

GuangZhou Walkera Technology Co., Ltd

Application
For
Certification
FCC ID: S29VOYAGER-3

R/C Helicopter

Model: VOYAGER-3

Computer Peripheral

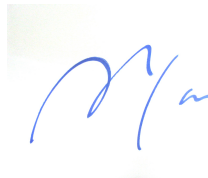
Report No.: 150422024SZN-002

Prepared and Checked by:

Approved by:

Sign on file

Leo Lai
Senior Project Engineer



Digitally signed
by Andy Yan
Location: Intertek
Testing Services

Andy Yan
Technical Supervisor
Date: May 3, 2016

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TRF No.: FCC 15C_PC_b

INTERTEK TESTING SERVICES

LIST OF EXHIBITS

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MEASUREMENT / TECHNICAL REPORT

GuangZhou Walkera Technology Co., Ltd

**Taishi Industrial Park, Dongchong Town, Panyu District, Guangzhou,
China**

MODEL: VOYAGER-3

FCC ID: S29VOYAGER-3

This report concerns (check one:) Original Grant ☒ Class II Change ☐

Equipment Type: JBP-Class B Computing Device Peripheral

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes ☐ No ☒

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes ☐ No ☒

If no, assumed Part 15, Subpart B for unintentional radiator – the new 47 CFR [10-01-14 Edition] provision.

Report prepared by:

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List of attached file

Exhibit Type	File Description	Filename
Test Report	Test Report	report.pdf
Test Setup Photo	Radiated photos	radiated photos.pdf
Test Setup Photo	Conducted photos	conducted photos.pdf
External Photo	External Photos	external photos.pdf
Internal Photo	Internal Photos	internal photos.pdf
Block Diagram	Block Diagram	block.pdf
ID Label / Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf
Cover Letter	Confidential Letter	request.pdf
Cover Letter	Letter of Agency	agency.pdf

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EXHIBIT 1

GENERAL DESCRIPTION

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1.0 **General Description**

1.1 Product Description

The Equipment under Test (EUT) is a wireless R/C Helicopter which can transfer data with PC through PC USB Port. For more detail please refer to user manual.

1.2 Related Submittal(s) Grants

This is an application for certification of a computer peripheral. The wireless function were reported in the report: 150422024SZN-001/150422024SZN-003.

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1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). Radiated emission measurement was performed in Semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility

The Semi-anechoic chamber and shielding room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: 242492).

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EXHIBIT 2

SYSTEM TEST CONFIGURATION

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2.0 **System Test Configuration**

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2009).

The EUT was powered by PC USB port (PC is powered through AC 120V/60Hz) during the test. Only the worst case data was reported.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. The step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

The frequency range from 30MHz to 1.0GHz (The highest frequency of the internal sources of the EUT is less 108MHz) was searched for spurious emissions from the device. Only those emissions reported were detected. All other emissions were at least 20 dB below the applicable limits.

2.2 EUT Exercising Software

N/A

2.3 Special Accessories

Shielded USB cable was used.

2.4 Equipment Modification

Any modifications installed previous to testing by GuangZhou Walkera Technology Co., Ltd will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch.

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2.5 Measurement Uncertainty

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

2.6 Support Equipment List and Description

This product was tested in the following configuration:

Refer List:

Description	Manufacturer	Model No.
Laptop	Lenovo	X1
Hard Disk	N/A	Smart. drive
USB Cable	N/A	Shielded, Length: 120cm
RJ45 Cable	N/A	5.0m
Router	TP-LINK	TL- SF1008+

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EXHIBIT 3

EMISSION RESULTS

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3.0 **Emission Results**

Data is included worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

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3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG$$

where FS = Field Strength in dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dB μ V

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB/m

AG = Amplifier Gain in dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG$$

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3.1 Field Strength Calculation (cont'd)

Example

Assume a receiver reading of 62.0dB μ V is obtained. The antenna factor of 7.4dB/m and cable factor of 1.6dB is added. The amplifier gain of 29dB is subtracted. The net field strength for comparison to the appropriate emission limit is 42dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 62.0\text{dB}\mu\text{V}$$

$$AF = 7.4\text{dB/m}$$

$$CF = 1.6\text{dB}$$

$$AG = 29.0\text{dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 = 42\text{dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm} [(42\text{dB}\mu\text{V/m})/20] = 125.9\mu\text{V/m}$$

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3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission
At
668.801MHz

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos.pdf.

