is obtained. This level shall be noted.

f) The substitution antenna (see clause B.2.3) shall replace the transmitter antenna in the same position and in vertical polarization. It shall be connected to the signal generator.

g) At each frequency at which an emission has been detected, the signal generator, substitution antenna, and measuring receiver shall be tuned. The test antenna shall be raised or lowered through the specified height range until the maximum signal level is detected on the measuring receiver. The level of the signal generator giving the same signal level on the measuring receiver as in item e) shall be noted. After corrections due to the gain of the substitution antenna and the cable loss between the signal generator and the substitution antenna, is the radiated spurious emission at this frequency.

h) The frequency and level of each spurious emission measured and the bandwidth of the measuring receiver shall be recorded in the test report.

i) Steps c) to h) shall be repeated with the test antenna oriented in horizontal polarization.

j) If a user accessible power adjustment is provided then the tests in steps c) to h) shall be repeated at the lowest power setting available.

k) Steps c) to i) shall be repeated with the transmitter in the standby condition if this option is available.

2) Method of measurement radiated spurious emission

This method of measurement applies to transmitters having an integral antenna.

Additional requirements for equipment employing FHSS modulation are given in clause 4.2.4.3.4.

a) A test site selected from annex B which fulfils the requirements of the specified frequency range of this measurement shall be used. The test antenna shall be oriented initially for vertical polarization and connected to a measuring receiver, through a suitable filter to avoid overloading of the measuring receiver if required.
The bandwidth of the measuring receiver shall be adjusted until the sensitivity of the measuring receiver, after allowing for the coupling loss, is at least 6 dB below the spurious emission limit given in table 3, see clause 4.2.4.4. This bandwidth shall be recorded in the test report.

For the measurement of spurious emissions below the second harmonic of the carrier frequency the optional filter used shall be a high "Q" (notch) filter centred on the transmitter carrier frequency and attenuating this signal by at least 30 dB.

For the measurement of spurious emissions at and above the second harmonic of the carrier frequency the optional filter used shall be a high pass filter with a stop band rejection exceeding 40 dB. The cut-off frequency of the high pass filter shall be approximately 1,5 times the transmitter carrier frequency.

The transmitter under test shall be placed on the support in its standard position and shall be switched on without modulation. If modulation cannot be inhibited then the test shall be carried out with modulation (see clause 6.1) and this fact shall be recorded in the test report.

b) The same method of measurement as steps b) and k) of clause 4.2.4.3.2 shall be used.

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Nancy Wang on 2019-07-21.

Frequency (MHz)	Receiver Reading (dBμV)	TurnTable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	EN 300 440	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable loss (dB)	Antenna Gain (dBi)		Limit (dBm)	Margin (dB)
Test Mode: Transmitting										
2416 MHz										
223.47	33.42	101	1.6	H	-63.6	0.30	0	-63.90	-54	9.90
223.47	33.39	98	1.8	V	-63.6	0.30	0	-63.90	-54	9.90
4832.00	50.91	5	1.9	H	-48.9	1.60	12.10	-38.40	-30	8.40
4832.00	50.12	336	1.8	V	-48.6	1.60	12.10	-38.10	-30	8.10
2460 MHz										
223.47	33.98	275	2.2	H	-63.0	0.30	0	-63.30	-54	9.30
223.47	32.44	242	2.4	V	-64.6	0.30	0	-64.90	-54	10.90
4920.00	49	143	1.8	H	-49.9	1.60	12.10	-39.40	-30	9.40
4920.00	47.91	108	2.1	V	-51.3	1.60	12.10	-40.80	-30	10.80
2475 MHz										
223.47	33.72	227	2.2	H	-63.3	0.30	0	-63.60	-54	9.60
223.47	32.60	159	1.0	V	-64.4	0.30	0	-64.70	-54	10.70
4950.00	47.53	267	1.4	H	-50.7	1.70	12.00	-40.40	-30	10.40
4950.00	46.53	242	1.9	V	-51.1	1.70	12.00	-40.80	-30	10.80
Test Mode: Standby										
213.54	30.81	140	1.5	H	-66.2	0.30	0	-66.50	-57	9.50
213.54	31.85	98	2.5	V	-65.1	0.30	0	-65.40	-57	8.40
1352.84	41.31	175	1.8	H	-66.6	1.60	8.30	-59.90	-47	12.90
1352.84	41.24	4	1.3	V	-67.0	1.60	8.30	-60.30	-47	13.30

Note:
1) Absolute Level = SG Level - Cable Loss + Antenna Gain
2) Margin = Limit - Absolute Level

ETSI EN 300 440 V2.1.1 (2017-03) §4.3.5– RECEIVER SPURIOUS RADIATIONS

Applicable Standard

For measurements above 1 000 MHz the peak value shall be measured using a spectrum analyser. The "max hold" function of a spectrum analyser shall be used. For measurements up to 1 000 MHz the quasi-peak detector set in accordance with the specification of CISPR 16 [1], [2] and [3] shall be used.

