ETSI EN 301 489-1 V2.2.0 (2017-03)
ETSI EN 301 489-3 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: RSZ180717810-02

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 test report is prepared on behalf of DONGHUANG TOYS FACTORY in accordance with ETSI EN 301 489-3 V2.1.1 (2017-03), ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU.

The objective is to determine compliance with ETSI EN 301 489-3 V2.1.1 (2017-03).

Test Methodology

All measurements contained in this report were conducted with ETSI EN 301 489-1 V2.2.0 (2017-03).

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 test at Bay Area Compliance Laboratories Corp. (Shenzhen) is shown as below. And the uncertainty will be taken into consideration for the test data recorded in the report

Item			Expanded Measurement uncertainty
Conducted Emissions	AC Mains		2.20 dB (k=2, 95% level of confidence)
Radiated emission	30MHz~200MHz	Horizontal	4.58 dB (k=2, 95% level of confidence)
		Vertical	4.59 dB (k=2, 95% level of confidence)
	200MHz~1 GHz	Horizontal	4.83 dB (k=2, 95% level of confidence)
		Vertical	5.85 dB (k=2, 95% level of confidence)
	1 GHz~6 GHz	Horizontal/Vertical	4.08 dB (k=2, 95% level of confidence)
	Above 6 GHz	Horizontal/Vertical	4.59 dB (k=2, 95% level of confidence)

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a typical fashion (as normally used by a typical user)

Equipment Modifications

No modifications were made to the EUT.

Support Equipment List and Details

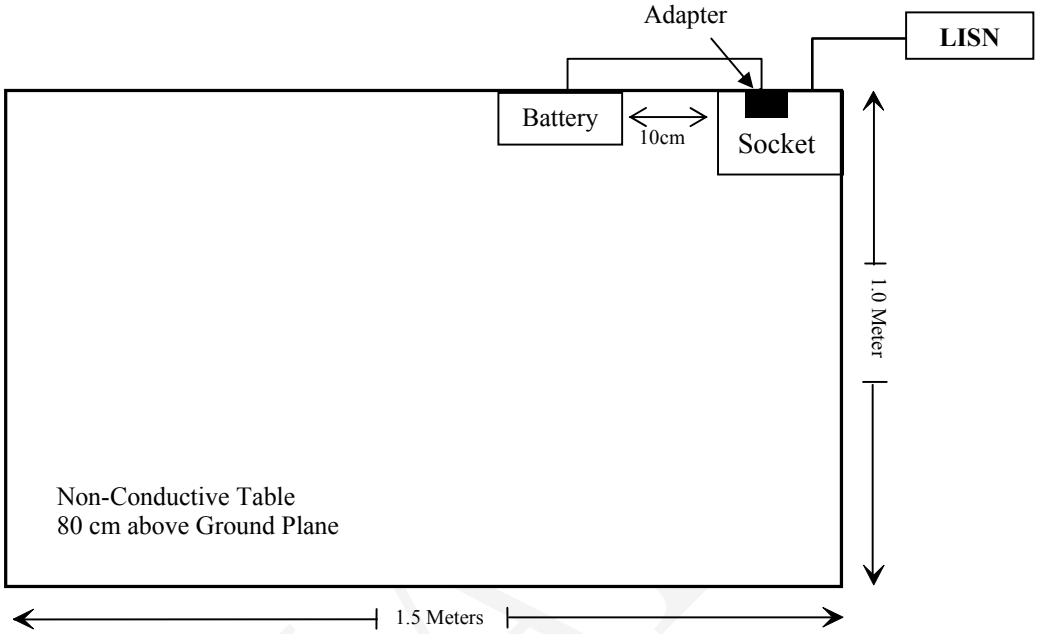
Manufacturer	Description	Model	Serial Number
N/A	Battery	N/A	N/A
SHENZHEN SAMSON POWER	Adapter	SC/10WC050200EU	N/A

External I/O Cable

Cable Description	Length (m)	From Port	To
Un-Shielding Detachable USB Charger	0.6	Adapter	Battery

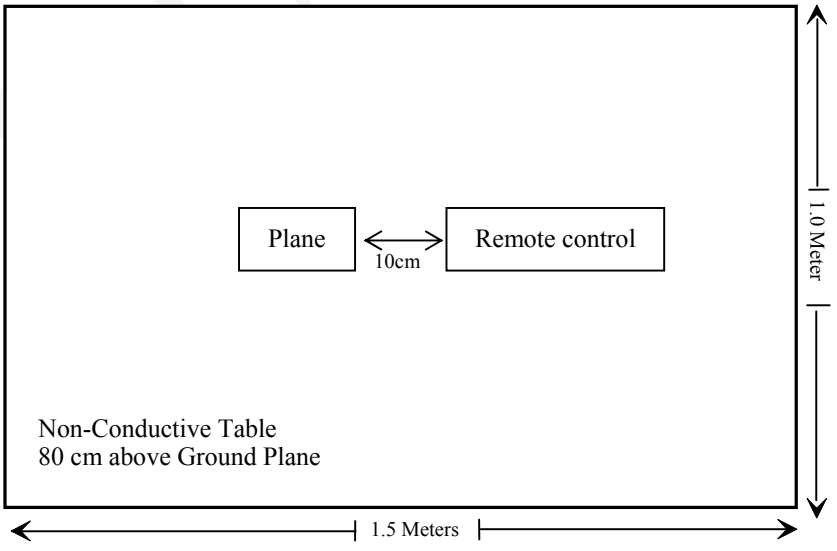
Block Diagram of Test Setup

For Conducted Emissions:
Test Mode: Charging



For Radiated Emissions:

Test Mode: Working



SUMMARY OF TEST RESULTS

Rules	Description of Test	Result
§7.1	Reference to clauses EN 301 489-1 §8.4 AC mains power input/output ports	Compliance
	Reference to clauses EN 301 489-1 §8.3 DC power input/output ports	Not Applicable
	Reference to clauses EN 301 489-1 §8.2 Enclosure port of ancillary equipment measured on a stand alone basis	Compliance
	Reference to clauses EN 301 489-1 §8.5 Harmonic current emissions (AC mains input port)	Compliance
	Reference to clauses EN 301 489-1 §8.6 Voltage fluctuations and flicker (AC mains input port)	Compliance
	Reference to clauses EN 301 489-1 §8.7 Wired network ports	Not Applicable
§7.2	Reference to clauses EN 301 489-1 §9.2 Radio frequency electromagnetic field (80 MHz to 6000 MHz) (EN 61000-4-3)	Compliance
	Reference to clauses EN 301 489-1 §9.3 Electrostatic discharge (EN 61000-4-2)	Compliance
	Reference to clauses EN 301 489-1 §9.4 Fast transients, common mode (EN 61000-4-4)	Compliance
	Reference to clauses EN 301 489-1 §9.5 Radio frequency, common mode (EN 61000-4-6)	Compliance
	Reference to clauses EN 301 489-1 §9.6 Transients and surges in the vehicular environment (ISO 7637-2)	Not Applicable
	Reference to clauses EN 301 489-1 §9.8 Surges (EN 61000-4-5)	Compliance
	Reference to clauses EN 301 489-1 §9.7 Voltage dips and interruptions (EN 61000-4-11)	Compliance

Not Applicable: Please refer to Applicability overview tables in sections 7.1 and 7.2 of EN 301 489-1 requirements for Radio and ancillary equipment.

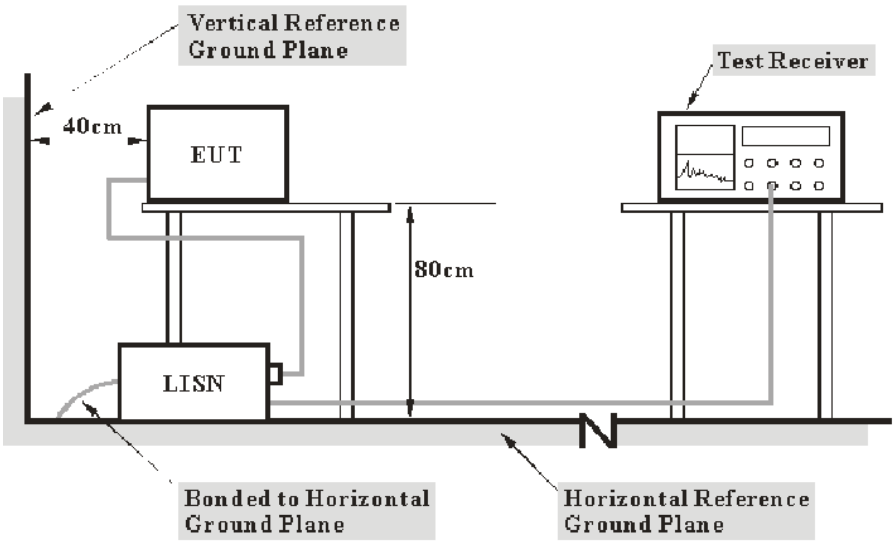
TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EMI					
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2017-08-04	2018-08-04
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2017-12-21	2018-12-21
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2018-05-21	2018-11-19
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
HP	Amplifier	HP8447E	1937A01046	2018-05-21	2018-11-19
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2018-01-11	2019-01-11
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2017-12-22	2020-12-21
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
A.H.System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Rohde & Schwarz	Auto test Software	EMC32	V9.10	NCR	NCR
EM Test	Harmonic/Flicker Analyzer	DPA 500N	V0939105176	2018-01-11	2019-01-11
EM Test	AC Source	ACS500	303276	2018-01-11	2019-01-11
EM Test	Test Software	DPA. Control	V5.0.3.0	NCR	NCR
EMS					
TESEQ	ESD Tester	NSG 438	1476	2018-07-15	2019-07-15
EM Test	EMS Combination Tester	UCS 500 N5	V0939105172	2017-12-21	2018-12-21
EM Test	AC Source	MV2616	V0939105173	2017-12-06	2018-12-06
EM Test	Test Software	IEC. Control	V5.0.9.0	NCR	NCR
Krohn-hite	Audio Filter	3940	003096	NCR	NCR
BACL	Sound detecting Holder	N/A	N/A	NCR	NCR
Rohde & Schwarz	Audio Analyzer	UPV	1146.2003K02-101782-XP	2018-07-17	2019-07-17
Agilent	Signal Generator	8665B	3744A01692	2018-07-21	2019-07-21
A&R	Power Amplifier	500W100B	0348446	NCR	NCR
A&R	Power Amplifier	60S1G6	0348712	NCR	NCR
EMCO	Horn Antenna	3115	9903-5766	NCR	NCR
A&R	Antenna	ATL80M1G	348837	NCR	NCR
/	6dB Attenuator	/	/	NCR	NCR
HP	Signal Generator	8657A	3217A04699	NCR	NCR
A&R	RF Power Amplifier	15A250	13444	NCR	NCR
COM-POWER	CDN	CDN M325E	521145	2018-02-27	2019-02-27

*** 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).

§7.1 - CONDUCTED EMISSIONS

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per EN 301 489-1 measurement procedures. The specification used was with the EN 301 489-1 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the EN 301 489-1,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

