SLG Asia Test Labs & Service (HK) Limited

Test Report

According to

FCC PART 15 Subpart C

FCC ID: S29WK-CTL01-D

Test Report Number: H1M21112-9668-P-15

SLG Asia Test Labs & Service (HK) Limited
26/F., Tamson Plaza, 161 Wai Yip Street
Kwun Tong, Kowloon, Hong Kong

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SLG Asia Test Labs & Service (HK) Limited

TEST REPORT

Summary | FCC Part 15C

Test Report No. ..... :	H1M21112-9668-P-15
Date of issue..... :	29.02.2012
Testing Laboratory name ..... :	SLG Asia Test Labs & Service (HK) Limited
Address..... :	26/F., Tamson Plaza, 161 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong
Applicant's name ..... :	GUANGZHOU Walkera Technology Co., Ltd.
Address..... :	Taishi Industrial Park, Dongchong Town, Panyu District, 511475 Guangzhou, China
Manufacturer's name ..... :	GUANGZHOU Walkera Technology Co., Ltd.
Address..... :	Taishi Industrial Park, Dongchong Town, Panyu District, 511475 Guangzhou, China
Test specification	
Standard(s) applied ..... :	FCC Rules 47 CFR Part 15 Subpart C
Test item description ..... :	Telemetry module
Brand Name ..... :	devention, WALKERA
Model and/or type reference..... :	WK-CTL01-D
Rating(s) ..... :	5 VDC

Summary of Test Results **Pass**

The Summary of Test Results based on a technical opinion belongs to the applied standard(s).

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Further details of testing are provided in particular chapters of this Test Report.
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1 General Information

1.1 Test Report

Tested by:

29.02.2012 Mr. Karl Lau 

Date Test Engineer Signature

Approved by:

29.02.2012 Mr. F. Schulz 

Date Laboratory Manager Signature

1.2 Test Location

All tests were carrying by personnel from:

Name: SLG Asia Test Labs & Service (HK) Limited
Address: 26/F., Tamson Plaza, 161 Wai Yip Street
Kwun Tong, Kowloon, Hong Kong

Telephone: +852 2389 2200
Fax: +852 2389 3073

The Test facility for radiated measurements is located at:

Name : Hong Kong Productivity Council
Address: EMC Centre, LG1, HKPC Building, 78 Tat Chee Avenue
Kowloon, Hong Kong

The Hong Kong Laboratory Accreditation Scheme (HOKLAS)
Reg. No.082

FCC registered measurement facility
Reg. No.90656

1.3 Details of applicant

Name: GUANGZHOU Walkera Technology Co., Ltd.
Address: Taishi Industrial Park, Dongchong Town, Panyu District
511475 Guangzhou, China

Contact: Mr. Ya
Telephone: +86 20 8491 5116
Fax: +86 20 8491 5117

1.4 Manufacturer

Name: GUANGZHOU Walkera Technology Co., Ltd.
Address: Taishi Industrial Park, Dongchong Town, Panyu District
511475 Guangzhou, China

Contact: Mr. Ya
Telephone: +86 20 8491 5116
Fax: +86 20 8491 5117

1.5 Application details

Date of receipt of application:	05.12.2011	
Date of receipt of test item:	05.12.2011	
Date (s) of performance of tests:	05.12.2011	- 29.02.2012

1.6 Test item

Description of test item:	Telemetry module
Type identification:	WK-CTL01-D
Brand Name:	devention, WALKERA
Equipment category:	2.4GHZ Spread Spectrum Transceiver
Equipment classification:	Portable use
Permitted frequency range:	2400 – 2483.5 MHz
Operation frequency range:	2405 – 2479 MHz
Lowest Operation frequency:	2405 MHz
Middles Operation frequency:	2441 MHz
Highest Operation frequency:	2479 MHz
Emission designator:	F7D
Antenna gain:	≤ 3 dBi
Type of modulation:	DSSS
Operation mode:	simplex
Type of antenna:	integral
Power supply:	5 VDC

All information was provided by the applicant)

Test configuration

The following equipment was used for supporting the module and for function test only:

V450 (with RX801module): 11.1V, 2200mAh (rechargeable Li-Po battery)

Transceiver Devo-8S:

1.7 General Test Conditions

Environmental reference conditions

If not defined otherwise by the Technical Committee responsible for the generic standard and/or the product standard the climatic conditions during the tests are to be within the limits specified by the manufacturer for the operation of the EUT and the test equipment.