EUT Setup

The radiated emission tests were performed in the 3-meter Chamber, using the setup accordance with ETSI EN 300 440. The specifications used were the ETSI EN 300 440 limits.

Spectrum Analyzer Setup

According to ETSI EN 300 440, the EUT was tested from 25 MHz to 40 GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	RBW	Video B/W	Detector
Below 30 MHz	10 kHz	30 kHz	Peak
30 MHz – 1000 MHz	100 kHz	300 kHz	Peak
Above 1 GHz	1 MHz	3 MHz	Peak

Test Procedure

1) Method of measurement conducted spurious components

This method of measurement applies to receivers having a permanent antenna connector.

A test load, 50Ω power attenuator, may be used to protect the measuring receiver (see clause 6.5) against damage when testing a receiver combined in one unit with a transmitter.

The measuring receiver used shall have sufficient dynamic range and sensitivity to achieve the required measurement accuracy at the specified limit. The bandwidth of the measuring receiver shall be adjusted until the sensitivity of the measuring receiver is at least 6 dB below the spurious emission limit given in clause 4.3.5.4. This bandwidth shall be recorded in the test report:

a) The receiver input terminals shall be connected to a measuring receiver having an input impedance of 50 Ω and the receiver is switched on.

b) For carrier frequencies in the range 1 GHz to 20 GHz the frequency of the measuring receiver shall be adjusted over the frequency range 25 MHz to 10 times the carrier frequency, not exceeding 40 GHz. For carrier frequencies above 20 GHz the measuring receiver shall be tuned over the range 25 MHz up to twice the carrier frequency not exceeding 66 GHz. The frequency and the absolute power level of each of the spurious components found shall be noted.

c) If the detecting device is not calibrated in terms of power input, the level of any detected components shall be determined by replacing the receiver by the signal generator and adjusting it to reproduce the

frequency and level of every spurious component noted in step b). The absolute power level of each spurious component shall be noted.

d) The frequency and level of each spurious emission measured and the bandwidth of the measuring receiver shall be recorded in the test report.

2) Method of measurement cabinet radiation

This method of measurement applies to receivers having a permanent antenna connector.

a) A test site selected from annex B which fulfils the requirements of the specified frequency range of this measurement shall be used. The test antenna shall be oriented initially for vertical polarization and connected to a measuring receiver. The bandwidth of the measuring receiver shall be adjusted until the sensitivity of the measuring receiver is at least 6 dB below the spurious emission limit given in clause 4.3.5.4. This bandwidth shall be recorded in the test report.

The receiver under test shall be placed on the support in its standard position and connected to an artificial antenna, see clause 5.8.2.

b) For carrier frequencies in the range 1 GHz to 20 GHz the frequency of the measuring receiver shall be adjusted over the frequency range 25 MHz to 10 times the carrier frequency, not exceeding 40 GHz. For carrier frequencies above 20 GHz the measuring receiver shall be tuned over the range 25 MHz up to twice the carrier frequency not exceeding 66 GHz. The frequency of each spurious component shall be noted. If the test site is disturbed by radiation coming from outside the site, this qualitative search may be performed in a screened room with reduced distance between the transmitter and the test antenna.

c) At each frequency at which a component has been detected, the measuring receiver shall be tuned and the test antenna shall be raised or lowered through the specified height range until the maximum signal level is detected on the measuring receiver.

d) The receiver shall be rotated up to 360° about a vertical axis, to maximize the received signal.

e) The test antenna shall be raised or lowered again through the specified height range until a maximum is obtained. This level shall be noted.

f) The substitution antenna (see clause B.3.2) shall replace the receiver antenna in the same position and in vertical polarization. It shall be connected to the signal generator.

g) At each frequency at which a component has been detected, the signal generator, substitution antenna and measuring receiver shall be tuned. The test antenna shall be raised or lowered through the specified height range until the maximum signal level is detected on the measuring receiver. The level of the signal generator giving the same signal level on the measuring receiver as in step e) shall be noted. This level, after correction due to the gain of the substitution antenna and the cable loss, is the radiated spurious component at this frequency.

h) The frequency and level of each spurious emission measured and the bandwidth of the measuring receiver shall be recorded in the test report.

i) Measurements b) to h) shall be repeated with the test antenna oriented in horizontal polarization.

3) Method of measurement radiated spurious components

This method of measurement applies to receivers having an integral antenna.

a) A test site selected from annex B which fulfils the requirements of the specified frequency range of this measurement shall be used. The test antenna shall be oriented initially for vertical polarization and connected to a measuring receiver. The bandwidth of the measuring receiver shall be adjusted until the sensitivity of the measuring receiver is at least 6 dB below the spurious emission limit given in clause 4.3.5.4. This bandwidth shall be recorded in the test report.

The receiver under test shall be placed on the support in its standard position.

b) The same method of measurement as items b) to i) of clause 4.3.5.3.2 shall apply.