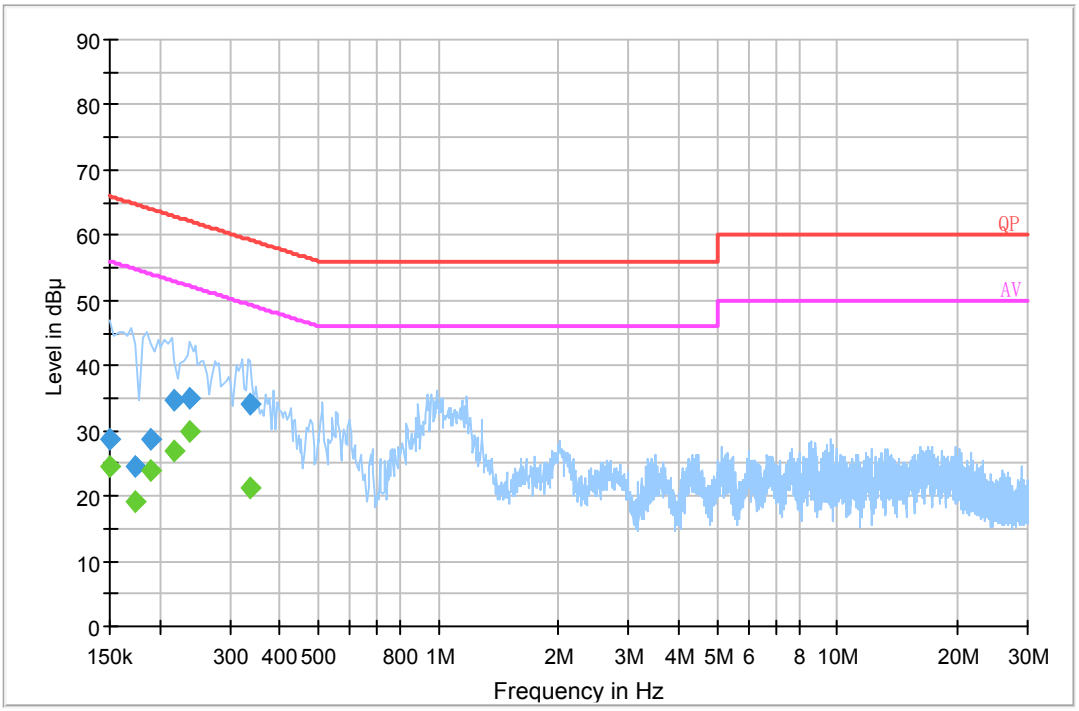
Environmental Conditions

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

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

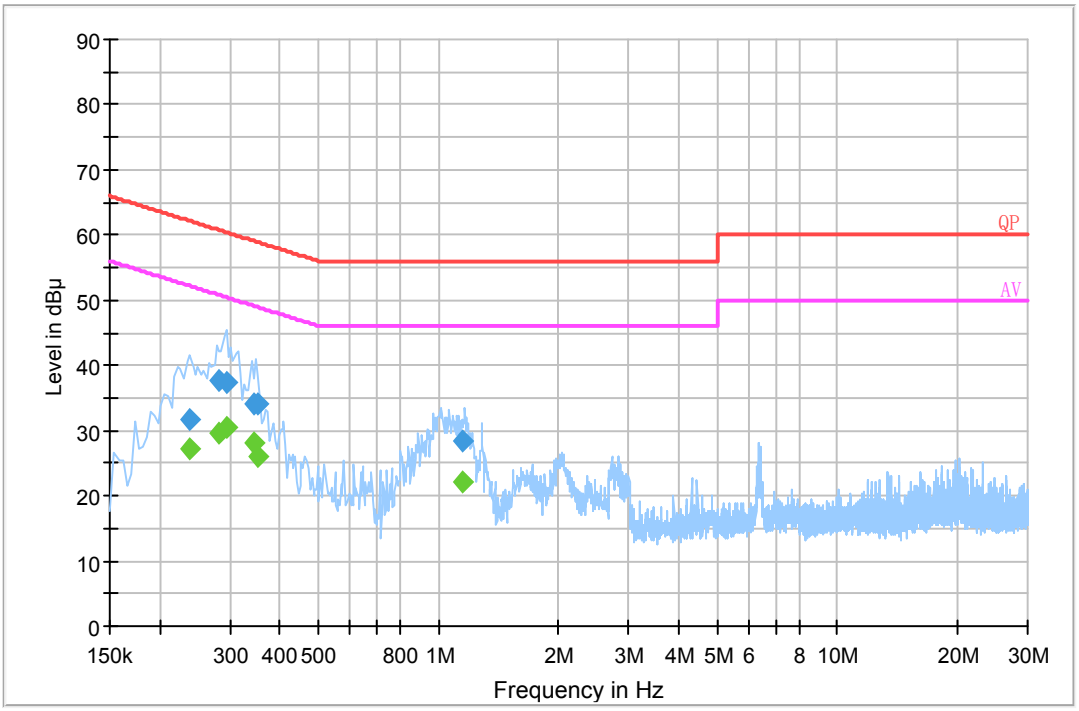
Test Mode: Charging

AC 230 V/ 50 Hz, Line:



Frequency (MHz)	Corrected Amplitude (dBµV)	Corrected Factor (dB)	Limit (dBµV)	Margin (dB)	Remark (PK/ QP/Ave.)
0.150000	28.6	20.1	66.0	37.4	QP
0.174500	24.4	20.1	64.7	40.3	QP
0.190501	28.8	20.1	64.0	35.2	QP
0.217500	34.7	20.1	62.9	28.2	QP
0.237500	35.1	20.1	62.2	27.1	QP
0.339010	34.1	20.1	59.2	25.1	QP
0.150000	24.6	20.1	56.0	31.4	Ave.
0.174500	19.1	20.1	54.7	35.6	Ave.
0.190501	23.8	20.1	54.0	30.2	Ave.
0.217500	26.8	20.1	52.9	26.1	Ave.
0.237500	29.8	20.1	52.2	22.4	Ave.
0.339010	21.3	20.1	49.2	27.9	Ave.

AC 230 V/ 50 Hz, Neutral:

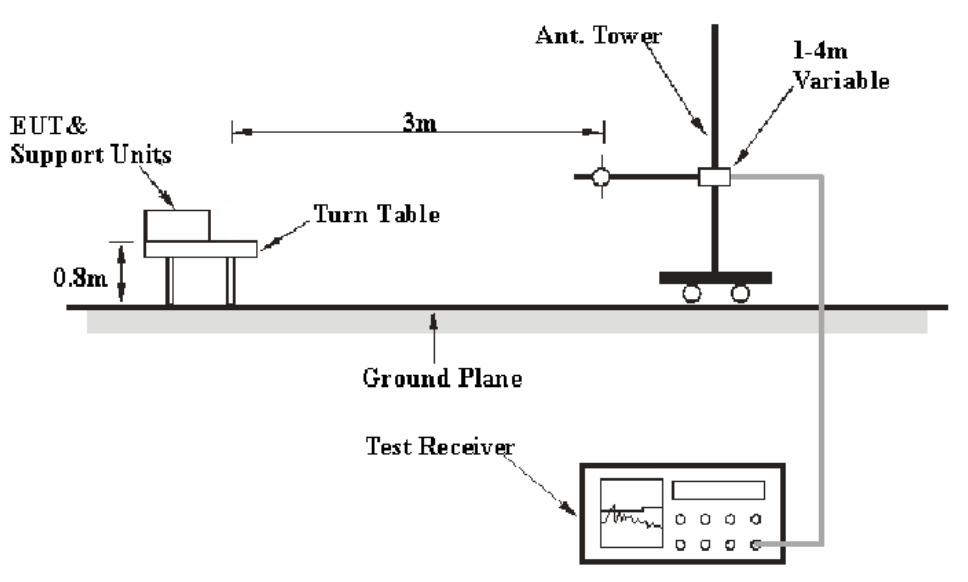


Frequency (MHz)	Corrected Amplitude (dBµV)	Corrected Factor (dB)	Limit (dBµV)	Margin (dB)	Remark (PK/ QP/Ave.)
0.237500	31.8	20.1	62.2	30.4	QP
0.282500	37.5	20.1	60.7	23.2	QP
0.293500	37.3	20.1	60.4	23.1	QP
0.344750	34.1	20.1	59.1	25.0	QP
0.352690	34.1	20.1	58.9	24.8	QP
1.152510	28.4	20.0	56.0	27.6	QP
0.237500	27.2	20.1	52.2	25.0	Ave.
0.282500	29.5	20.1	50.7	21.2	Ave.
0.293500	30.6	20.1	50.4	19.8	Ave.
0.344750	28.2	20.1	49.1	20.9	Ave.
0.352690	25.9	20.1	48.9	23.0	Ave.
1.152510	22.1	20.0	46.0	23.9	Ave.

Note:
1) Correction Factor =LISN/ISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
2) Corrected Amplitude = Reading + Correction Factor
3) Margin = Limit – Corrected Amplitude

§7.1 - RADIATED EMISSIONS

Test System Setup



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the CISPR 16-1-4:2012, CISPR 16-2-3:2010. The limit was specified in EN 301 489-1.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 6 GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
1 GHz – 6 GHz	1 MHz	3 MHz	-	Peak
1 GHz – 6 GHz	1 MHz	Reduce Video Bandwidth	-	Peak

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in the Quasi-peak detection mode for below 1 GHz, and Peak and Average for above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit for Class B. The equation for margin calculation is as follows:

Margin = Limit –Corrected Amplitude.

Test Results Summary

According to the recorded data in following table, the EUT complied with the EN 301 489-1,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

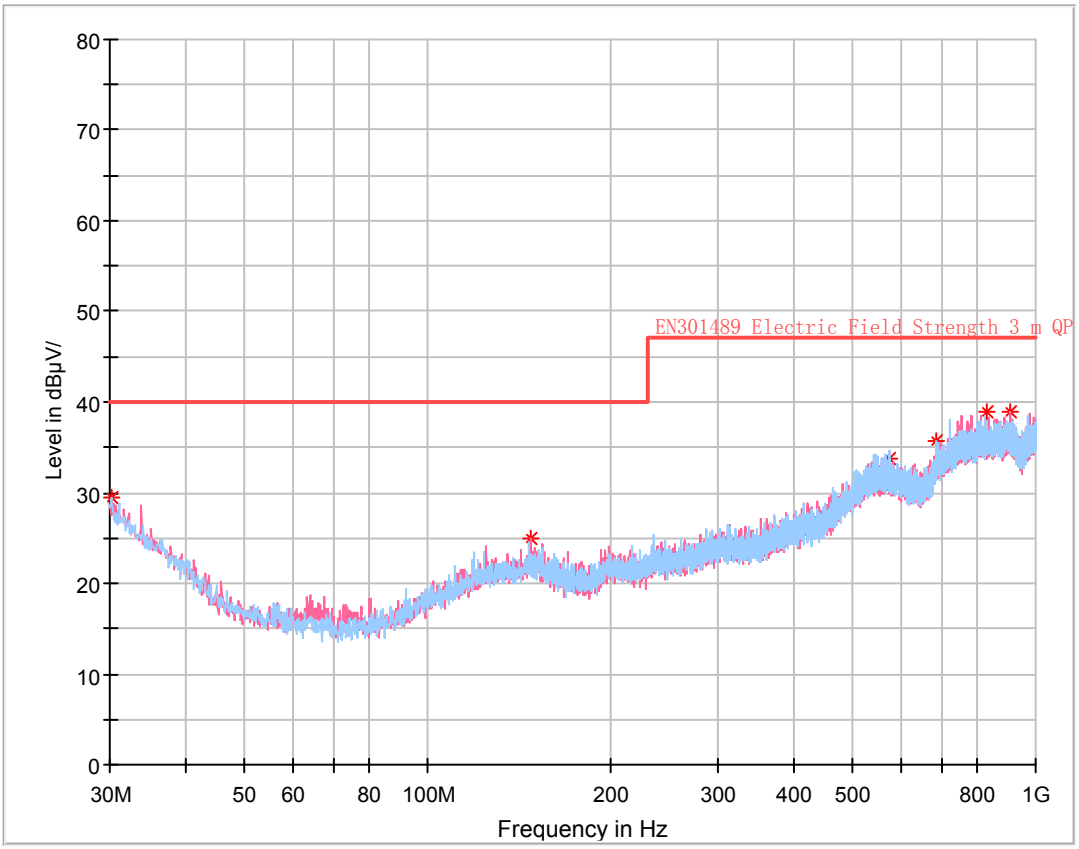
Environmental Conditions

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

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

Test Mode: Charging

30 MHz-1 GHz:



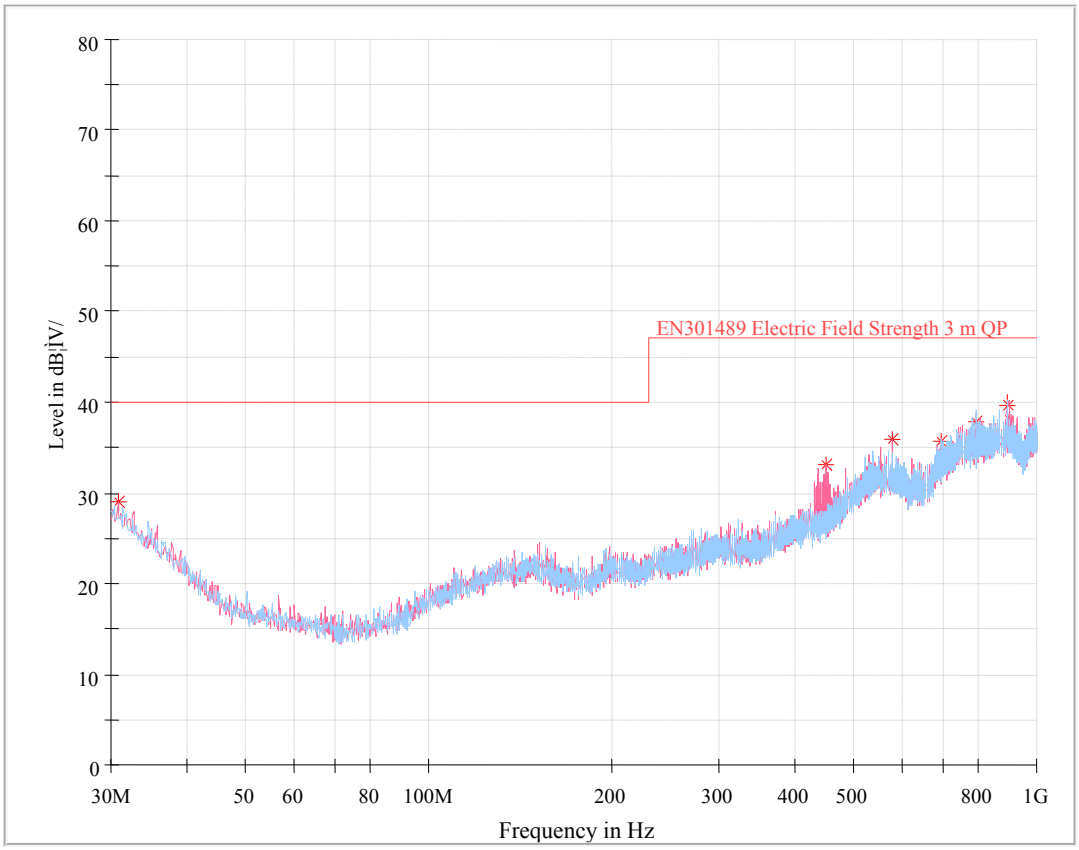
Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
573.236625	33.83	102.0	H	75.0	5.0	47.00	13.17
687.417500	35.62	202.0	H	3.0	6.2	47.00	11.38
30.121250	29.50	202.0	H	283.0	0.7	40.00	10.50
147.855000	24.84	102.0	V	256.0	-4.6	40.00	15.16
832.675000	38.82	102.0	V	347.0	9.4	47.00	8.18
906.273750	38.96	202.0	V	316.0	9.9	47.00	8.04