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3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 4.1dB margin

TEST PERSONNEL:

Sign on file

Leo Lai Senior Project Engineer_____
Typed/Printed Name

July 10, 2015_____
Date

INTERTEK TESTING SERVICES

Company: GuangZhou Walkera Technology Co., Ltd

Date of Test: July 10, 2015

Model: VOYAGER-3

Operating Mode: Data Transfer

Table 1

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	117.300	41.5	20.0	10.6	32.1	43.5	-11.4
Horizontal	152.705	42.7	20.0	15.4	38.1	43.5	-5.4
Horizontal	666.805	32.5	20.0	25.0	37.5	46.0	-8.5
Vertical	45.520	23.9	20.0	24.3	28.2	40.0	-11.8
Vertical	140.580	30.3	20.0	27.5	37.8	43.5	-5.7
Vertical	668.801	33.3	20.0	28.6	41.9	46.0	-4.1

NOTES:

1. Quasi-Peak detector is used for frequency up to 1GHz.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.
4. All emissions up to 1GHz are below the QP limit.

Test Engineer: Leo Lai

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3.4 Conducted Emission at Mains Terminal

3.5 Conducted Emission Configuration Photograph

Worst Case Conducted Configuration
at
0.402 MHz

For electronic filing, the worst case conducted emission configuration photograph is saved with filename: conducted photos.pdf.

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3.6 Conducted Emission Data

Judgement: Passed by 14.7 dB margin

TEST PERSONNEL:

Sign on file

Leo Lai Senior Project Engineer_____
Typed/Printed Name

July 10, 2015_____
Date

INTERTEK TESTING SERVICES

Company: GuangZhou Walkera Technology Co., Ltd

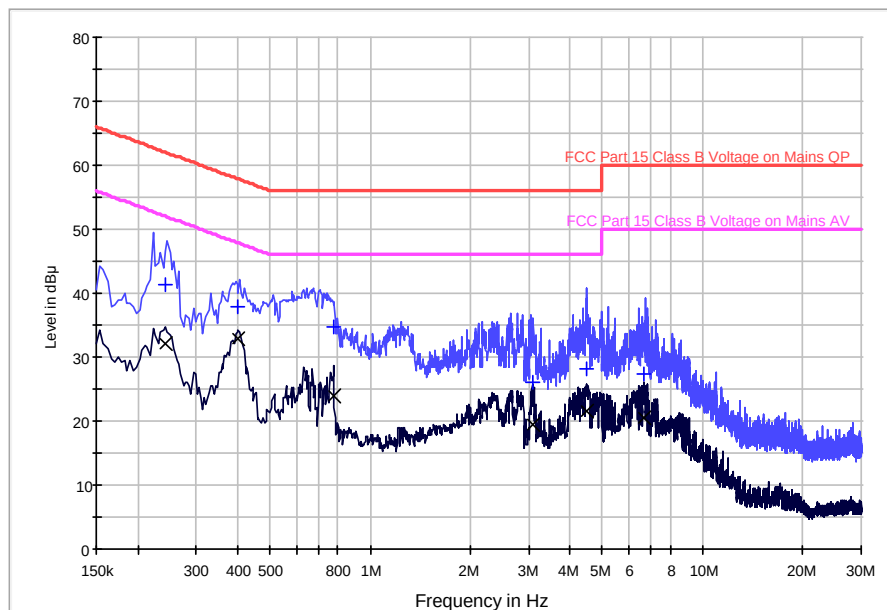
Date of Test: July 10, 2015

Model: VOYAGER-3

Operating Mode: Data Transfer

Phase: Live

Conducted Emission Test - FCC



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.242000	41.2	L1	9.9	20.8	62.0
0.402000	37.9	L1	9.9	19.9	57.8
0.778000	34.8	L1	10.0	21.2	56.0
3.066000	26.1	L1	10.0	29.9	56.0
4.466000	28.3	L1	10.0	27.7	56.0
6.674000	27.3	L1	10.0	32.7	60.0

Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.242000	32.2	L1	9.9	19.8	52.0
0.402000	32.8	L1	9.9	15.0	47.8
0.778000	24.0	L1	10.0	22.0	46.0
3.066000	19.5	L1	10.0	26.5	46.0
4.466000	21.5	L1	10.0	24.5	46.0
6.674000	20.6	L1	10.0	29.4	50.0

Test Engineer: Leo Lai

TRF No.: FCC 15C_PC_b

FCC ID: S29VOYAGER-3

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Company: GuangZhou Walkera Technology Co., Ltd