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Nancy Wang on 2019-07-21.

Test mode: Receiving

Frequency (MHz)	Receiver Reading (dBμV)	TurnTable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	EN 300 440	
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable loss (dB)	Antenna Gain (dBi)		Limit (dBm)	Margin (dB)
254.91	30.10	262	1.5	H	-66.9	0.32	0	-67.22	-57	10.22
254.91	31.67	313	2.5	V	-65.3	0.32	0	-65.62	-57	8.62
1264.87	40.37	121	1.1	H	-67.8	1.60	7.60	-61.80	-47	14.80
1264.87	41.80	18	1.1	V	-66.3	1.60	7.60	-60.30	-47	13.30

Note:
1) Absolute Level = SG Level - Cable Loss + Antenna Gain
2) Margin = Limit - Absolute Level

EXHIBIT A - PRODUCT CE LABELING

Proposed CE Label Format

Specification: The marking set out above must be affixed to the apparatus or to its data plate and have a minimum height of 5 mm. The elements should be easily readable and indelible. They may be placed anywhere on the apparatus case or in its battery compartment. No tool should be needed to view the marking

Proposed Label Location on EUT

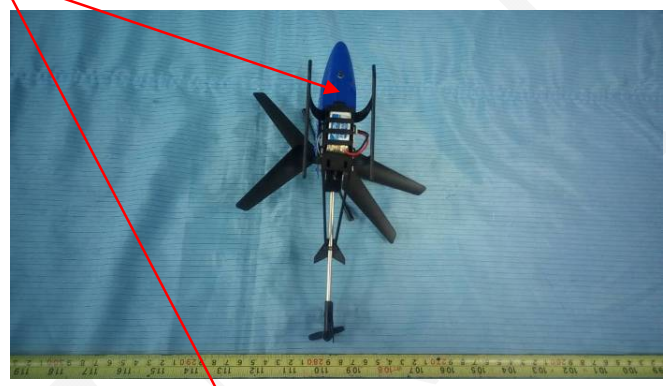
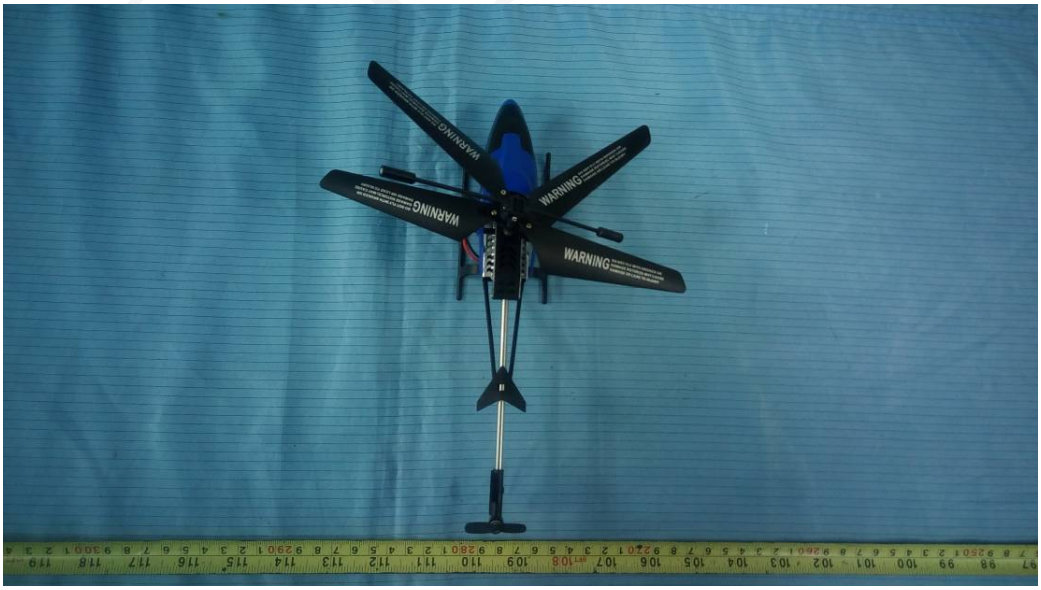


