



Shenzhen Huaxia Testing Technology Co., Ltd

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Telephone: +86-755-26648640
Fax: +86-755-26648637
Website: www.cqa-cert.com

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RF Exposure Evaluation Report

Report No. : CQASZ20191201284E-02
Applicant: SHANTOU LULA PLASTIC PRODUCTS CO., LIMITED.
Address of Applicant: 4TH FLOOR, JINCHENG BUILDING, PUMEI DISTRICT, GUANGYI STREET, CHENGHAI, SHANTOU, CHINA
Equipment Under Test (EUT):
Product: R/C QUADCOPTER/DRONE
Model No.: X300C, 8816, 8816W, 8810, 8810W, A6, A6W, A6GPS, 8808, 8808W, 8801, 8802, 8802W, 8803, 8803W, 8805, 8805W, 8806, 8806W, 8807, 8807W, 8807OFP, 8809, 8809W, 8809OFP, 8811, 8811W, 8812, 8812W, 8813, 8813W, 8815, 8815W, 8816, 8816W, 8817, 8817W, 8818, 8818W, 8819, 8819W, 8820, 8820-1, 8820W, 8822, 8822-1, 8822W, 8823, 8823-1, 8823W, 88025, 8825-1, 88025W, 8826, 8826-1, 8826W, 8827, 8827-1, 8827W, 8828, 8828-1, 8828W, 8829, 8829-1, 8829W, S5
Test Model No.: X300C
Brand Name: N/A
FCC ID: 2AVJKX300C8810WTX
Standards: 47 CFR Part 1.1307
47 CFR Part 2.1093
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2019-12-10
Date of Test: 2019-12-10 to 2019-12-30
Date of Issue: 2019-12-30
Test Result : **PASS***

Tested By:

Tom Chen

(Tom chen)

Reviewed By:

Aaron Ma

(Aaron Ma)

Approved By:

Jack Ai
(Jack Ai)



* In the configuration tested, the EUT complied with the standards specified above.

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20191201284E-02	Rev.01	Initial report	2019-12-30

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3 General Information

3.1 Client Information

Applicant:	SHANTOU LULA PLASTIC PRODUCTS CO., LIMITED.
Address of Applicant:	4TH FLOOR, JINCHENG BUILDING, PUMEI DISTRICT, GUANGYI STREET, CHENGHAI, SHANTOU, CHINA
Manufacturer:	SHANTOU LULA PLASTIC PRODUCTS CO., LIMITED.
Address of Manufacturer:	4TH FLOOR, JINCHENG BUILDING, PUMEI DISTRICT, GUANGYI STREET, CHENGHAI, SHANTOU, CHINA

3.2 General Description of EUT

Product Name:	R/C QUADCOPTER/DRONE
All Model No.:	X300C, 8816, 8816W, 8810, 8810W, A6, A6W, A6GPS, 8808, 8808W, 8801, 8802, 8802W, 8803, 8803W, 8805, 8805W, 8806, 8806W, 8807, 8807W, 8807OFP, 8809, 8809W, 8809OFP, 8811, 8811W, 8812, 8812W, 8813, 8813W, 8815, 8815W, 8816, 8816W, 8817, 8817W, 8818, 8818W, 8819, 8819W, 8820, 8820-1, 8820W, 8822, 8822-1, 8822W, 8823, 8823-1, 8823W, 88025, 8825-1, 88025W, 8826, 8826-1, 8826W, 8827, 8827-1, 8827W, 8828, 8828-1, 8828W, 8829, 8829-1, 8829W, S5
Test Model No.:	X300C
Trade Mark:	N/A
Hardware version:	KY-XLL8810R-163-1
Software version:	KY-XLL8810R-163-1
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20 and HT40) : OFDM (64QAM, 16QAM, QPSK,BPSK)
Transfer Rate:	IEEE for 802.11b: 1Mbps/2Mbps/5.5Mbps/11Mbps IEEE for 802.11g : 6Mbps/9Mbps/12Mbps/18Mbps/24Mbps/36Mbps/48Mbps/54Mbps IEEE for 802.11n(HT20) : 6.5Mbps/13Mbps/19.5Mbps/26Mbps/39Mbps/52Mbps/58.5Mbps/65Mbps IEEE for 802.11n(HT40) : 13.5Mbps/27Mbps/40.5Mbps/54Mbps/81Mbps/108Mbps/121.5Mbps/135Mbps
Product Type:	<input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable <input type="checkbox"/> Fix Location
Test Software of EUT:	RF test (manufacturer declare)
Antenna Type:	Integral antenna
Antenna Gain:	0dBi
Power Supply:	Li-ion Battery 3.7V, Charging by DC5V

Note:

Model No.: X300C, 8816, 8816W, 8810, 8810W, A6, A6W, A6GPS, 8808, 8808W, 8801, 8802, 8802W, 8803, 8803W, 8805, 8805W, 8806, 8806W, 8807, 8807W, 8807OFP, 8809, 8809W, 8809OFP, 8811, 8811W, 8812, 8812W, 8813, 8813W, 8815, 8815W, 8816, 8816W, 8817, 8817W, 8818, 8818W, 8819, 8819W, 8820, 8820-1, 8820W, 8822, 8822-1, 8822W, 8823, 8823-1, 8823W, 88025, 8825-1, 88025W, 8826, 8826-1, 8826W, 8827, 8827-1, 8827W, 8828, 8828-1, 8828W, 8829, 8829-1, 8829W, S5

Only the model X300C was tested, Their electrical circuit design, layout, components used and internal wiring are identical, Only the color or the packaging is different..

4 SAR Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.1.3 EUT RF Exposure

1) For WIFI

Antenna Gain: 0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

IEEE for 802.11b mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	9.31	9.0±1	10	10.000
Middle(2437MHz)	9.77	9.0±1	10	10.000
Highest(2462MHz)	9.21	9.0±1	10	10.000
IEEE for 802.11g mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	8.12	8.0±1	9	7.943
Middle(2437MHz)	9.47	9.0±1	10	10.000
Highest(2462MHz)	9.09	9.0±1	10	10.000
IEEE for 802.11n(HT20) mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2412MHz)	7.86	8.0±1	9	7.943
Middle(2437MHz)	9.37	9.0±1	10	10.000
Highest(2462MHz)	9.26	9.0±1	10	10.000
IEEE for 802.11n(HT40) mode				
Test channel	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2422MHz)	8.38	8.5±1	9.5	8.913
Middle(2437MHz)	8.92	8.5±1	9.5	8.913
Highest(2452MHz)	8.53	8.5±1	9.5	8.913

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
10.000	0	0.00199	1.0	PASS

Note: 1) Refer to report No. CQASZ20191201284E-01 for EUT test Max Conducted Peak Output Power value.

2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (10.000 * 1) / (4 * 3.1416 * 20^2) = 0.00199$