Above 1 GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m)	EN 301 489-1	
	Reading (dBµV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
1432.18	46.28	PK	207	2.1	H	-7.89	38.39	70	31.61
1432.18	29.46	Ave.	207	2.1	H	-7.89	21.57	50	28.43
1432.18	48.51	PK	200	1.2	V	-7.89	40.62	70	29.38
1432.18	29.68	Ave.	200	1.2	V	-7.89	21.79	50	28.21
2465.69	46.84	PK	281	2.1	H	-0.62	46.22	70	23.78
2465.69	29.02	Ave.	281	2.1	H	-0.62	28.40	50	21.60
2465.69	47.20	PK	58	1.5	V	-0.62	46.58	70	23.42
2465.69	29.23	Ave.	58	1.5	V	-0.62	28.61	50	21.39

Test Mode: Working

30 MHz-1 GHz:



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
694.731500	35.75	102.0	H	240.0	6.7	47.00	11.25
797.063250	37.93	202.0	H	58.0	9.1	47.00	9.07
449.282500	33.18	102.0	V	130.0	0.2	47.00	13.82
580.232500	35.84	102.0	V	157.0	4.9	47.00	11.16
897.301250	39.18	102.0	V	337.0	10.2	47.00	7.82
30.848750	28.93	202.0	V	298.0	0.2	40.00	11.07

Above 1 GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBµV/m)	EN 301 489-1	
	Reading (dBµV)	PK/QP/Ave.		Height (m)	Polar (H/V)			Limit (dBµV/m)	Margin (dB)
1769.18	48.51	PK	54	1.9	H	-5.22	43.29	70	26.71
1769.18	30.37	Ave.	54	1.9	H	-5.22	25.15	50	24.85
1769.18	47.92	PK	144	1.1	V	-5.22	42.70	70	27.30
1769.18	30.42	Ave.	144	1.1	V	-5.22	25.20	50	24.80
2410.23	49.32	PK	259	1.4	H	-0.88	48.44	70	21.56
2410.23	29.68	Ave.	259	1.4	H	-0.88	28.80	50	21.20
2410.23	47.19	PK	118	2.4	V	-0.88	46.31	70	23.69
2410.23	29.64	Ave.	118	2.4	V	-0.88	28.76	50	21.24

Note:

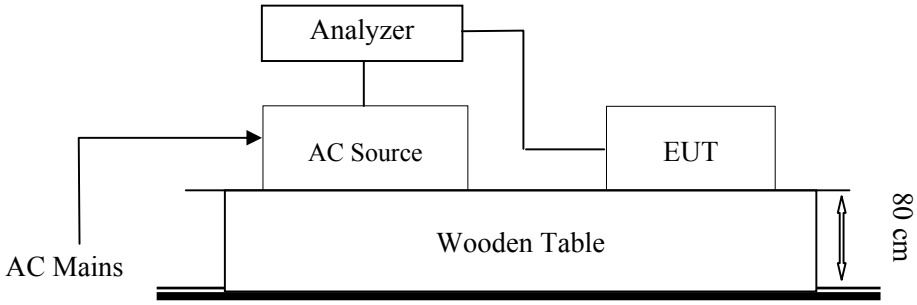
1) Corrected Amplitude = Meter Reading + Correction Factor
2) Correction Factor = Antenna Factor + Cable Loss - Amplifier Gain
3) Margin = Limit – Corrected Amplitude

§7.1 - HARMONIC CURRENT EMISSIONS

According to EN 61000-3-2: 2014 section 7: Equipment with a rated power of 75 Watt or less, other than lighting equipment, are not included in this standard.

§7.1-VOLTAGE FLUCTUATION AND FLICKER

Test System Setup



Test Standard

EN 61000-3-3:2013

Flicker Test Limits:

The limits shall be applicable to voltage fluctuations and flicker at the supply terminals of the equipment under test, measured or calculated according to clause 4 under test conditions described in clause 6 and annex A. Tests made to prove compliance with the limits are considered to be type tests.
The following limits apply:
– the value of Pst shall not be greater than 1,0;
– the value of Plt shall not be greater than 0,65;
– the value of d(t) during a voltage change shall not exceed 3,3 % for more than 500 ms;
– the relative steady-state voltage change, dc, shall not exceed 3,3 %;
– the maximum relative voltage change dmax, shall not exceed
a) 4 % without additional conditions;
b) 6 % for equipment which is:
– switched manually, or
– switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.

Note: The cycling frequency will be further limited by the Pst and Plt limit. For example: a dmax of 6 % producing a rectangular voltage change characteristic twice per hour will give a Plt of about 0,65.
c) 7 % for equipment which is
– attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or

– switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

In the case of equipment having several separately controlled circuits in accordance with 6.6, limits b) and c) shall apply only if there is delayed or manual restart after a power supply interruption; for all equipment with automatic switching which is energized immediately on restoration of supply after a power supply interruption, limits a) shall apply; for all equipment with manual switching, limits b) or c) shall apply depending on the rate of switching. Pst and Plt requirements shall not be applied to voltage changes caused by manual switching. The limits shall not be applied to voltage changes associated with emergency switching or emergency interruptions.

Test Data and Setup Photo

Environmental Conditions

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

Date of test:	10:45 27 Jul. 2019
Tester:	Nancy Wang
Standard used:	EN/IEC 61000-3-3 Flicker
Short time (Pst):	10 min
Observation time:	120 min (12 Flicker measurements)
Flicker meter:	230V / 50Hz
Flicker Impedance:	Zref (IEC 60725)
Customer:	DONGHUANG TOYS FACTORY
E. U. T.:	2.4G RC HELICOPTER
Model:	DH8001D-1
EUT operation mode	Charging

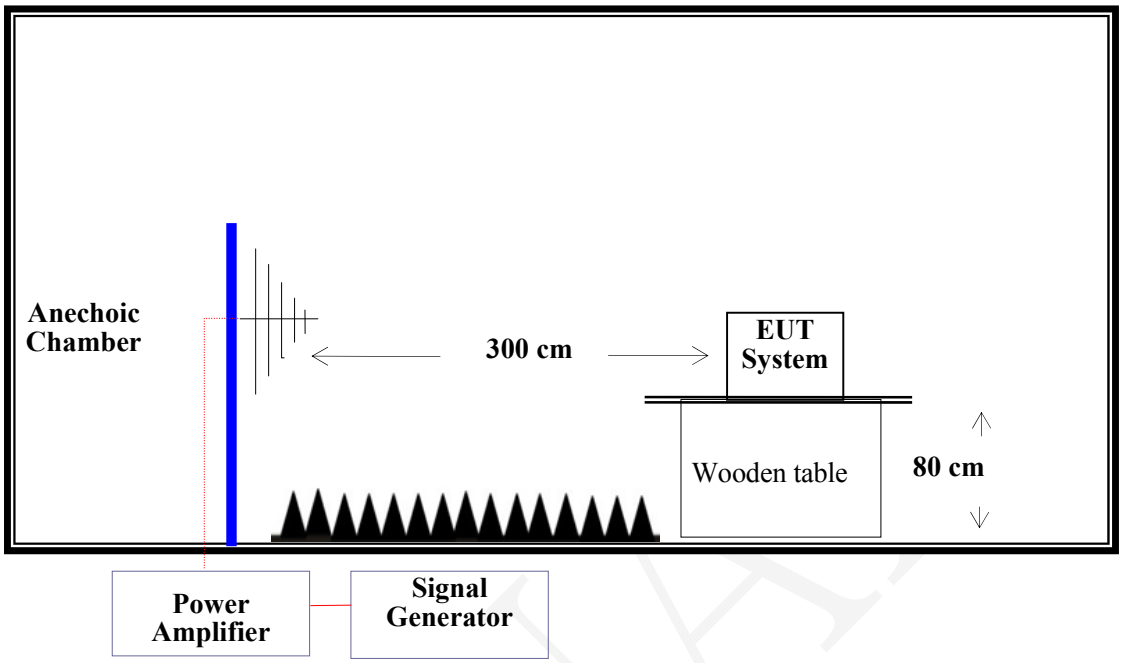
Maximum Flicker results

	EUT values	Limit	Result
Pst	0.028	1.00	Pass
Plt	0.028	0.65	Pass
dc [%]	0.017	3.30	Pass
dmax [%]	0.058	4.00	Pass
dt [s]	0.000	0.50	Pass

Test Setup Photo

§7.2 - RF ELECTROMAGNETIC FIELD (80 MHz to 6000 MHz)

Test System Setup



Test Standard

ETSI EN 301 489-1 V2.2.0 (2017-03) / EN 61000-4-3:2006+A1:2008 +A2: 2010
Test Level 2 at 3V / m
Test Levels and Performance Criterion

Test Level

Level	Field Strength (V/m)
1.	1
2.	3
3.	10
X.	Special

Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above the ground. The EUT is set 3 meters away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarizations of the antenna are set on test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually.
In order to judge the EUT performance, a CCD camera and smart phone are used to monitor the EUT or an artificial ear and sound level meter were used to monitor the sound pressure level.
All the scanning conditions are as follows:

	Condition of Test	Remarks
1.	Field Strength	3 V/m (Test Level 2)
2.	Radiated Signal	Modulated
3.	Scanning Frequency	80 - 6000 MHz
4.	Sweeping time of radiated	0.0015 decade/s
5.	Dwell Time	1 Sec.

Test Data and Setup Photo

Environmental Conditions

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

The testing was performed by Nancy Wang on 2019-07-26.