EXHIBIT B - EUT PHOTOGRAPHS

EUT – All View

For plane

EUT – Front View



EUT – Rear View

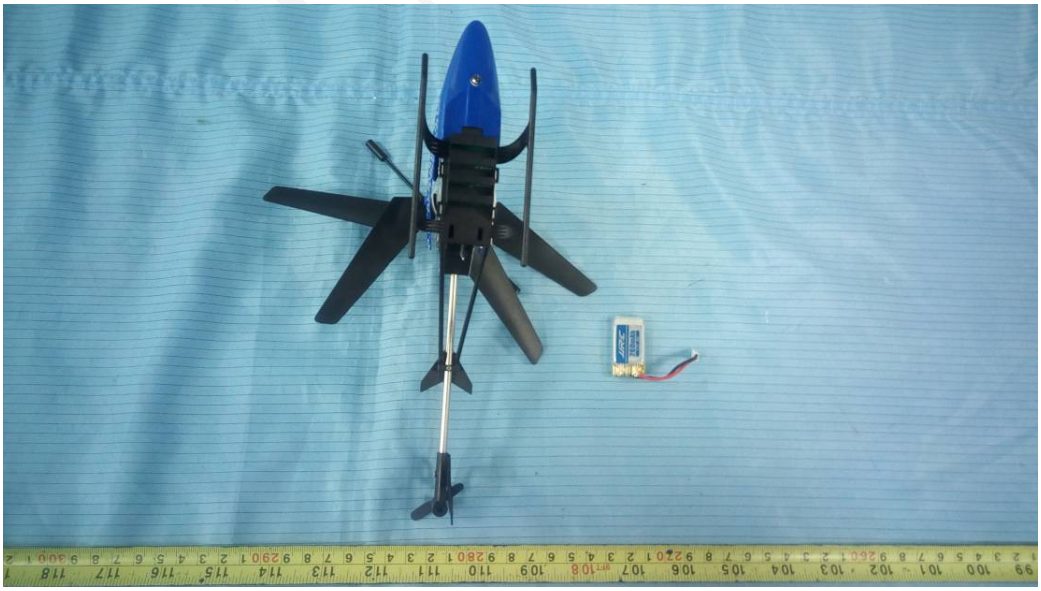
EUT – Top View

EUT – Bottom View

EUT – Left View

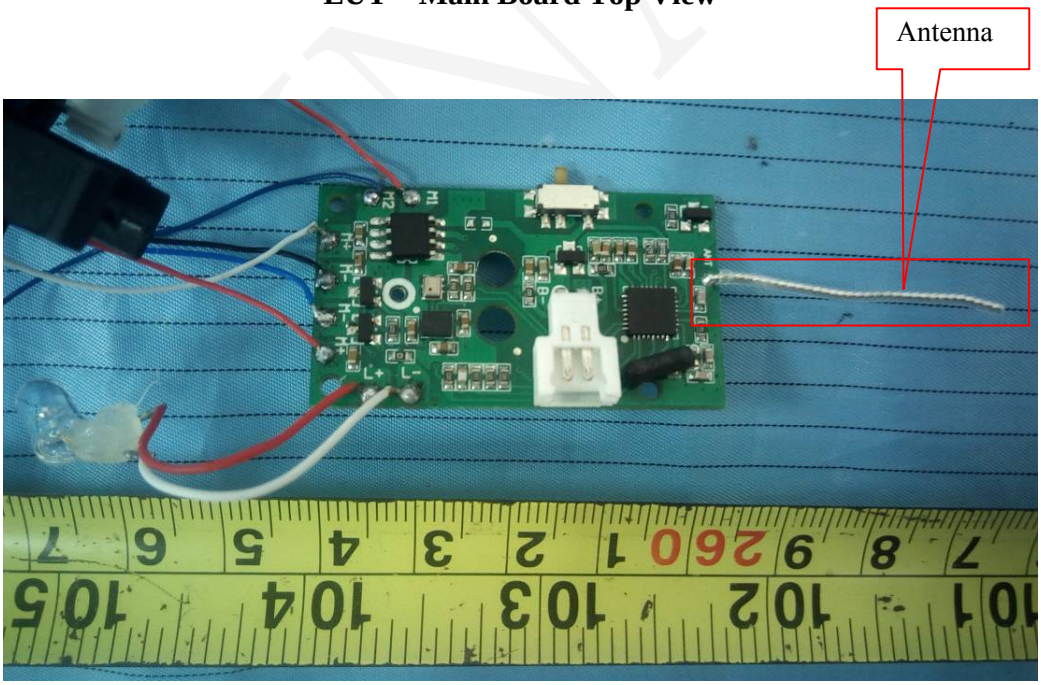
EUT – Right View

EUT – Cover off View 1

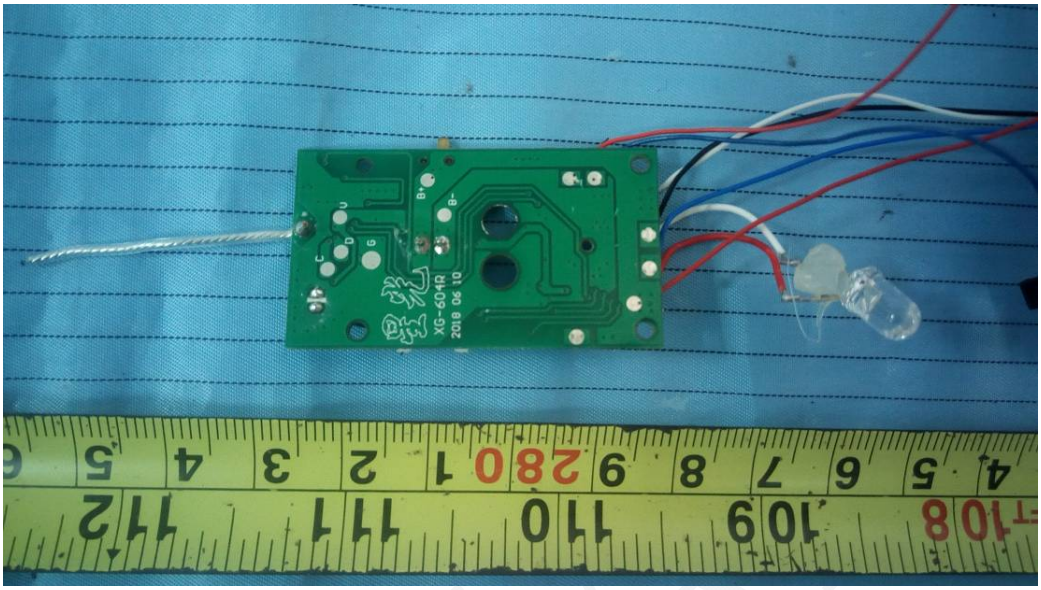


EUT – Cover off View 2

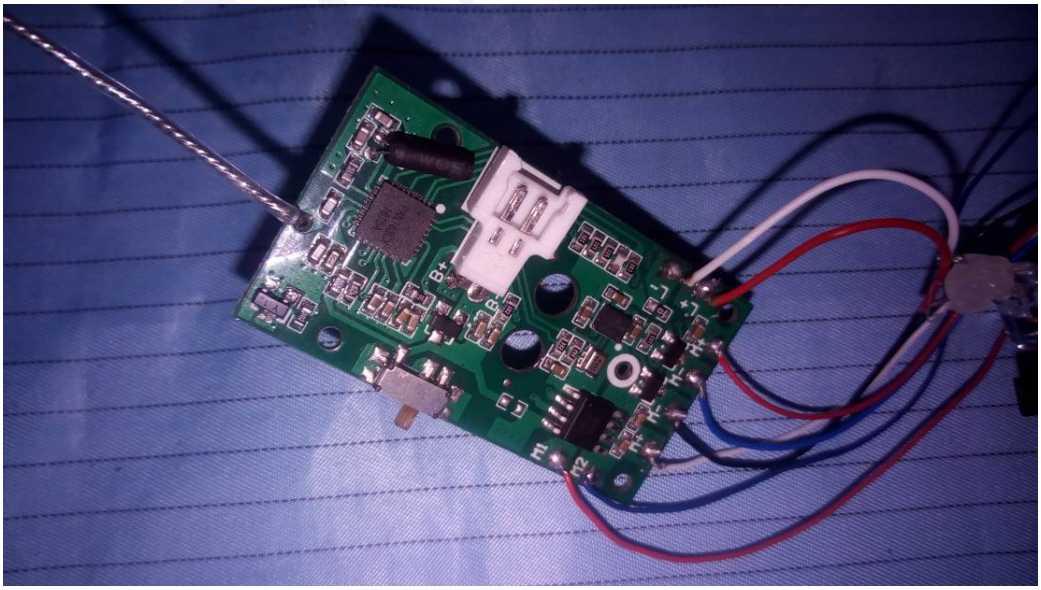
EUT – Main Board Top View



EUT –Main Board Bottom View

