



**SLG Asia Test Labs & Service (HK) Limited**

# **Test Report**

**According to**

**FCC PART 15 Subpart C**

**FCC ID: S29DEVO-F4**

**Test Report Number: H1M21301-0746-P-15**



## TEST REPORT

### Summary | FCC Part 15C

Test Report No. ....: H1M21301-0746-P-15

Date of issue.....: 07.03.2013

**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** .....: Transmitter for R/C Helicopter

Brand Name .....: devention, WALKERA

Model and/or type reference.....: DEVO-F4

Rating(s) .....: 6 VDC (4 x AA size batteries)

#### Summary of Test Results

**Pass**

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

#### Disclaimer

*Further details of testing are provided in particular chapters of this Test Report.*

*This document base on General Terms and Conditions of SLG Asia Test Labs & Service (HK) Limited, which the applicant accepted with order confirmation.*

#### Emphasized conditions or project related conditions:

*Released Test Reports apply only to the specific samples tested under stated test conditions. It is the applicant's responsibility to assure that additional production units of the tested model(s) are manufactured in same construction and with identical electrical and mechanical components to meet the same quality as tested model(s). The applicant/manufacturer/importer is responsible for any modifications made to the production units which result in non-compliance to the applied and/or relevant regulations. SLG Asia Test Labs & Service (HK) Limited shall have no liability for any deductions, inferences or generalizations drawn by the client or others from any kind of issued reports. Reports are confidential property of the client. As a mutual protection to the applicant, the clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval.*



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## 1 General Information

### 1.1 Test Report

Tested by:

07.03.2013

Mr. Karl Lau

Date

Test Engineer

Signature

Approved by:

07.03.2013

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: 22.01.2013  
Date of receipt of test item: 22.01.2013  
Date (s) of performance of tests: 22.01.2013 - 07.03.2013

## 1.6 Test item

Description of test item: Transmitter for R/C Helicopter  
Type identification: DEVO-F4  
Brand Name: devention, WALKERA

Equipment category: 2.4GHz DSSS Spread Spectrum Transmitter  
Equipment classification: Portable use  
Permitted frequency range: 2400 – 2483.5 MHz  
Operation frequency range: 2405 – 2479 MHz (2.4GHz DSSS Transceiver)  
Lowest Operation frequency: 2405 MHz  
Middles Operation frequency: 2441 MHz  
Highest Operation frequency: 2479 MHz  
Emission designator: F7D  
Antenna gain:  $\leq 3$  dBi  
Type of modulation: DSSS  
Operation mode: simplex  
Operation frequency range: 5733 – 5866 MHz (5.8GHz Video receiver)  
Type of antenna: integral  
Power supply: 6 VDC (4 x AA size batteries)

All information was provided by the applicant)



## 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	> 898 KHz	> 500kHz	P
15.247(b) (3)	Maximum peak E Power	17.07 dBm (EIRP) (50.93 mW)	1W, EIRP limited to 4W	P
15.247(e)	Power Spectral Density	4.31 dBm/3kHz	< 8dBm/3kHz	P
15.247(d) / 15.209, 15.205	Out-of-band Emission 30MHz – 25GHz	All signals below Limits	15.209, 15.205 restricted bands, all others < -20dBc	P
15.247(d)	Band-edge requirements in 100kHz Bandwidth	All frequencies inside the band	Within range 2405-2483.5MHz	P
15.203	RF Connector	EUT has integral antenna		P
15.247 (b)/ 15.407 (f)	RF Exposure requirements	Refer to MPE Calculation and statement in user manual	Refer to OET 65	P
15.109	Receiver radiated emission	All signals below Limits	15.109 class B	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