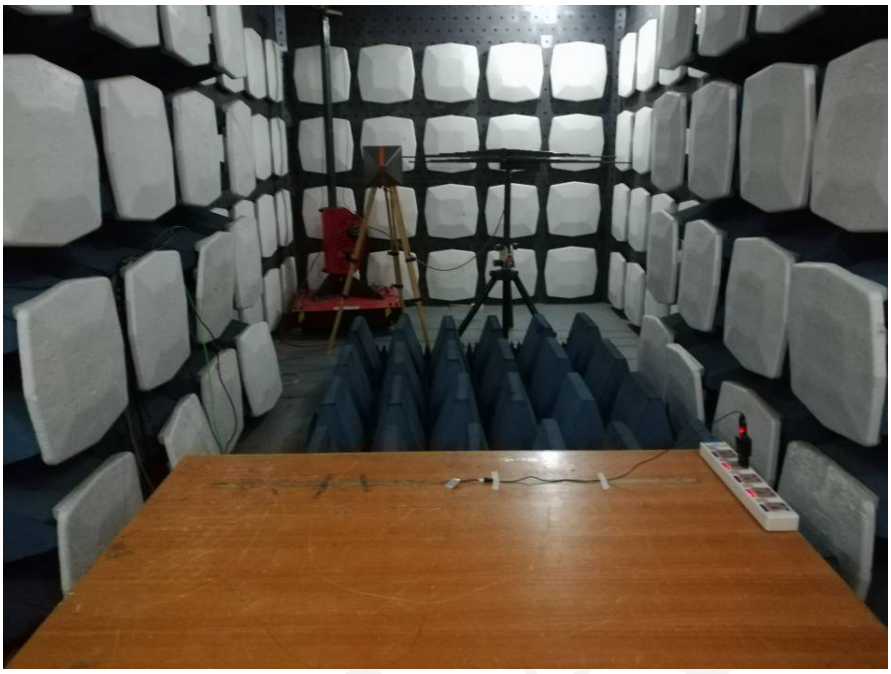
Test Mode: Charging& Working

Modulation: Amplitude 80%, 1 kHz sine wave

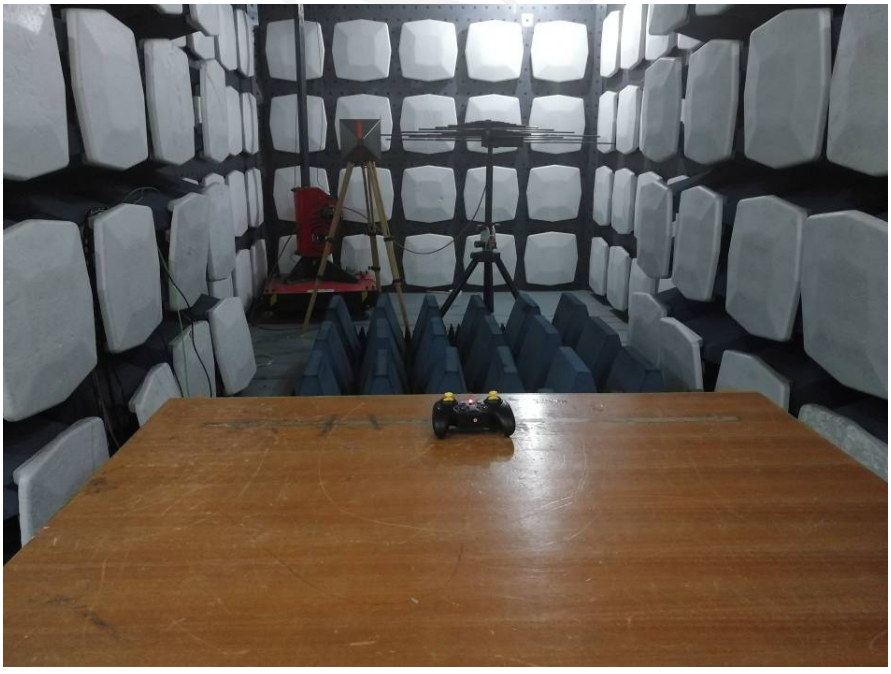
Frequency Range (MHz)	Front Side (3 V/m)		Rear Side (3 V/m)		Left Side (3 V/m)		Right Side (3 V/m)	
	VERT	HORI	VERT	HORI	VERT	HORI	VERT	HORI
80-6000	A	A	A	A	A	A	A	A

Note: “A” stand for, during test, operate as intended No loss function, no degradation of performance,no unintentional transimissions.and after test, no degradation of performance, no loss of function, no loss of stored data or user programmable functions.

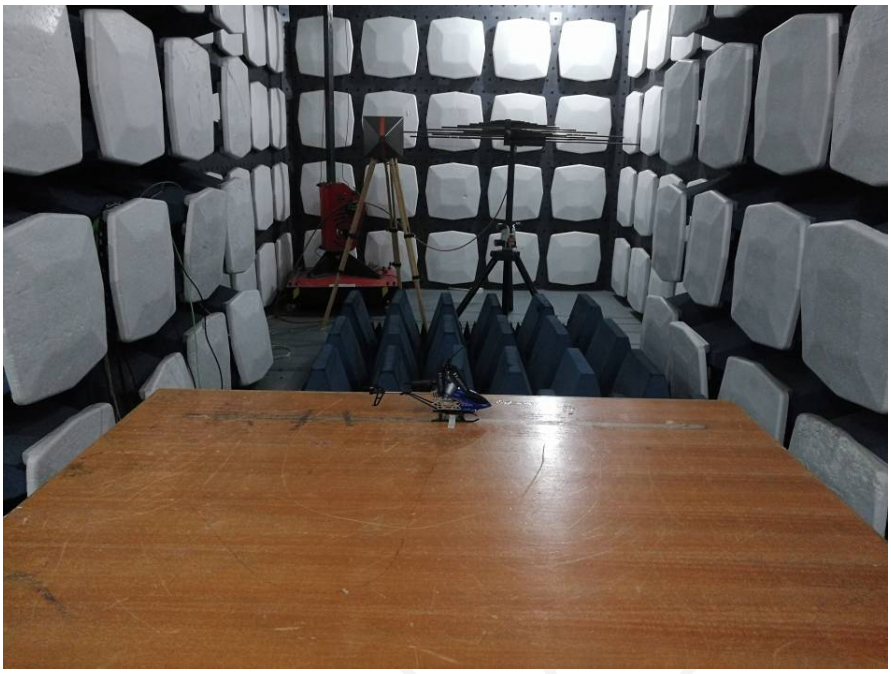
Charging



Working for remote control



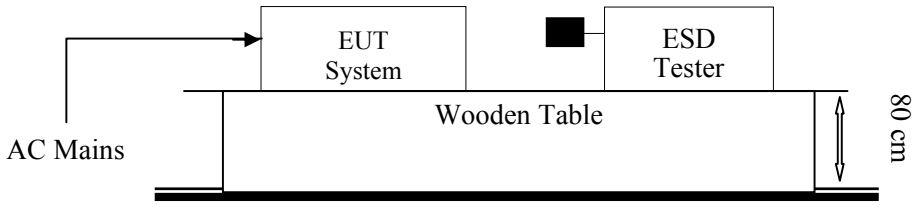
Working for plane



Test Setup Photos

§7.2 - ELECTROSTATIC DISCHARGE

Test System Setup



Remark: ■ is the tip of the electrode

EN 61000-4-2 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.6 by 0.8-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by *0.5-millimeter* thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

Test Standard

ETSI EN 301 489-1 V2.2.0 (2017-03) / EN 61000-4-2:2009
Air Discharge at ±2 kV, ±4 kV, ±8 kV
Contact Discharge at ±2 kV, ±4 kV

Test Level

Level	Test Voltage Contact Discharge (±kV)	Test Voltage Air Discharge (±kV)
1.	2	2
2.	4	4
3.	6	8
4.	8	15
X.	Special	Special

Performance criterion: B

Test Procedure

Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

Contact Discharge:

All the procedure shall be same as Section 8.3.1 of EN 61000-4-2, except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

Indirect discharge for horizontal coupling plane

At least 50 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

Indirect discharge for vertical coupling plane

At least 50 single discharges shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m ×0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

Test Data and Setup Photo

Environmental Conditions

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

The testing was performed by Nancy Wang on 2019-07-24.

Test Mode: Charging

Table 1: Electrostatic Discharge Immunity (Air Discharge)

EN 61000-4-2 Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-8 kV	+8 kV	-15 kV	+15 kV
Top (3 points)	A	A	A	A	A	A	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact)

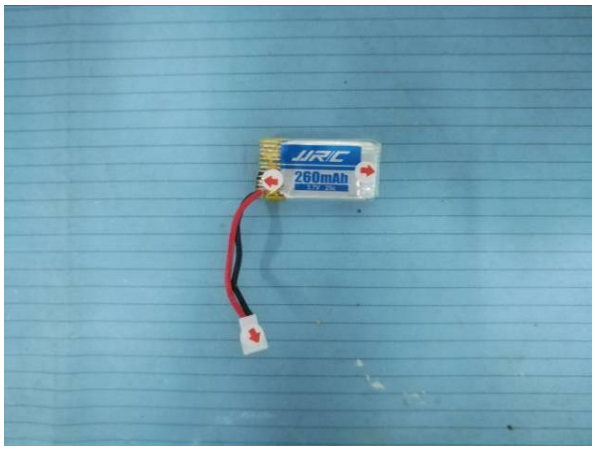
EN 61000-4-2 Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
/	/	/	/	/	/	/	/	/

Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

EN 61000-4-2 Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

EN 61000-4-2 Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/



Note: represents air discharge, represents direct contact

Test Mode: plane

Table 1: Electrostatic Discharge Immunity (Air Discharge)

EN 61000-4-2 Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-8 kV	+8 kV	-15 kV	+15 kV
Bottom (2 points)	A	A	A	A	A	A	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact)

EN 61000-4-2 Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Left (3 points)	A	A	A	A	/	/	/	/
Right (2 points)	A	A	A	A	/	/	/	/

Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

EN 61000-4-2 Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

EN 61000-4-2 Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/

Note: ➔ represents air discharge, ➔ represents direct contact

Test Mode: remote control

Table 1: Electrostatic Discharge Immunity (Air Discharge)

EN 61000-4-2 Test Points Location		Test Levels							
		-2 kV	+2 kV	-4 kV	+4 kV	-8 kV	+8 kV	-15 kV	+15 kV
Front	(3 points)	A	A	A	A	A	A	/	/
Back	(1 point)	A	A	A	A	A	A	/	/
Left	(1 point)	A	A	A	A	A	A	/	/
Right	(1 point)	A	A	A	A	A	A	/	/
Top	(6 points)	A	A	A	A	A	A	/	/
Bottom	(6 points)	A	A	A	A	A	A	/	/

Table 2: Electrostatic Discharge Immunity (Direct Contact)

EN 61000-4-2 Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
/	/	/	/	/	/	/	/	/

Table 3: Electrostatic Discharge Immunity (Indirect Contact HCP)

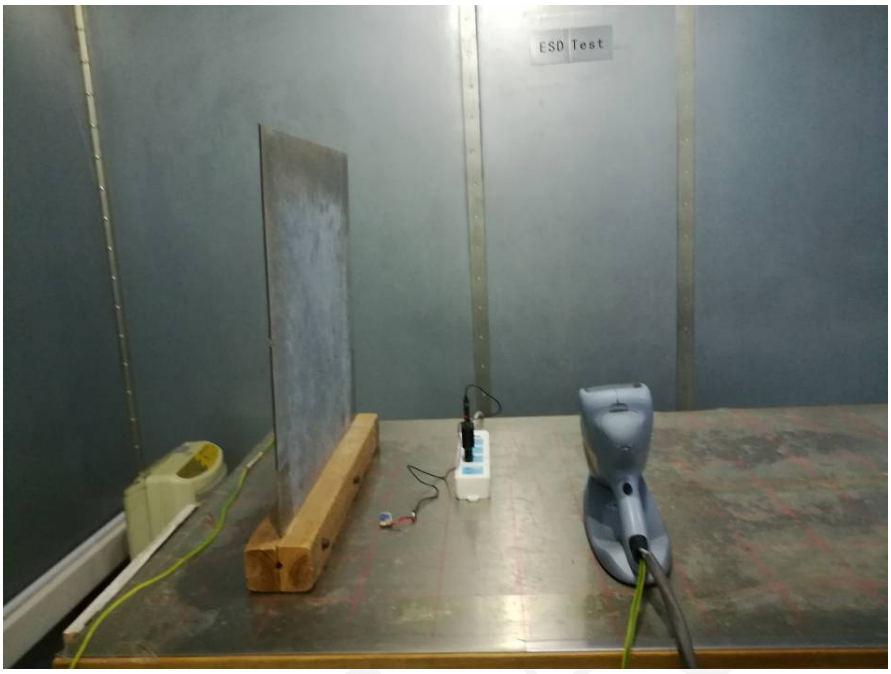
EN 61000-4-2 Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/

Table 4: Electrostatic Discharge Immunity (Indirect Contact VCP)

EN 61000-4-2 Test Points Location	Test Levels							
	-2 kV	+2 kV	-4 kV	+4 kV	-6 kV	+6 kV	-8 kV	+8 kV
Front Side	A	A	A	A	/	/	/	/
Back Side	A	A	A	A	/	/	/	/
Left Side	A	A	A	A	/	/	/	/
Right Side	A	A	A	A	/	/	/	/

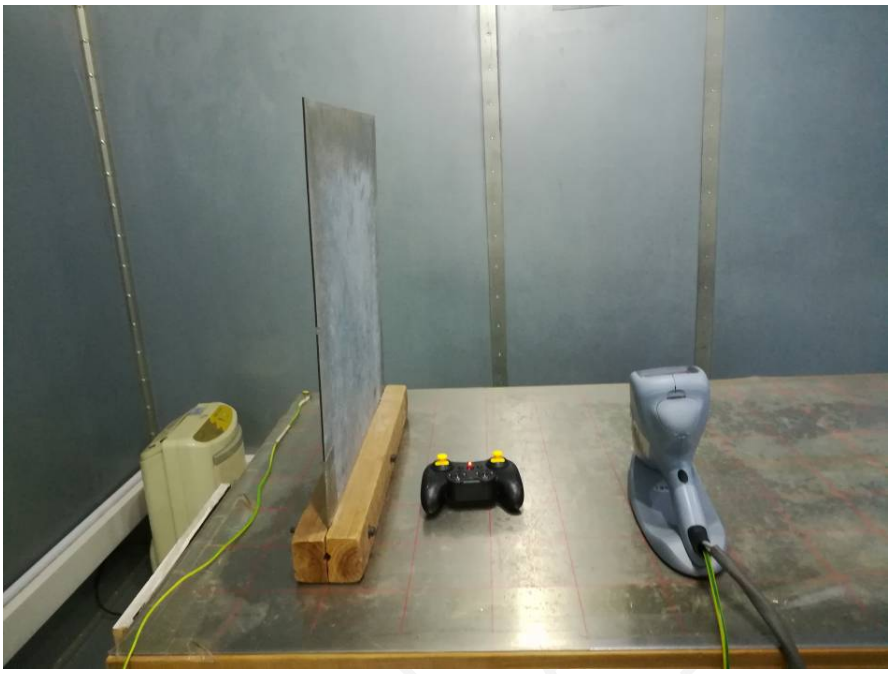
Note: represents air discharge, represents direct contact