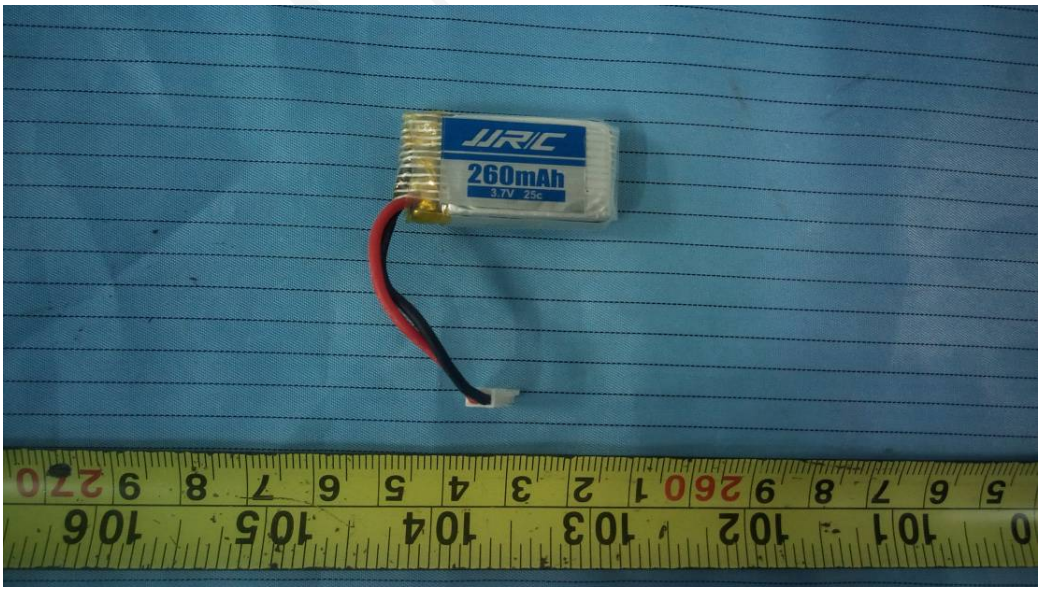


EUT – IC Chip View



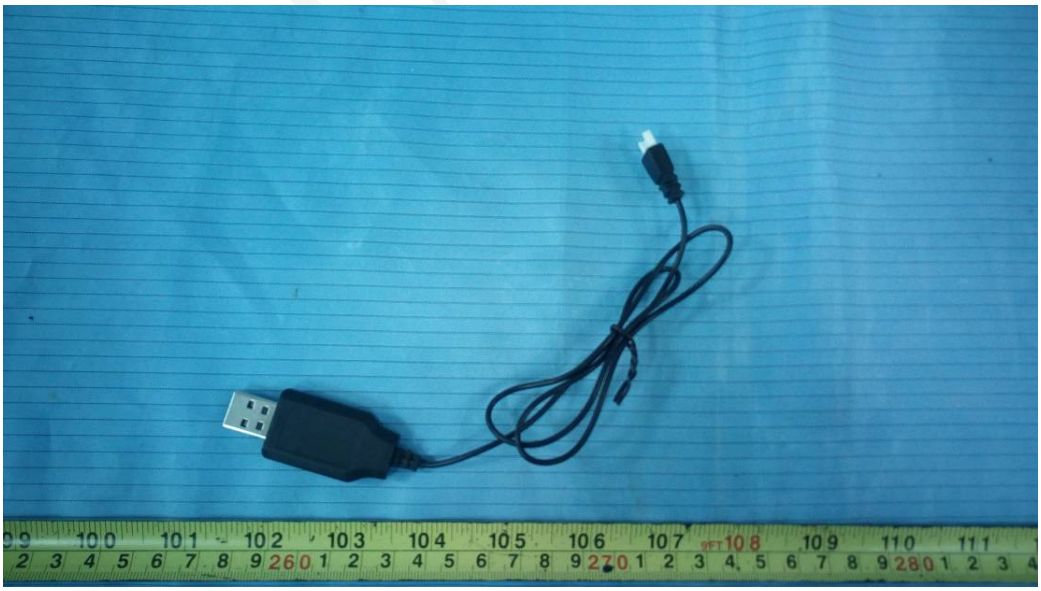
EUT – Battery Top View

EUT – Battery Bottom View

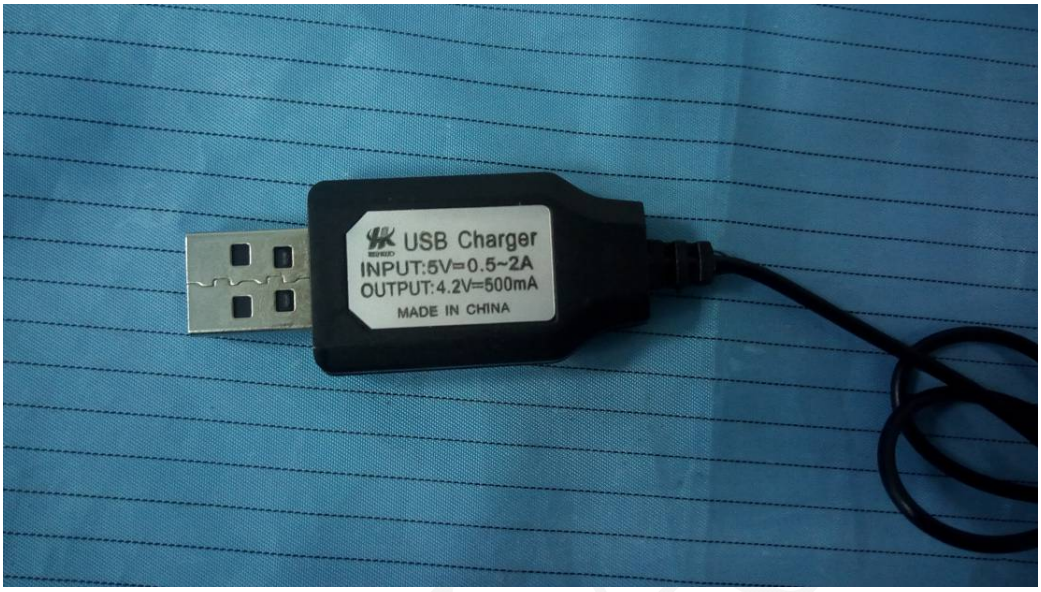


EUT –USB Charger Top View

EUT –USB Charger Bottom View



EUT – USB Charger Label View



For remote control

EUT – Front View

EUT – Rear View

EUT – Top View

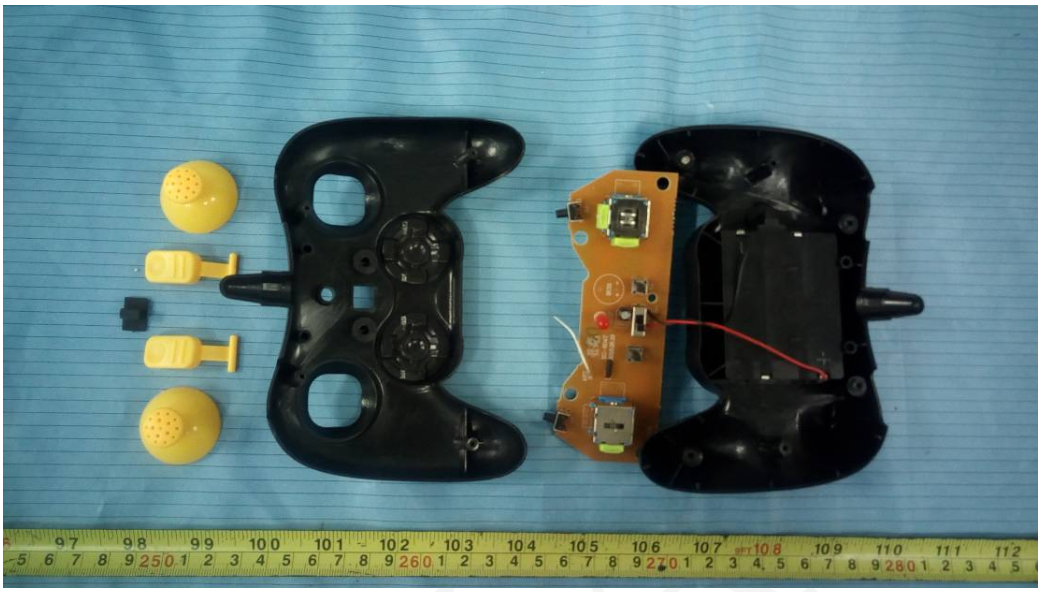
EUT – Bottom View

EUT – Left View