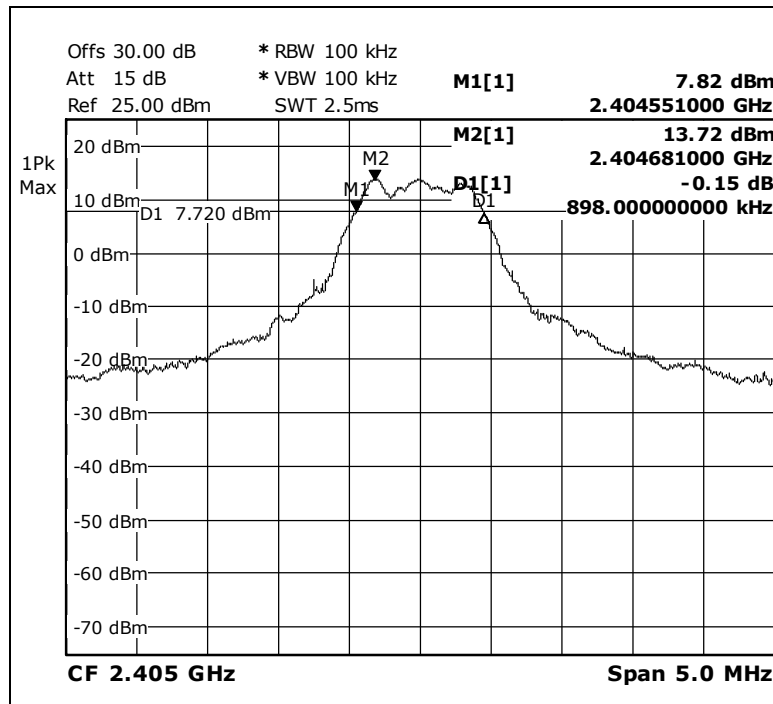
### 3.1. 6dB Bandwidth

#### Measurement Results:

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

Frequency (MHz)	Resolution bandwidth	6dB bandwidth (kHz)	Limit (kHz)	Results
2405	100kHz	898	>500	Pass
2441	100kHz	908	>500	Pass
2479	100kHz	908	>500	Pass

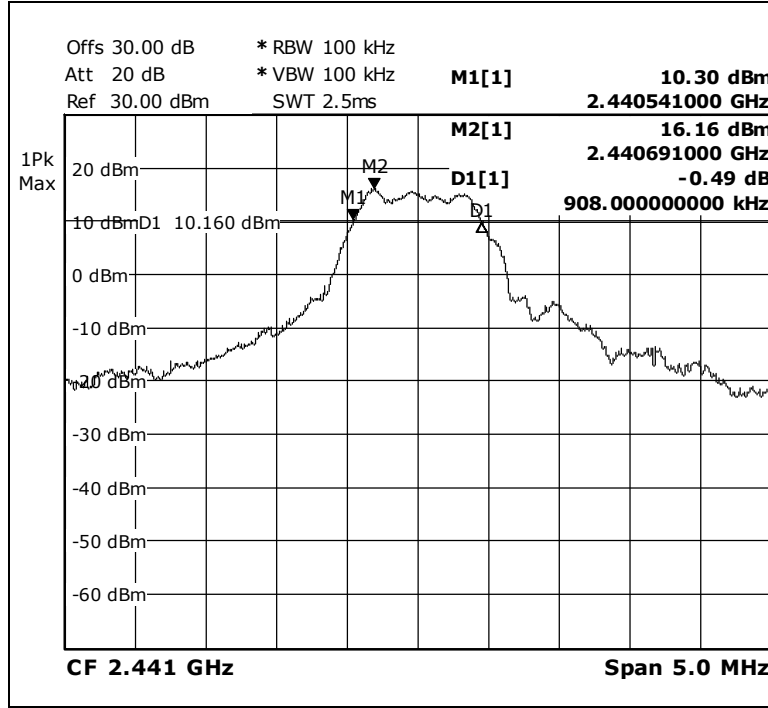
Lowest Operation frequency: 2405 MHz



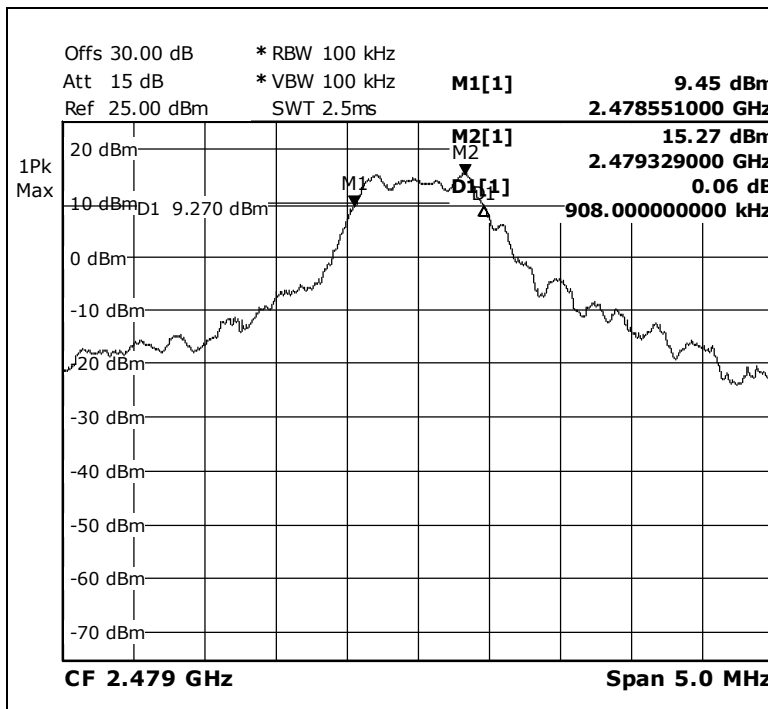
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Middles Operation frequency: 2441 MHz