Charging



Plane

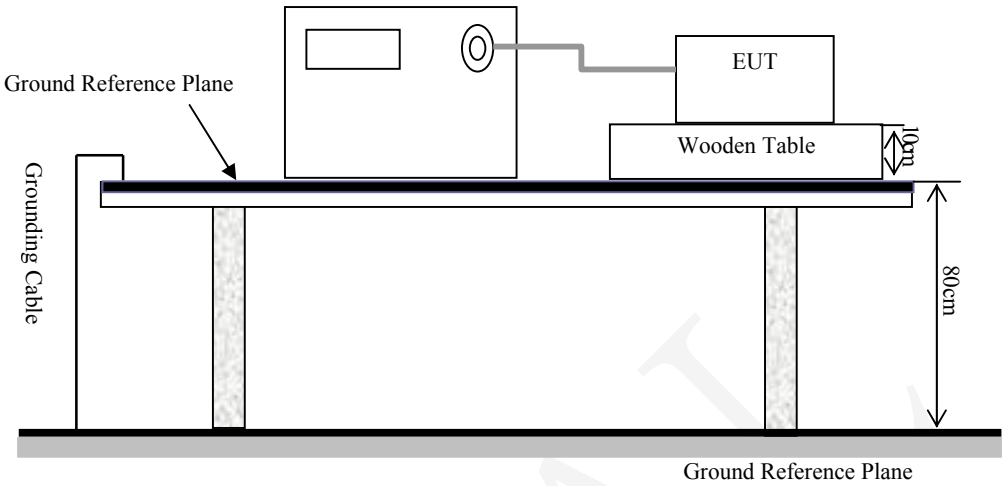
Remote control



Test Setup Photos

§7.2 - ELECTRICAL FAST TRANSIENT IMMUNITY

Test System Setup



Test Standard

ETSI EN 301 489-1 V2.2.0 (2017-03) / EN 61000-4-4: 2004 + A1:2010
AC Mains: Test level 2 at 1 kV

Test Level

Open Circuit Output Test Voltage ±10%		
Level	**On Power Supply Lines**	**On I/O (Input/Output) Signal data and control lines**
1	0.5 kV	0.25 kV
2	1 kV	0.5 kV
3	2 kV	1 kV
4	4 kV	2 kV
X	Special	Special

Performance Criterion: B

Test Procedure

The EUT was arranged for Power Line Coupling and for I/O Line Coupling through a capacitive clamp, where applicable. (Note: The I/O coupling test using a capacitive clamp is performed on the I/O interface cables that are longer in length than 3 meters.) A metal ground plane 2.4 meter by 2.0 meter was placed between the floor and the table and is connected to the earth by a 2.0 meter ground rod. The ground rod is connected to the test facility's electrical earth.

Test Data and Setup Photo

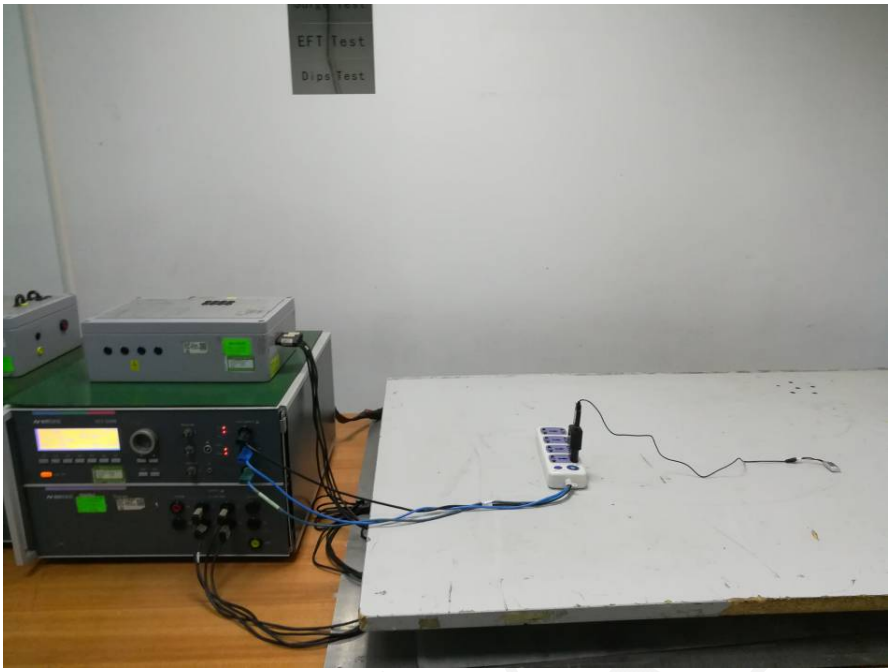
Environmental Conditions

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

The testing was performed by Nancy Wang on 2019-07-27.

Test Mode: Charging

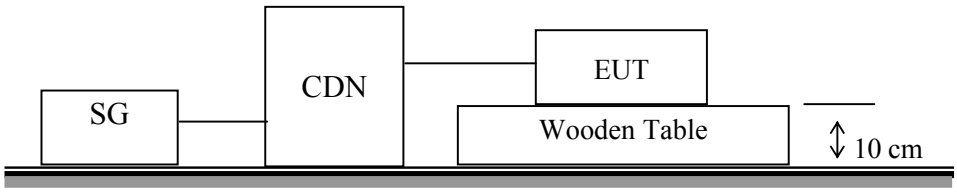
EN 61000-4-4 Test Points		**Test Levels (kV)**							
		+0. 5	**-0. 5**	**+1.0**	**-1.0**	**+2.0**	**-2.0**	**+4.0**	**-4.0**
AC Mains Power Input Ports	L1	/	/	A	A	/	/	/	/
	N	/	/	A	A	/	/	/	/
	PE	/	/	/	/	/	/	/	/
	L1/N	/	/	A	A	/	/	/	/
	L1/PE	/	/	/	/	/	/	/	/
	N/PE	/	/	/	/	/	/	/	/
	L1/N/PE	/	/	/	/	/	/	/	/
Signal Port	/	/	/	/	/	/	/	/	/



Test Setup Photo

§7.2 - RF COMMON MODE

Test Setup



Test Standard

ETSI EN 301 489-1 V2.2.0 (2017-03) /EN 61000-4-6: 2009
Test level 2 at 3 V (r.m.s.), 0.15 MHz ~ 80 MHz

Test Level

Level	Voltage Level (r.m.s.) (U_0)
1	1
2	3
3	10
X	Special

Performance Criterion: A

Note: "A" stand for, during test, operate as intended no loss function, no degradation of performance,no unintentional reansimissions.and after test, no degradation of performance, no loss of function, no loss of stored data or user programmable functions.

Test Procedure

1) Let the EUT work in test mode and test it.
2) The EUT are placed on an insulating support 0.1 m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3 m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
3) The disturbance signal described below is injected to EUT through CDN.
4) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
5) The frequency range is swept from 150 kHz to 80 MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave.
6) The rate of sweep shall not exceed $1.5*10^{-3}$decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
7) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

Test Data and Setup Photo

Environmental Conditions

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

The testing was performed by Nancy Wang on 2019-07-27.

Test Mode: Charging

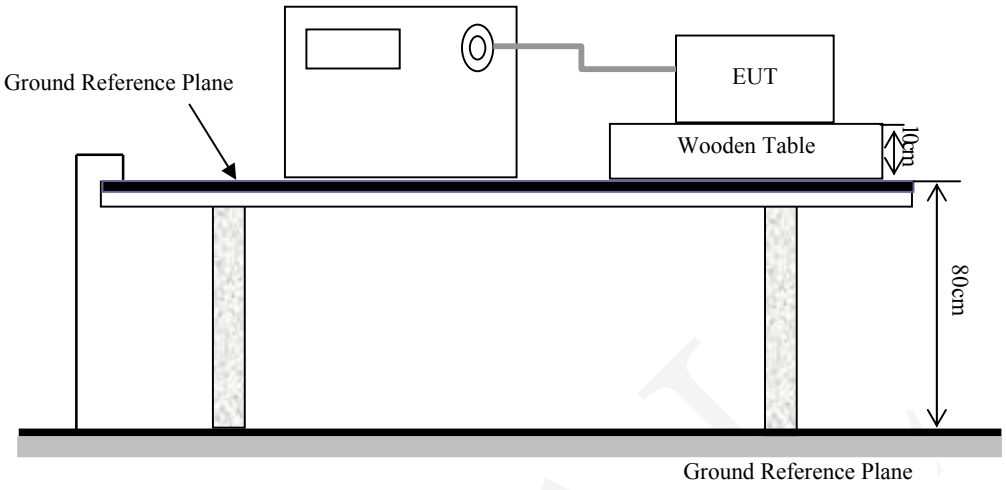
Table 1: AC mains power input port
Frequency range: 150 kHz to 80 MHz
Modulation: Amplitude 80%, 1 kHz sine wave
Test level: 3V r.m.s.

Level	Voltage Level (r.m.s.) U_0	Pass	Fail
1	1	/	/
2	3	A	/
3	10	/	/
X	Special	/	/

Test Setup Photo

§7.2 - SURGES, LINE TO LINE AND LINE TO GROUND

Test System Setup



Test Standard

ETSI EN 301 489-1 V2.2.0 (2017-03) / EN 61000-4-5: 2006
AC Mains port:
Line to Line at ±0.5kV, ±1kV

Test Level

Level	Open Circuit Output Test Voltage ±10%	Performance Criterion	
		AC Mains	Signal Port
1	0.5 kV	B	C
2	1 kV	B	C
3	2 kV	B	C
4	4 kV	B	C
X	Special	/	/

Test Procedure

1) For line to line coupling mode, provide a 1.2/50μs voltage surge (at open-circuit condition) and a 8/20 μs current surge into a short circuit.
2) For telecommunication port, provide a 10/700μs voltage surge (at open-circuit condition) and a 5/320 μs current surge into a short circuit.
3) At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
4) Different phase angles are done individually.
5) Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

Test Data and Setup Photo

Environmental Conditions

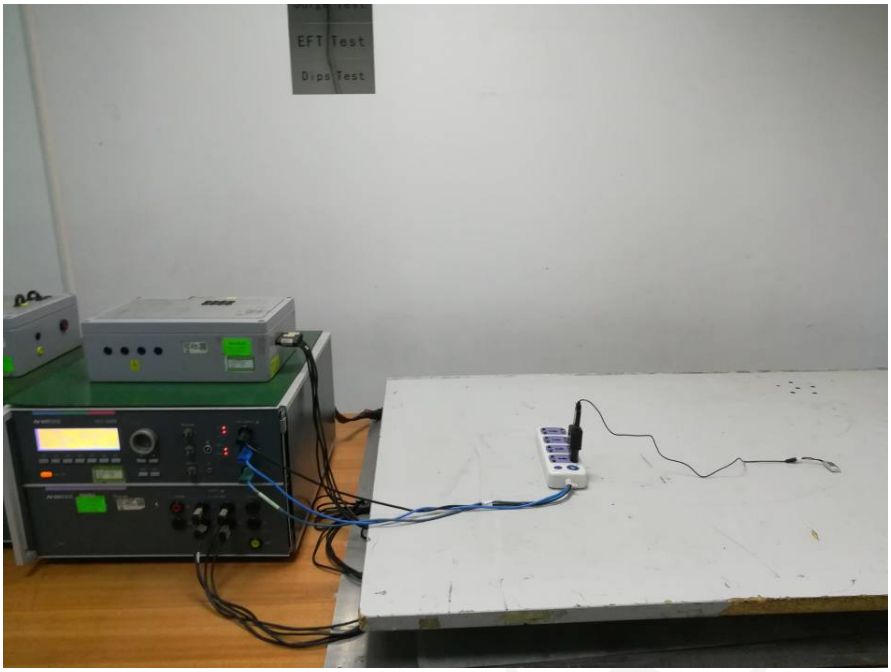
Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Nancy Wang on 2019-07-27.