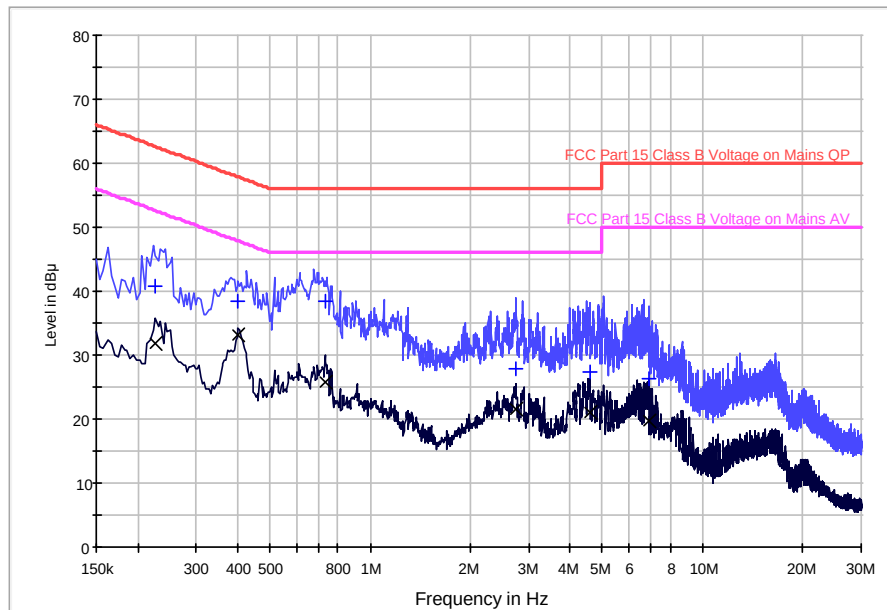
Date of Test: July 10, 2015

Model: VOYAGER-3

Operating Mode: Data Transfer

Phase: Neutral

Conducted Emission Test - FCC



Limit and Margin QP

Frequency (MHz)	QuasiPeak (dBuV)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.226000	40.8	N	10.2	21.8	62.6
0.402000	38.3	N	10.2	19.5	57.8
0.730000	38.3	N	10.3	17.7	56.0
2.738000	27.8	N	10.3	28.2	56.0
4.598000	27.2	N	10.3	28.8	56.0
6.862000	26.4	N	10.3	33.6	60.0

Limit and Margin AV

Frequency (MHz)	Average (dBuV)	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.226000	31.8	N	10.2	20.8	52.6
0.402000	33.1	N	10.2	14.7	47.8
0.730000	25.7	N	10.3	20.3	46.0
2.738000	21.4	N	10.3	24.6	46.0
4.598000	21.1	N	10.3	24.9	46.0
6.862000	19.6	N	10.3	30.4	50.0

Test Engineer: Leo Lai

TRF No.: FCC 15C_PC_b

FCC ID: S29VOYAGER-3

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EXHIBIT 4

EQUIPMENT PHOTOGRAPHS

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4.0 **Equipment Photographs**

For electronic filing, photographs of the tested EUT are saved with filename: external photos.pdf and internal photos.pdf.

EXHIBIT 5
PRODUCT LABELLING

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5.0 **Product Labelling**

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

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EXHIBIT 6

TECHNICAL SPECIFICATIONS

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6.0 **Technical Specifications**

For electronic filing, the block diagram of the tested EUT is saved with filename: block.pdf.

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EXHIBIT 7

INSTRUCTION MANUAL

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7.0 **Instruction Manual**

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold / leased in the United States.

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EXHIBIT 8

MISCELLANEOUS INFORMATION

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8.0 **Miscellaneous Information**

This miscellaneous information includes emission measuring procedure.

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8.1 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of computer peripheral operating under Part 15, Subpart B rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 – 2009.

The computer peripheral equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The antenna height and polarization are varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in QP mode from the frequency band 30MHz to 1GHz with RBW setting 120kHz. Detector function for conducted emissions are in QP & AV mode and IFBW setting is 9kHz.

For radiated emission, the frequency range scanned is 30MHz to 1GHz. For line-conducted emissions, the range scanned is 150kHz to 30MHz.

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8.1 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

Conducted measurements are made as described in ANSI C63.4 – 2009.

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EXHIBIT 9

TEST EQUIPMENT LIST

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9.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-12	BiConiLog Antenna	ETS	3142E	00166158	2-Sep-14	2-Sep-15
SZ185-01	EMI Receiver	R&S	ESCI	100547	07-Feb-15	07-Feb-16
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	19-Apr-14	19-Apr-16
SZ062-22	RF Cable	HUBER+SUHNER	SF104PE	--	7-Apr-15	7-Oct-15
SZ062-23	RF Cable	HUBER+SUHNER	SF104PE	--	1-Nov-14	1-Nov-15
SZ062-25	RF Cable	HUBER+SUHNER	SF104PE	--	8-Jan-15	8-Jan-16
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	1-Nov-14	1-Nov-15
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	1-Nov-14	1-Nov-15
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	1-Nov-14	1-Nov-15
SZ188-03	Shielding Room	ETS	RFD-100	4100	23-Aug-14	23-Aug-15