The climatic conditions during the tests were within the following limits:

Temperature	Humidity	Atmospheric pressure
15 °C - 35 °C	30 % - 60 %	860 hPa - 1060 hPa

If explicitly required in the test base (basic) the climatic values are recorded and documented separately for the respective test.

Calibration of measurement and test equipment

All measurement and testing equipment that has a significant influence on the accuracy of qualitative measurements and tests is subject to a periodical in-house system of calibration and servicing that is part of the quality management system of the EMC laboratory of SLG Asia Test Labs & Service (HK) Limited.

Measurement uncertainties

All tests are subject to measurement uncertainties. The overall measurement uncertainty of a measurement is defined as the range of which can be supposed that it contains the true value with a specified probability. This probability is 95 % for the generally specified measurement uncertainty (so-called expanded measurement uncertainty).
The limits for emission measurements and the test levels for immunity tests in the applied standards were defined taking into consideration the accuracy limits for measurement and testing equipment required by the basic standards.
All measurement and test results of the EMC laboratory of SLG Asia Test Labs & Service (HK) Limited fulfil the requirements for measurement uncertainties according to the standards applied.

2 Test result Summary

Digital Transmission system (2400-2483.5MHz)

Requirements according standard:				
FCC Rule	**Test description**	**Results/Notes**	**Limits/Requirements**	**Verdict**
15.247(a)	Digital modulation	System uses DSSS techniques		P
15.247(a) (2)	6dB Bandwidth	> 918.2 KHz	> 500kHz	P
15.247(b) (3)	Output power	12.81 dBm (0.019 W)	1W, EIRP limited to 4W	P
15.247(d)	Power Spectral Density	-4.41 dBm/3kHz	< 8dBm/3kHz	P
15.247(c) / 15.209	Radiated Spurious Emissions 30MHz – 25GHz	All signals below Limits	15.207 restricted bands, all others < -20dBc	P
15.203	RF Connector	EUT has integral antenna		P
15.247 (b)/ 15.407 (f)	RF Exposure requirements	Refer to MPE calculation and User manual statement	Refer to OET 65	P

Test case verdicts

P	*- Pass*	*Test item does meet the requirement*
F	*- Fail*	*Test item does not meet the requirement*
N.A.	*- Not Applicable*	*Test case does not apply to the test object*

3 Test results

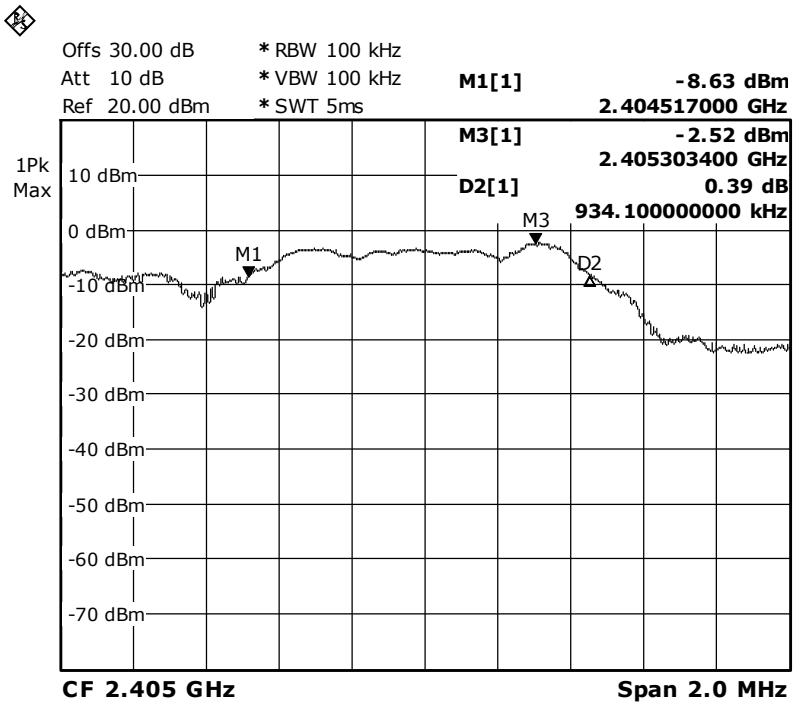
3.1. 6dB Bandwidth

Measurement Results:

FCC part 15.247 (a) (2): Signal Bandwidth

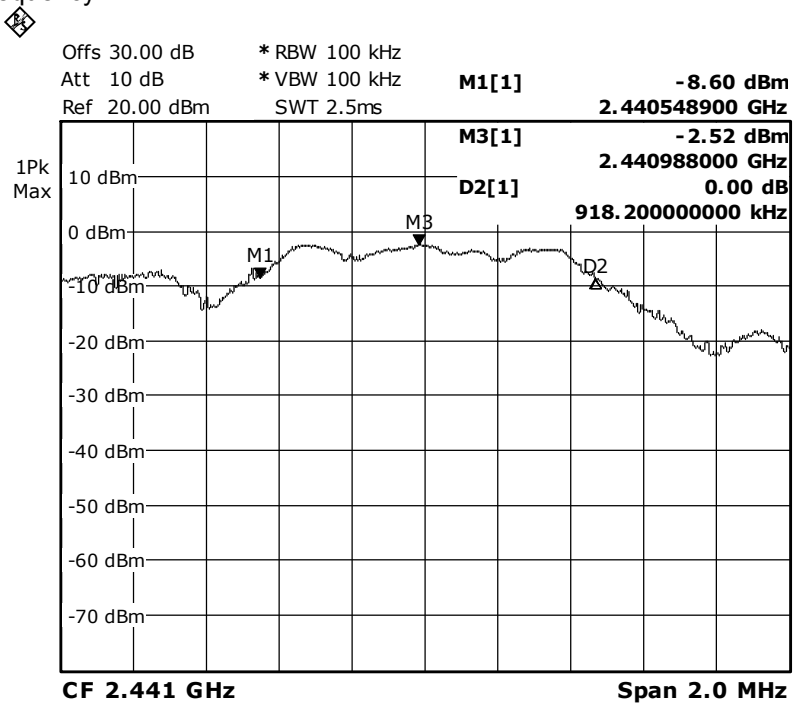
Frequency (MHz)	Resolution bandwidth	6dB bandwidth (kHz)	Limit (kHz)	Results
2405	100kHz	934.1	>500	Pass
2441	100kHz	918.2	>500	Pass
2479	100kHz	918.2	>500	Pass

Lowest Operation frequency: 2405 MHz



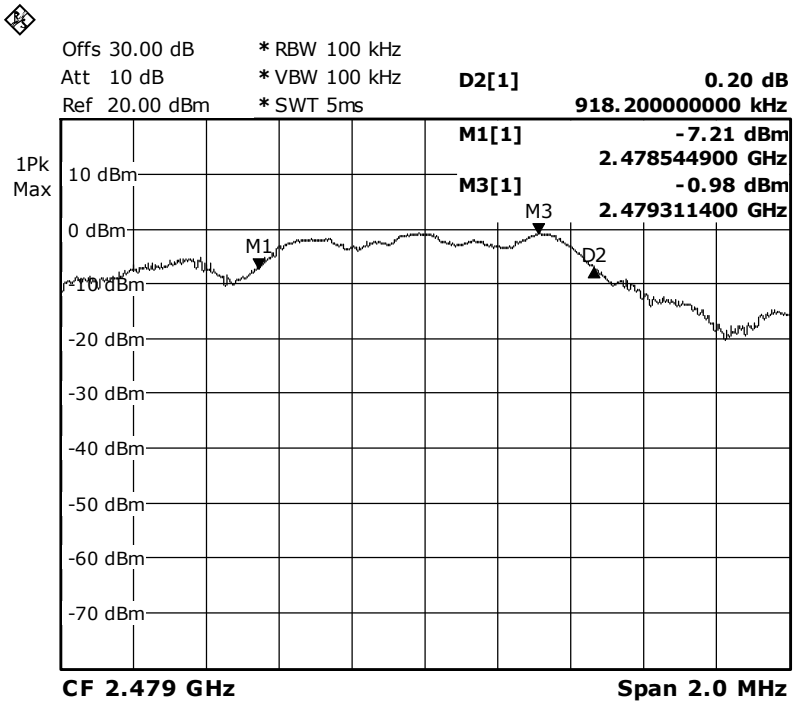
Occupied bandwidth: 2182.4 KHz

Middles Operation frequency: 2441 MHz



Occupied bandwidth: 2182.4 KHz

Highest Operation frequency: 2479 MHz



Occupied bandwidth: 2182.4 KHz

3.2. Output power

Measurement Results:

FCC part 15.247 (b) (3): Output Power

Frequency	Output Power		Antenna Gain	Results	EIRP	
MHz	dBm	mW	dBi		dBm	mW
2405	9.73	9.397233	3	Pass	12.73	0.019
2441	9.81	9.571941	3	Pass	12.81	0.019
2479	8.23	6.652732	3	Pass	11.23	0.013

All results were measured with peak power meter.