Test Mode: Charging

Table 1: AC mains power input port

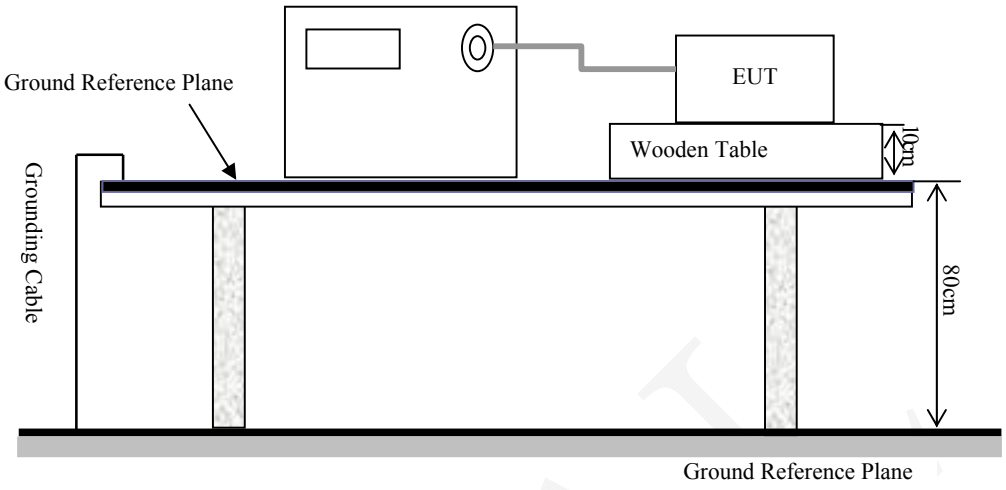
Level	Voltage	Poll	Path	Pass	Fail
1	0.5 kV	±	L1/N	A	/
2	1 kV	±	L1/N	A	/
3	2 kV	±	/	/	/
4	4 kV	±	/	/	/



Test Setup Photo

§7.2 - VOLTAGE DIPS AND INTERRUPTIONS IMMUNITY TEST

Test Setup



Test Standard

ETSI EN 301 489-1 V2.2.0 (2017-03) / EN 61000-4-11: 2004
Test levels and Performance Criterion

Test Level

Test Level	Voltage dip and short interruptions (% Residual Voltage)	Duration (in period)	Performance criterion:
1	0	0.5	B
2	0	1	B
3	70	25	C
4	0	250	C

Test Procedure

1) The interruption is introduced at selected phase angles with specified duration.
2) Record any degradation of performance.

Test Data and Setup Photo

Environmental Conditions

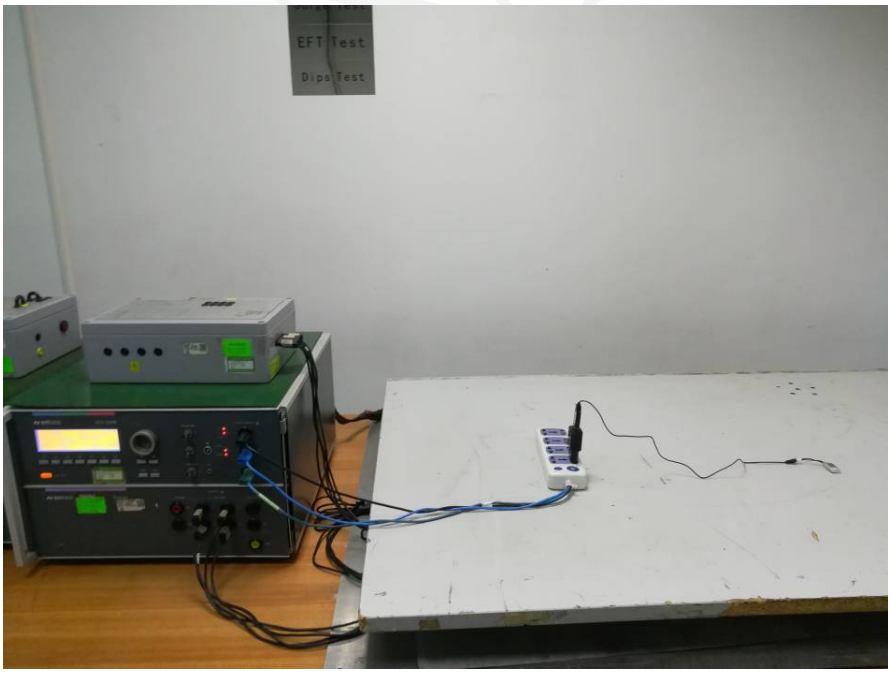
Temperature:	25 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Nancy Wang on 2019-07-27.

Test Mode: Charging

Level	Voltage dip and short interruptions (% Residual Voltage)	Periods	Phase Angle	N	Result
1	0	0.5	0/180	3	A
2	0	1	0/180	3	A
3	70	25	0/180	3	A
4	0	250	0/180	3	B

Note:"B" means charging stopped during the test and come back by self-restoring.