Highest Operation frequency: 2479 MHz



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**3.2. Output power**

**Measurement Results:**

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

Frequency MHz	Output Power		Antenna Gain dBi	Results	EIRP	
	dBm	mW			dBm	mW
2405	13.08	20.32	3	Pass	16.08	40.55
2441	14.07	25.53	3	Pass	17.07	50.93
2479	11.14	13.00	3	Pass	14.14	25.94

**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 13



### 3.3. Power Spectral Density

#### Measurement Results:

FCC part 15.247 (e): Power spectral Density

Frequency MHz	PSD dBm/3kHz	Limit dBm/3kHz	Results
2405	2.35	8	Pass
2441	4.31	8	Pass
2479	3.25	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
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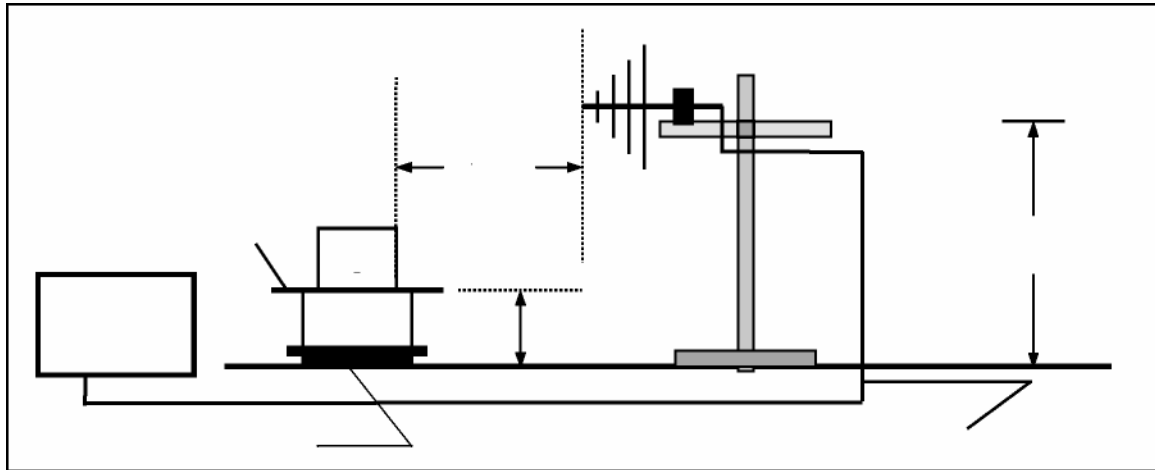
#### Measurement Equipment Used:

Test equipment	Type	S/N	Manufacturer	Cal Due Date
Spectrum Analyzer	FSEK 20	836043/003	Rohde & Schwarz	Sep 13



## 3.4. Out-of-band 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 13
Test Receiver	ESU 26	100050	Rohde & Schwarz	Aug 13
Bi-conical Antenna	HK116	841489/016	Rohde & Schwarz	Mar 13
Log.-Periodic Antenna	HL223	841516/020	Rohde & Schwarz	Feb 13
Horn Antenna	3115	9002-3351	EMCO	Feb 13
Active Loop Antenna	6502	9107-2651	EMCO	Dec 13