Measurement Equipment Used:

Test equipment	Type	S/N	Manufacturer	Cal Due Date
Spectrum Analyzer	FSEK 20	836043/003	Rohde & Schwarz	Sep 12

3.3. Power Spectral Density

Measurement Results:

FCC part 15.247 (d): Power spectral Density

Frequency MHz	PSD dBm/3kHz	Limit dBm/3kHz	Results
2405	-6.67	8	Pass
2441	-4.41	8	Pass
2479	-7.02	8	Pass

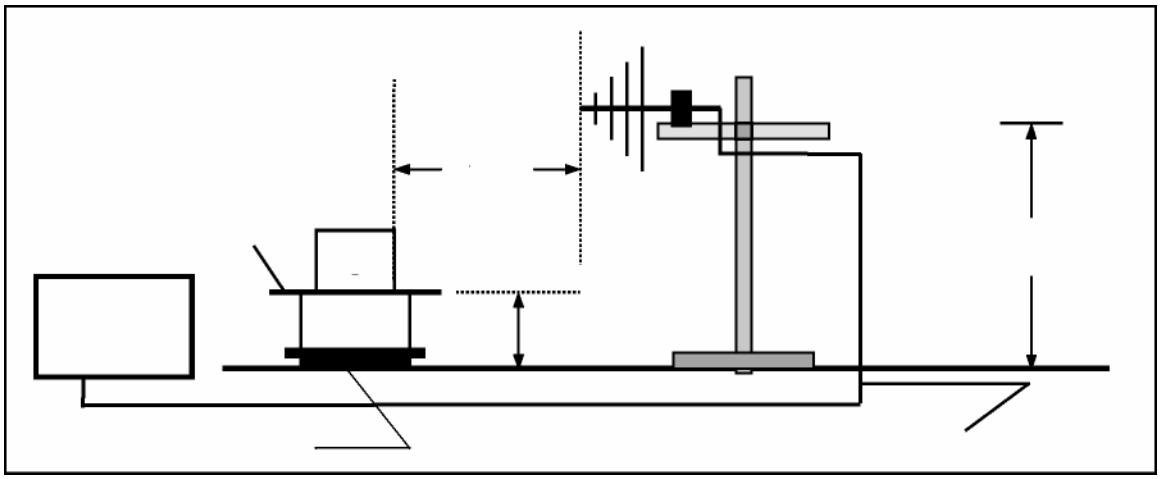
Note 1:	Power spectral density measured using RBW=3kHz, VBW=10kHz, analyzer with peak detector and with a sweep time set to ensure a dwell time of at least 1 second per 3kHz. The measurement is made at the frequency of PPSD determined from preliminary scans using

Measurement Equipment Used:

Test equipment	Type	S/N	Manufacturer	Cal Due Date
Spectrum Analyzer	FSEK 20	836043/003	Rohde & Schwarz	Sep 12

3.4. Radiated spurious emission

Measurement Procedure



The equipment under test is placed on a non metallic table with 0.8 m height.
The power supply and the RF connection points are close to the equipment under test at the floor inside a connection box. The cables to this connection box are shielded and below the double floor. The receiving antenna is placed in a height at 1.0 m to 4.0 m and in a distance of 3 m.

Measurement Equipment Used:

Test equipment	Type	S/N	Manufacturer	Cal Due Date
Semi-anechoic Chamber	Nil	Nil	Frankonia	May 12
Test Reciever	ESU 26	100050	Rohde & Schwarz	Aug 12
Bi-conical Antenna	HK116	841489/016	Rohde & Schwarz	Mar 12
Log.-Periodic Antenna	HL223	841516/020	Rohde & Schwarz	Feb 12
Horn Antenna	3115	9002-3351	EMCO	Feb 12
Active Loop Antenna	6502	9107-2651	EMCO	Dec 12

Measurement Results:

Low Frequency @ 2405 MHz

Fundamental emission level @3m in 100kHz RBV				107.96		dBμV/m
Limit for emission outside of restricted bands:				87.96		dBμV/m
Frequency	**Level**	**Pol**	**15.209/15.247**		**Detector**	**Comments**
MHz	**dBμV/m**	**V/H**	**Limit**	**Margin**	**Pk/QP/Avg**	
149.920	29.54	V	43.50	13.96	Pk	RB/VB 100kHz
191.142	29.93	H	87.96	58.03	Pk	RB/VB 100kHz
900.601	18.12	V	87.96	69.84	Pk	RB/VB 100kHz
897.395	17.93	H	87.96	70.03	Pk	RB/VB 100kHz
4810	43.00	V	54.00	11.00	Avg	RB/VB 1MHz
4810	46.55	H	54.00	7.45	Avg	RB/VB 1MHz
7214	46.88	V	54.00	7.12	Avg	RB/VB 1MHz
7214	47.14	H	54.00	6.86	Avg	RB/VB 1MHz
9618	38.02	V	87.96	49.94	Avg	RB/VB 1MHz
9618	40.79	H	87.96	47.17	Avg	RB/VB 1MHz
For emission in restricted band, the limit of 15,209 was used. For all other emission, the limit was set 20dB below the level of fundamental and measured in 100kHz						

Middle Frequency @ 2441 MHz

Fundamental emission level @3m in 100kHz RBV	108.04	dBμV/m
Limit for emission outside of restricted bands:	88.04	dBμV/m

Frequency	**Level**	**Pol**	**15.209/15.247**		**Detector**	**Comments**
MHz	**dBmV/m**	**V/H**	**Limit**	**Margin**	**Pk/QP/Avg**	
196.593	30.19	V	88.04	57.85	Pk	RB/VB 100kHz
88.597	29.99	H	88.04	58.05	Pk	RB/VB 100kHz
897.395	18.06	V	88.04	69.98	Pk	RB/VB 100kHz
951.904	18.09	H	88.04	69.95	Pk	RB/VB 100kHz
4882	44.82	V	54.00	9.18	Avg	RB/VB 1MHz
4882	44.03	H	54.00	9.97	Avg	RB/VB 1MHz
7327	47.31	V	54.00	6.69	Avg	RB/VB 1MHz
7327	47.97	H	54.00	6.03	Avg	RB/VB 1MHz
9761	39.85	V	88.04	48.19	Avg	RB/VB 1MHz
9761	42.60	H	88.04	45.44	Avg	RB/VB 1MHz
For emission in restricted band. the limit of 15.209 was used. For all other emission. the limit was set 20dB below the level of fundamental and measured in 100kHz						

High Frequency @ 2479 MHz

Fundamental emission level @3m in 100kHz RBV	106.46	dBμV/m
Limit for emission outside of restricted bands:	86.46	dBμV/m

Frequency	Level	Pol	15.209/15.247		Detector	Comments
MHz	dBmV/m	V/H	Limit	Margin	Pk/QP/Avg	
196.934	29.47	V	86.46	56.99	Pk	RB/VB 100kHz
196.253	29.98	H	86.46	56.48	Pk	RB/VB 100kHz
216.032	18.47	V	86.46	67.99	Pk	RB/VB 100kHz
892.585	18.27	H	86.46	68.19	Pk	RB/VB 100kHz
4958	47.04	V	54.00	6.96	Avg	RB/VB 1MHz
4954	47.87	H	54.00	6.13	Avg	RB/VB 1MHz
7438	46.93	V	54.00	7.07	Avg	RB/VB 1MHz
7439	46.12	H	54.00	7.88	Avg	RB/VB 1MHz
9913	44.46	V	86.46	42.00	Avg	RB/VB 1MHz
9913	47.48	H	86.46	38.98	Avg	RB/VB 1MHz

For emission in restricted band the limit of 15.209 was used. For all other emission. the limit was set 20dB below the level of fundamental and measured in 100kHz

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4. Emissions 20dB lower than the limit are not reported.

FCC Part 15. Subpart C. §15.209. Radiated Emission Limits

Frequency of Emission [MHz]	Field strength [μV/m]	Field Strength [dBμV/m]
30 – 88	100	40.0
88 – 216	150	43.5
216 – 960	200	46.0
Above 960	500	54.0

FCC Part 15. Subpart C. §15.205. Restricted bands of operation

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
10.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	
13.36-13.41			

4 Normative references

/1/ FCC Rules 47 CFR PART 15 Subpart: 2010
Radio Frequency Devises

/2/ ANSI C63.4-2003
Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

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5.1 Revision Notes

This revised Report replaces the all former Test Reports based on number H1M21112-9668-P-15. These former Test Reports are not longer valid. Every Revision of the original report is recorded below and identified by the ‖ symbol beside the text.

Revision No.	Revision
H1M21112-9668-P-15	Original Test Report