Test Setup Photo

EXHIBIT A - PRODUCT CE LABELING

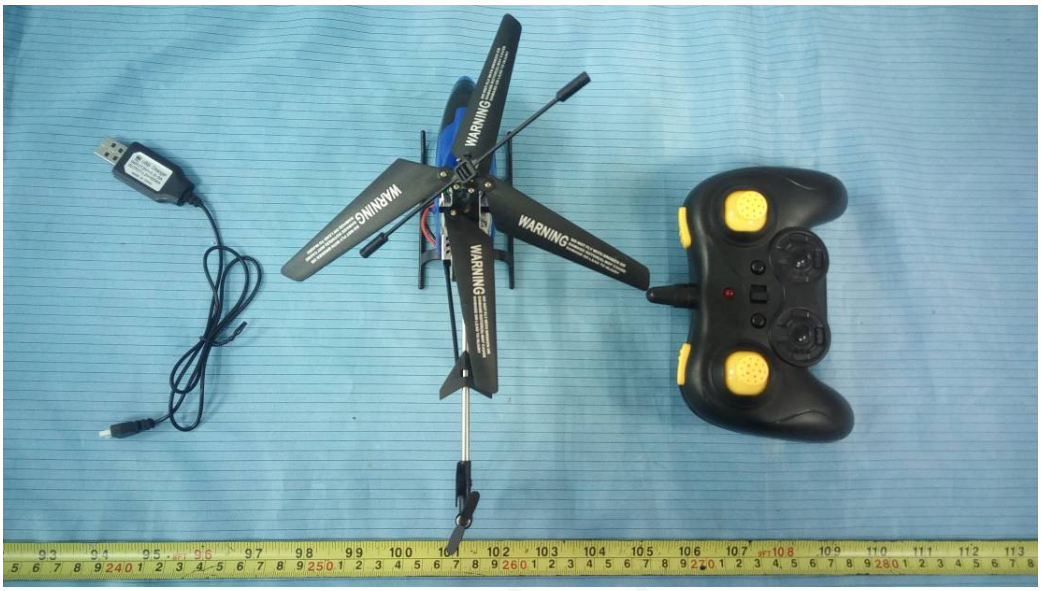
Proposed CE Label Format

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

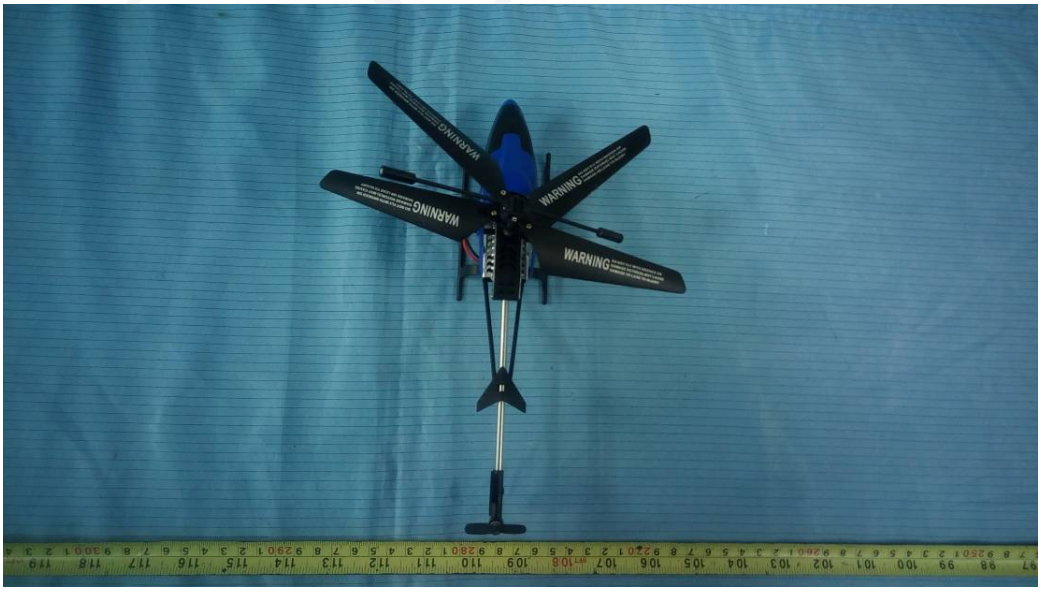
EXHIBIT B - EUT PHOTOGRAPHS

EUT – All View



For plane

EUT – Front View



EUT – Rear View

EUT – Top View

EUT – Bottom View

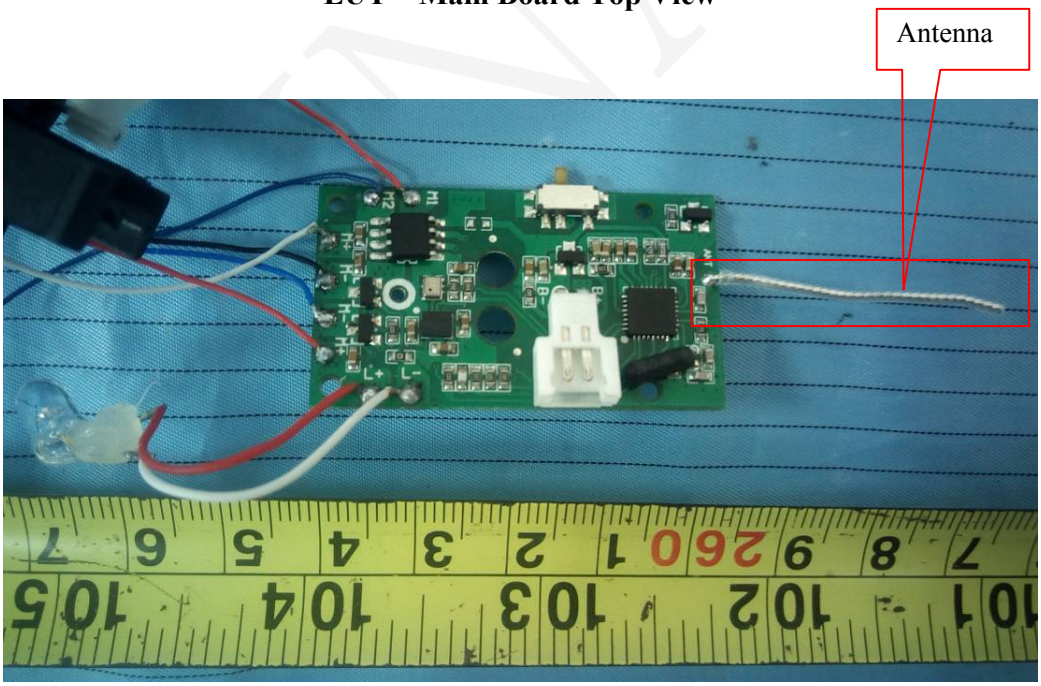
EUT – Left View

EUT – Right View

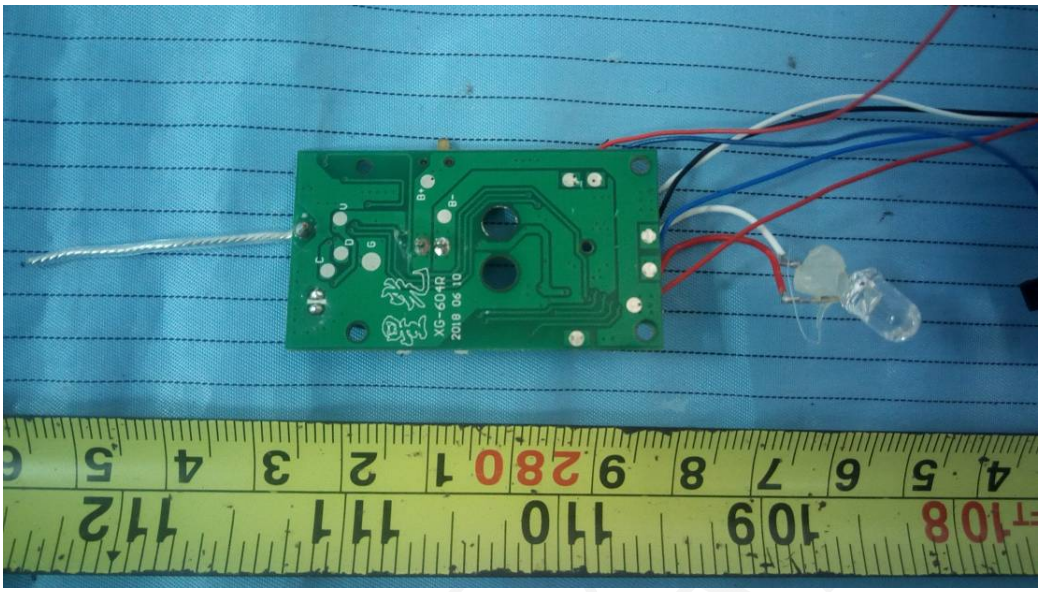
EUT – Cover off View 1

EUT – Cover off View 2

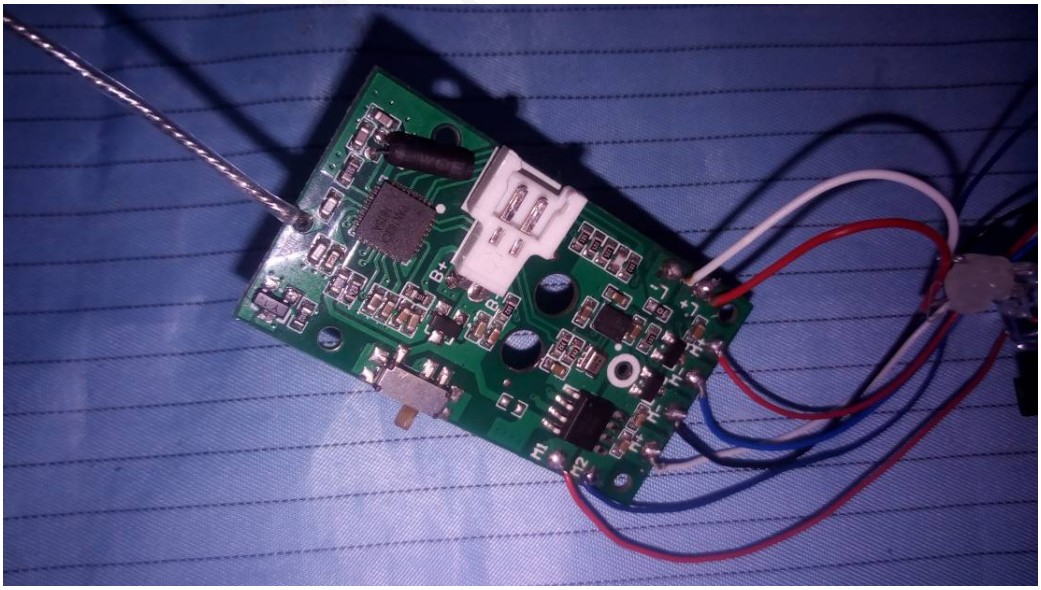
EUT – Main Board Top View



EUT –Main Board Bottom View

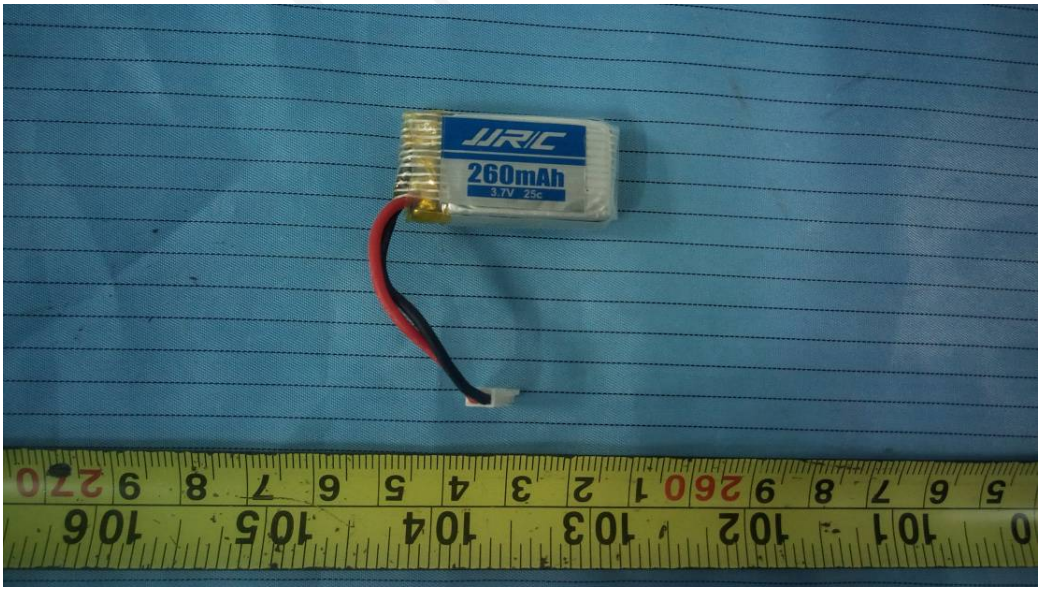


EUT – IC Chip View



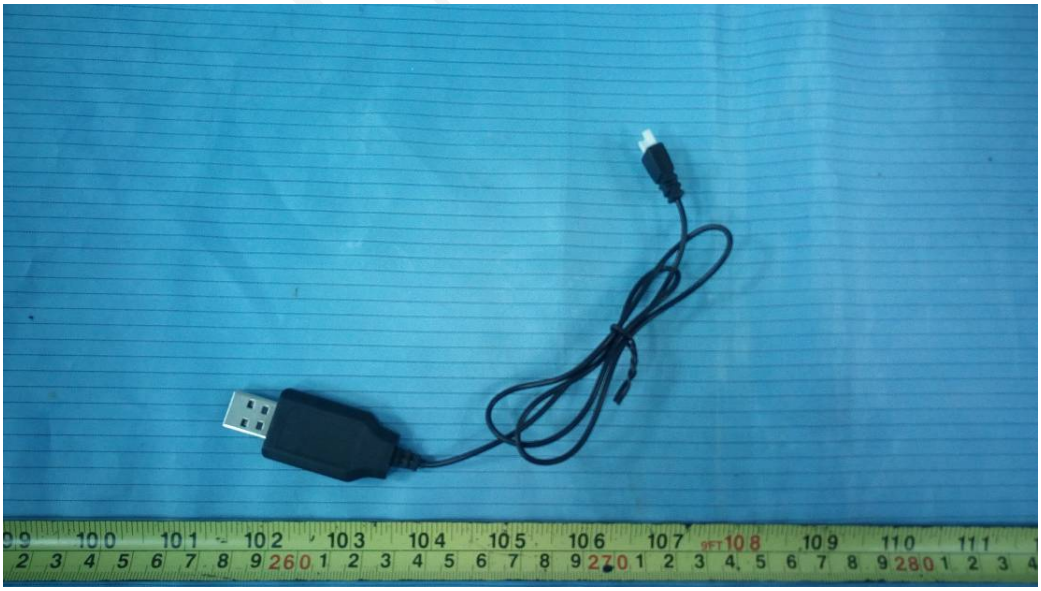
EUT – Battery Top View

EUT – Battery Bottom View

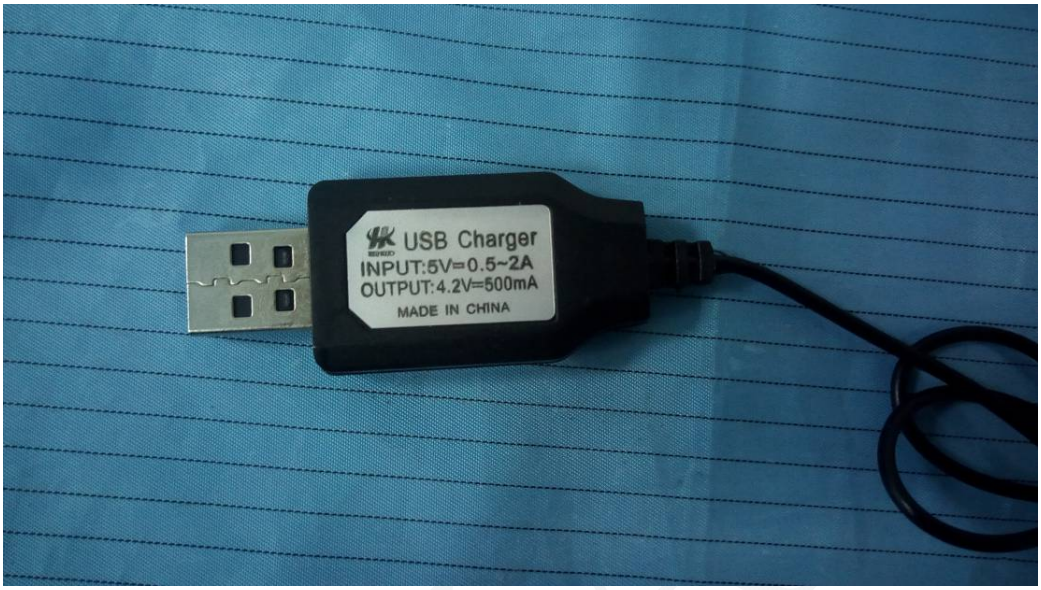


EUT –USB Charger Top View

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

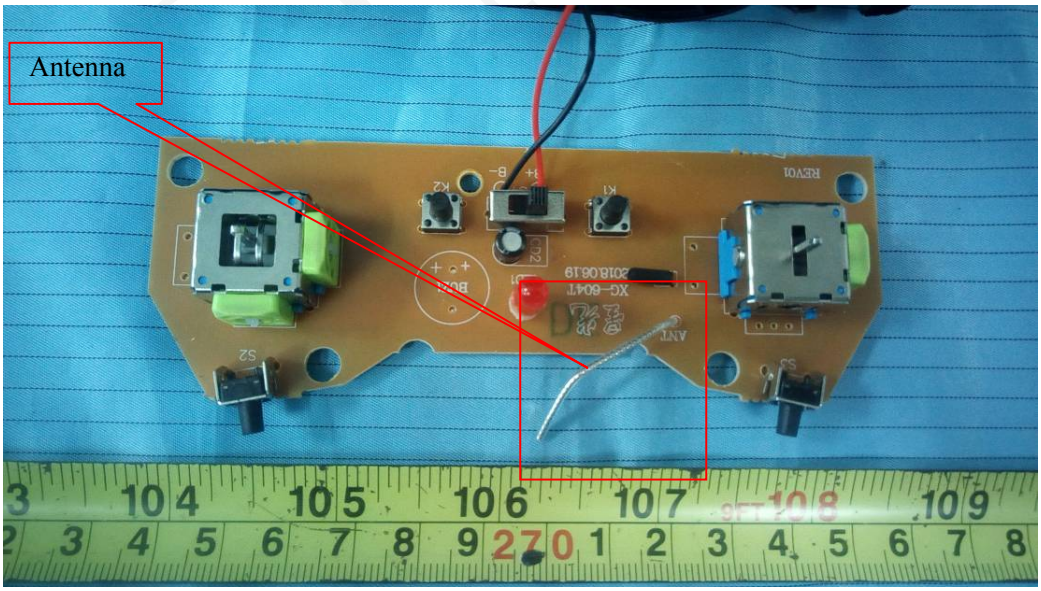
EUT – Left View