# SLG Asia Test Labs & Service (HK) Limited



## Measurement Results:

### Low Frequency @ 2405 MHz

<b>Fundamental emission level @3m in 100khz RBV</b>				111.31	dB $\mu$ V/m	
<b>Limit for emission outside of restricted bands:</b>				91.31	dB $\mu$ V/m	
<b>Frequency</b>	<b>Level</b>	<b>Pol</b>	<b>15.209/15.247</b>		<b>Detector</b>	<b>Comments</b>
<b>MHz</b>	<b>dB<math>\mu</math>V/m</b>	<b>V/H</b>	<b>Limit</b>	<b>Margin</b>	<b>Pk/QP/Avg</b>	
144.128	31.69	V	91.31	59.62	Pk	RB/VB 100kHz
77.695	31.28	H	91.31	60.03	Pk	RB/VB 100kHz
273.747	43.15	V	46	2.85	Pk	RB/VB 100kHz
432.465	36.16	H	91.31	55.15	Pk	RB/VB 100kHz
3206	30.47	V	91.31	60.84	Avg	RB/VB 1MHz
3206	27.63	H	91.31	63.68	Avg	RB/VB 1MHz
4810	37.00	V	54	17.00	Avg	RB/VB 1MHz
4810	36.61	H	54	17.39	Avg	RB/VB 1MHz
6413	34.99	V	91.31	56.32	Avg	RB/VB 1MHz
6413	34.86	H	91.31	56.45	Avg	RB/VB 1MHz
7216	41.06	V	91.31	50.25	Avg	RB/VB 1MHz
7216	39.78	H	91.31	51.53	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

<b>Fundamental emission level @3m in 100khz RBV</b>				112.30	dB $\mu$ V/m	
<b>Limit for emission outside of restricted bands:</b>				92.30	dB $\mu$ V/m	
<b>Frequency</b>	<b>Level</b>	<b>Pol</b>	<b>15.209/15.247</b>		<b>Detector</b>	<b>Comments</b>
<b>MHz</b>	<b>dBmV/m</b>	<b>V/H</b>	<b>Limit</b>	<b>Margin</b>	<b>Pk/QP/Avg</b>	
144.128	33.48	V	92.30	58.82	Pk	RB/VB 100kHz
79.399	32.85	H	92.30	59.45	Pk	RB/VB 100kHz
291.383	43.65	V	92.30	48.65	Pk	RB/VB 100kHz
291.383	34.60	H	92.30	57.70	Pk	RB/VB 100kHz
3256	36.36	V	92.30	55.94	Avg	RB/VB 1MHz
3256	33.79	H	92.30	58.51	Avg	RB/VB 1MHz
4882	43.11	V	54	10.89	Avg	RB/VB 1MHz
4882	41.52	H	54	12.48	Avg	RB/VB 1MHz
7327	35.28	V	54	18.72	Avg	RB/VB 1MHz
7327	36.18	H	54	17.82	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

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# SLG Asia Test Labs & Service (HK) Limited



## High Frequency @ 2479 MHz

Fundamental emission level @3m in 100kHz RBV	109.37	dB $\mu$ V/m
Limit for emission outside of restricted bands:	89.37	dB $\mu$ V/m

Frequency MHz	Level dBmV/m	Pol V/H	15.209/15.247		Detector Pk/QP/Avg	Comments
			Limit	Margin		
144.128	32.01	V	89.37	57.36	Pk	RB/VB 100kHz
74.970	31.26	H	40	8.74	Pk	RB/VB 100kHz
288.176	41.02	V	89.37	48.35	Pk	RB/VB 100kHz
283.367	31.16	H	46	14.84	Pk	RB/VB 100kHz
3306	46.83	V	89.37	42.54	Avg	RB/VB 1MHz
3306	44.58	H	89.37	44.79	Avg	RB/VB 1MHz
4958	42.54	V	54	11.46	Avg	RB/VB 1MHz
4958	43.91	H	54	10.09	Avg	RB/VB 1MHz
7439	32.30	V	54	21.70	Avg	RB/VB 1MHz
7439	30.26	H	54	23.74	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.**

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

Frequency of Emission [MHz]	Field strength [ $\mu\text{V/m}$ ]	Field Strength [ $\text{dB}\mu\text{V/m}$ ]
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			

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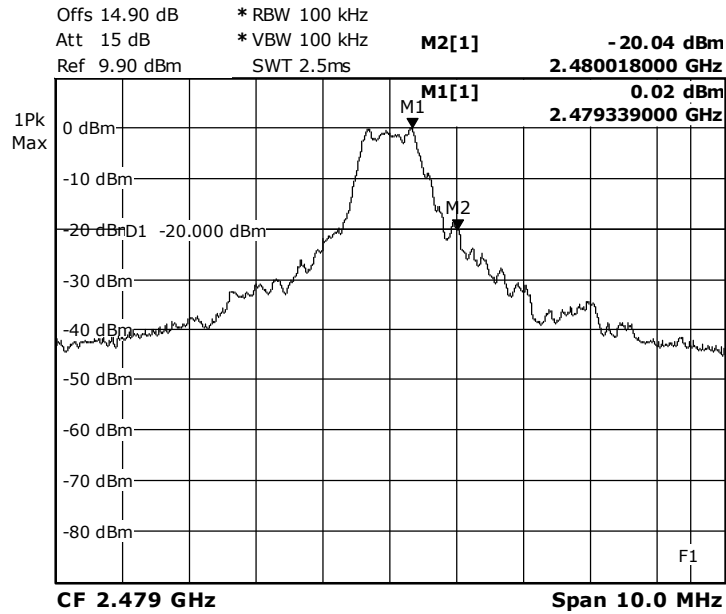