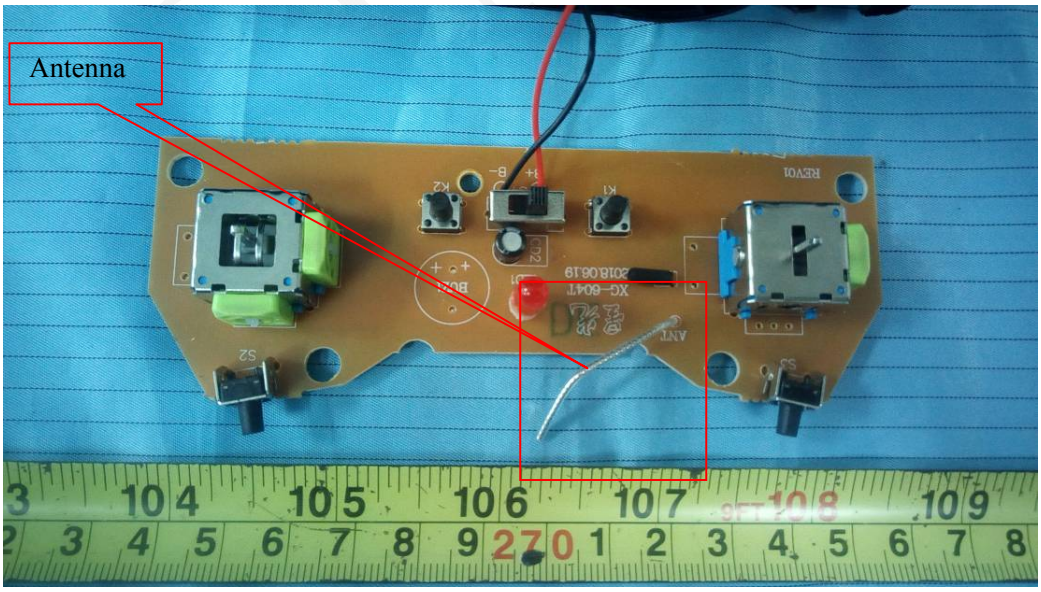
EUT – Right View

EUT – Cover off View 1

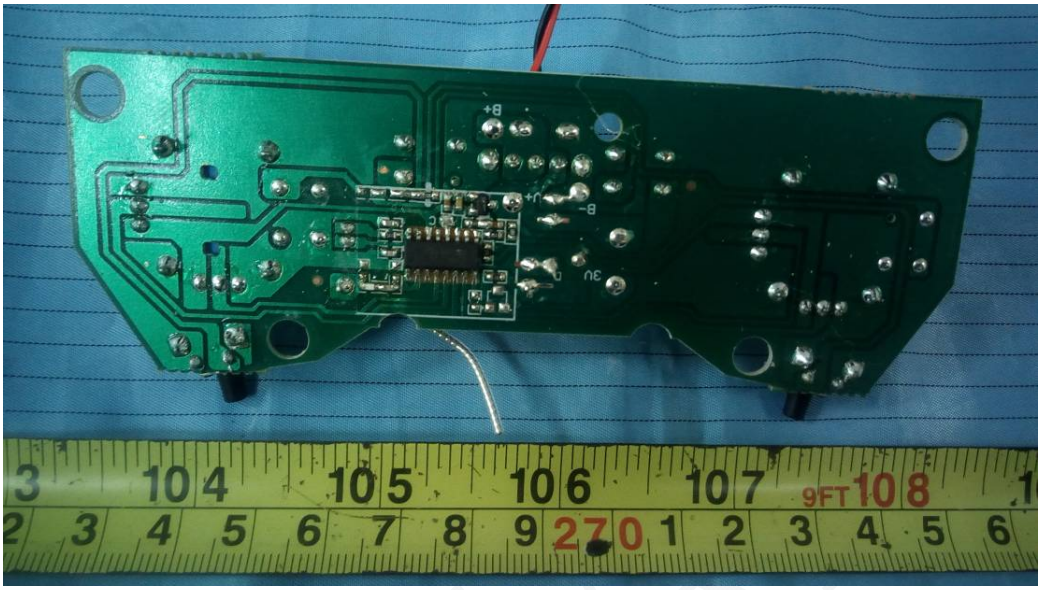
EUT – Cover off View 2



EUT – Main Board Top View



EUT –Main Board Bottom View



EUT – IC Chip View

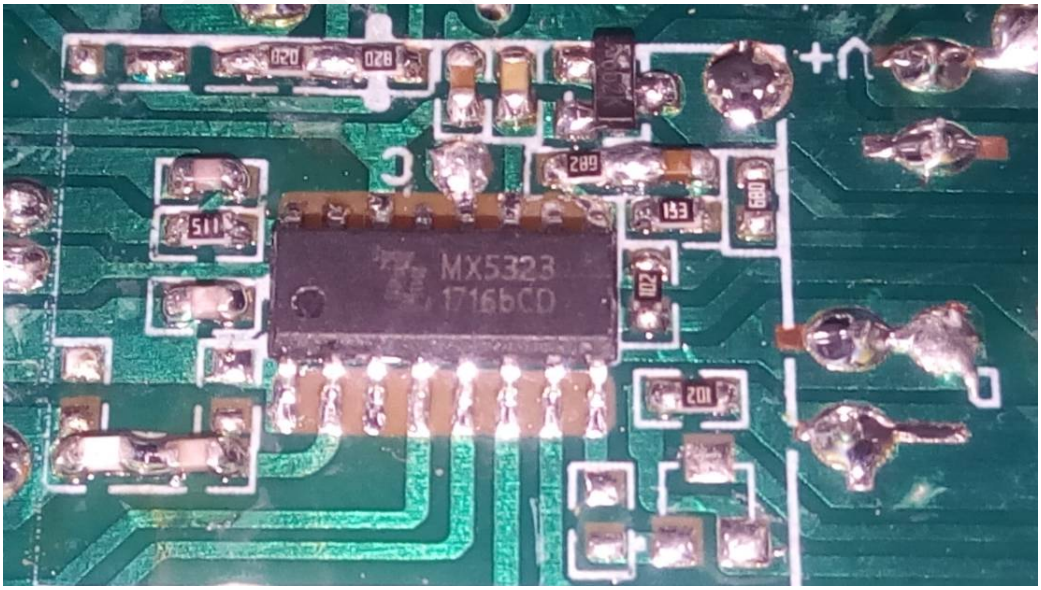


EXHIBIT C - TEST SETUP PHOTOGRAPHS

For plane

Radiated Spurious Emissions Test View (Below 1GHz)

Radiated Spurious Emissions Test View (Above 1GHz)

For remote control

Radiated Spurious Emissions Test View (Below 1GHz)

Radiated Spurious Emissions Test View (Above 1GHz)

PRODUCT SIMILARITY DECLARATION LETTER

COOLER STUFF CO., LIMITED
CHENGHAI DISTRICT,SHANTOU CITY,GUANGDONG PROVINCE,CHINA

07/15/2018

Product Similarity Declaration

To Whom It May Concern,

We, COOLER STUFF CO., LIMITED hereby declare that we have a product named as 2.4G RC HELICOPTER (Model number: CS037539) was tested by BACL, meanwhile, for our marketing purpose, we would like to list a series models (JX01,WX800,WX500,9527,888,866) on reports and certificate, all the models are electrically identical, only the color is different. No other changes are made to them.

We confirm that all information above is true, and we'll be responsible for all the consequences. Please contact me if you have any question.

Signature: Carl

Print Name: Carl

Title: Sales Manager

******* END OF REPORT *******