EUT – Right View

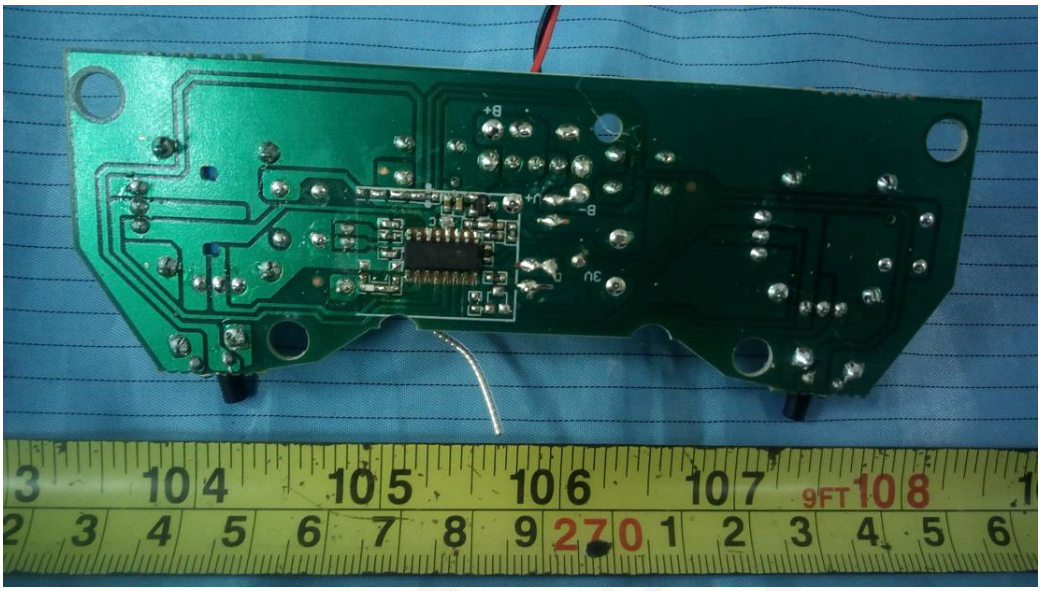
EUT – Cover off View 1

EUT – Cover off View 2

EUT – Main Board Top View



EUT –Main Board Bottom View



EUT – IC Chip View

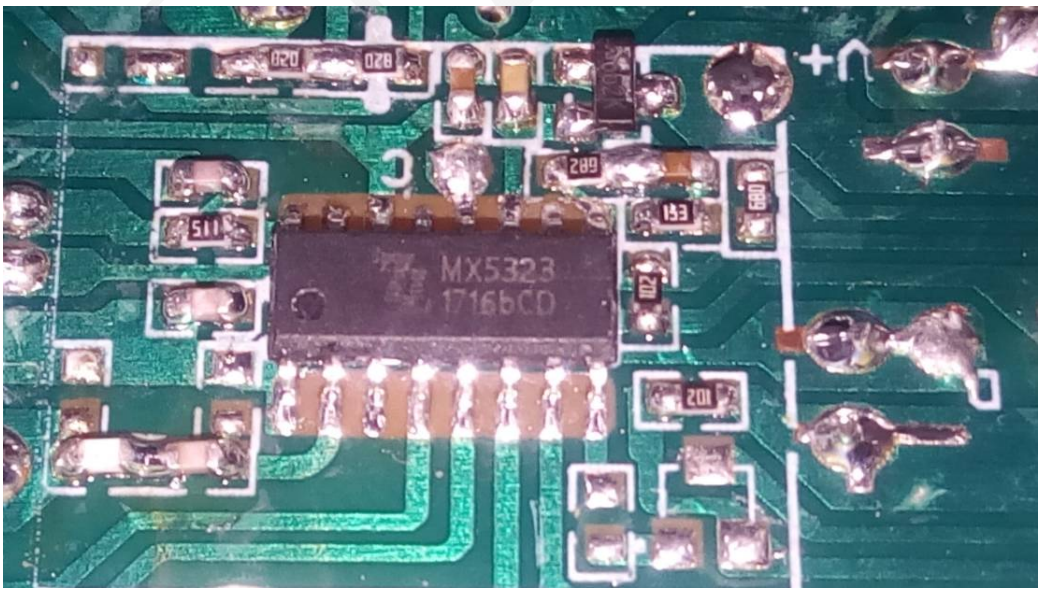
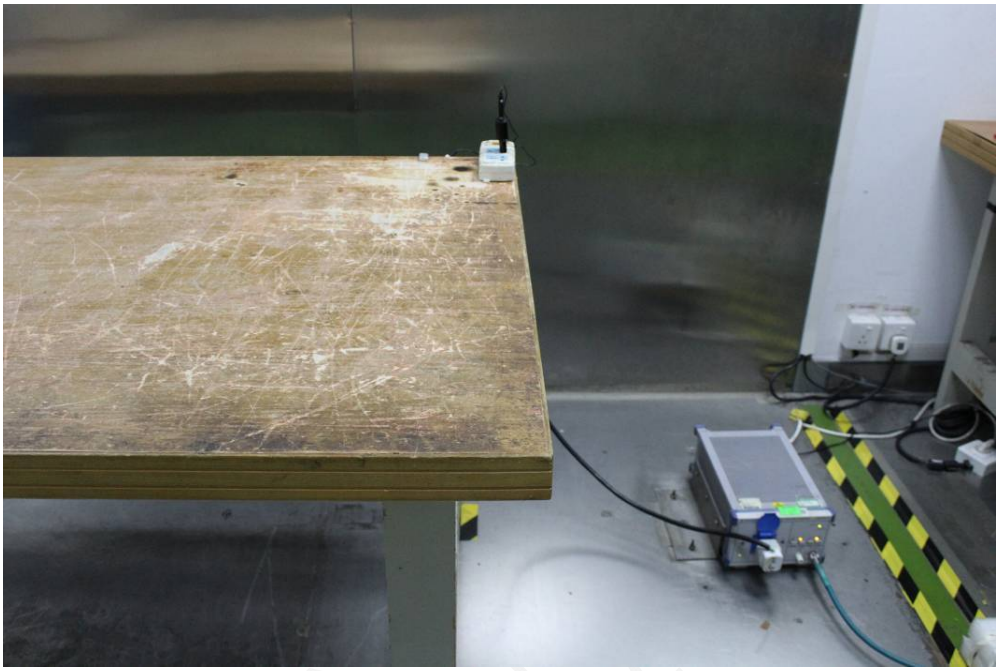
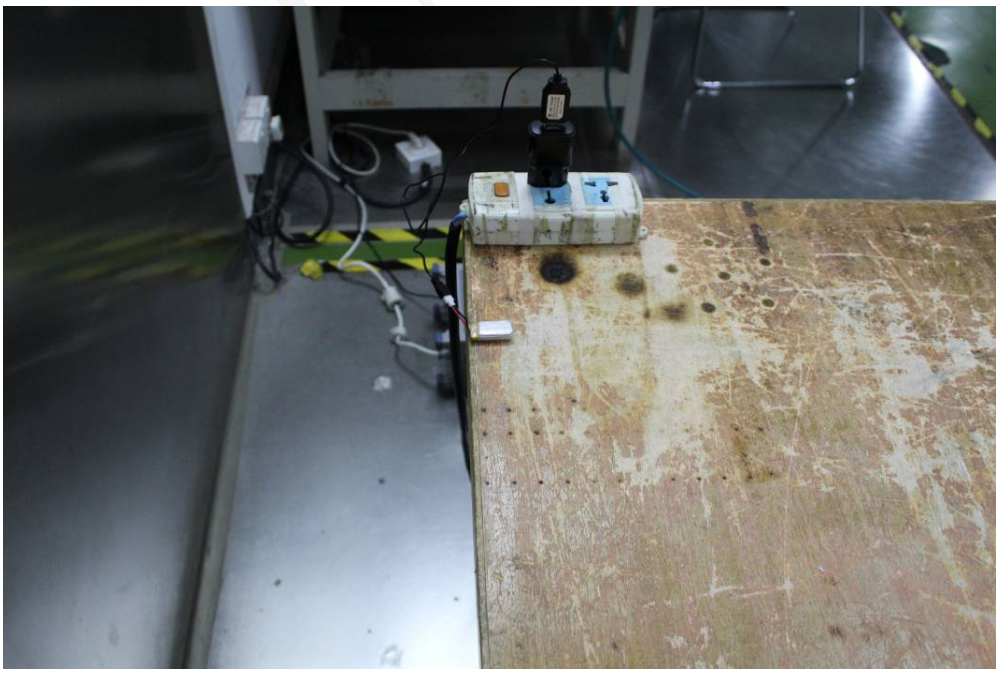


EXHIBIT C - TEST SETUP PHOTOGRAPHS

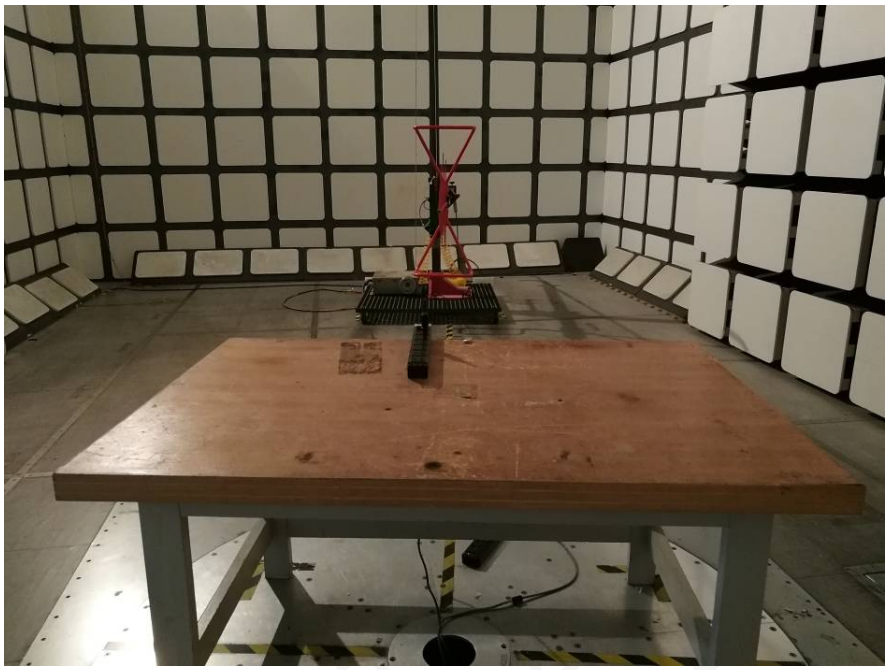
Conducted Emissions - Front View (Charging)



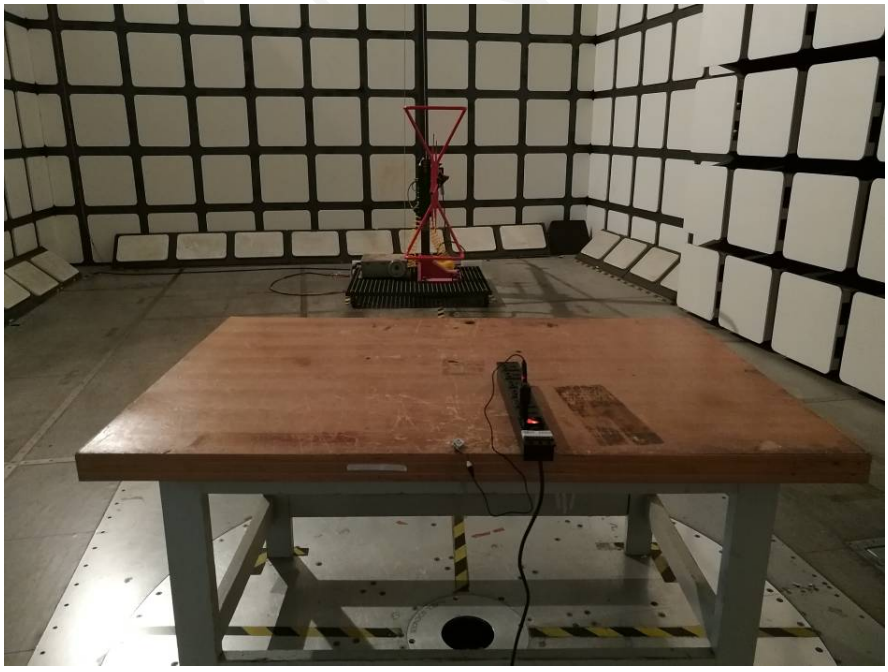
Conducted Emissions - Side View (Charging)



Radiated Emissions – Front View (Below 1 GHz, Charging)



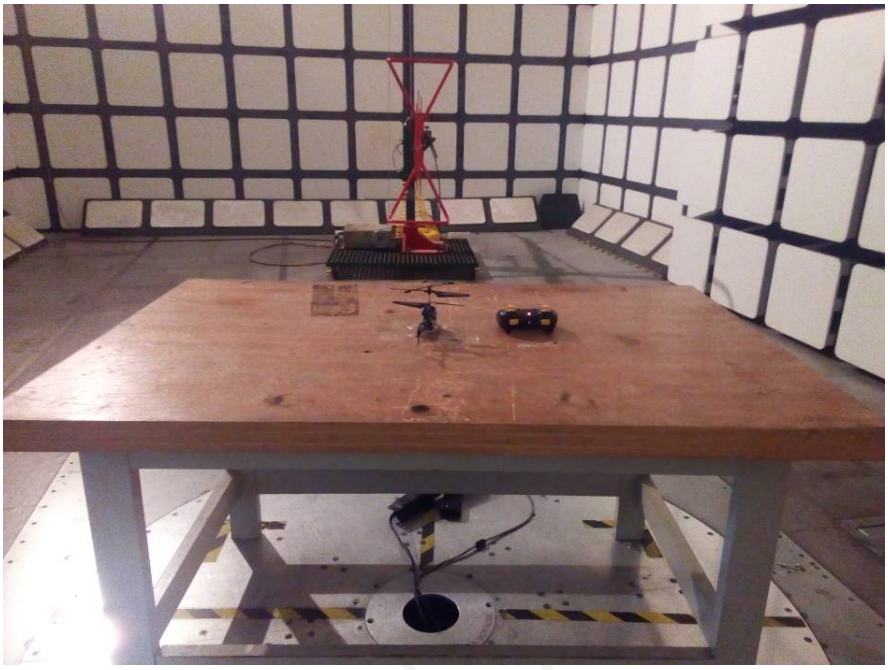
Radiated Emissions – Rear View (Below 1 GHz, Charging)



Radiated Emissions – Front View (Above 1 GHz, Charging)

Radiated Emissions – Rear View (Above 1 GHz, Charging)

Radiated Emissions View (Below 1 GHz, Working)



Radiated Emissions View (Above 1 GHz, Working)

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 *****