# SLG Asia Test Labs & Service (HK) Limited



Highest Operation frequency: 2479 MHz



Test Report No.: H1M21301-0746-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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## 3.6 Receiver radiated emission

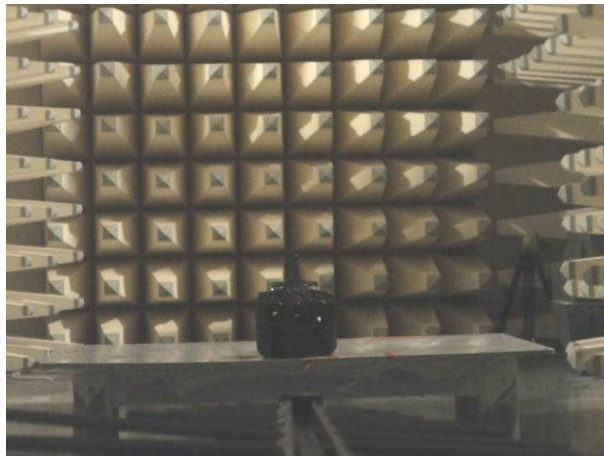
Test requirement: Section 15.109  
Test method: ANSI C63.4  
Test date: 26.02.2013  
Tested by: Mr. Karl Lau  
Class: B  
EUT operation Test in Receiver Video mode, according user manual

### Equipment used during test

Test equipment	Type	S/N	Manufacturer	Cal Due Date
Semi-anechoic Chamber	Nil	Nil	Frankonia	May 13
Test Receiver	ESU 26	100050	Rohde & Schwarz	Aug 13
Bi-conical Antenna	HK116	841489/016	Rohde & Schwarz	Mar 14
Log.-Periodic Antenna	HL223	841516/020	Rohde & Schwarz	Feb 14
Horn Antenna	3115	9002-3351	EMCO	Feb 14
Active Loop Antenna	6502	9107-2651	EMCO	Dec 13

### Test setup

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.



EUT on the turn table which rotate 360° during the pre-testing to find the maximum field-strength readings



## Measurement results

### Calculation of test results:

Such factors like antenna factor and cable loss are already included in the provided measurement results.

Frequency range	Antenna direction	Frequency in MHz	Worst case Result in dBuV/m	Limit in dBuV/mm	Detector PK/QP	Margin to Limit in dB	Verdict
30MHz-200MHz	V	98.818	30.17	43.5	Pk	13.33	Pass
30MHz-200MHz	H	35.792	31.17	43.5	Pk	12.33	Pass
200MHz-1GHz	V	288.176	31.56	46	Pk	14.44	Pass
200MHz-1GHz	H	432.465	29.76	46	Pk	16.24	Pass
1GHz-4GHz	V	3958	36.37	54	Pk	17.63	Pass
1GHz-4GHz	H	1511	35.64	54	Pk	18.36	Pass
4GHz-8GHz	V	6950	40.94	54	Pk	13.06	Pass
4GHz-8GHz	H	6669	40.66	54	Pk	13.34	Pass
8GHz-12.75GHz	V	12739	40.20	54	Pk	13.80	Pass
8GHz-12.75GHz	H	12469	39.91	54	Pk	14.09	Pass

Note: No (further) spurious emissions in the range 20 dB below the limit found.

### Limits (Section 15.109)

Frequency range	Limit
30MHz - 88MHz	100uV/m (40dBuV/m)
88MHz - 216MHz	150uV/m (43.5dBuV/m)
216MHz - 960MHz	200uV/m (46dBuV/m)
Above 960MHz	500uV/m (54dBuV/m)



## 4 Normative references

- /1/ FCC Rules 47 CFR PART 15 Subpart: 2012  
Radio Frequency Devices
- /2/ ANSI C63.4-2009  
Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and  
Electronic Equipment in the Range of 9 kHz to 40 GHz



## 5 Disclaimer

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Emphasized conditions or project related conditions:

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The test results of this test report relate exclusively to the item tested as specified in clause 1.6 of this report. The test report may only be reproduced or published in full.

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### 5.1 Revision Notes

This revised Report replaces the all former Test Reports based on number H1M21301-0746-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
H1M21301-0746-P-15	Original Test Report