



Product Service

## FCC TEST REPORT

Report Number : **68.950.12.045.01** Date of Issue: 5 April 2012

Model : **REC 410 Line RF, RRR-L**

Product Type : **Laser receiver and Remote control**

Applicant : **ODA Electronics Limited**

Address : **Shunjing Industrial Areas, Shunxin Village, Changping**

**Town, 523568 Dongguan, PEOPLE'S REPUBLIC OF CHINA**

Production Facility : **ODA Electronics Limited**

Address : **Shunjing Industrial Areas, Shuxin Village, Changping**

**Town, 523568 Dongguan, PEOPLE'S REPUBLIC OF CHINA**

Test Result : **■ Positive       Negative**

Total pages including Appendices : **24**

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## 2 Details about the Test Laboratory

### Details about the Test Laboratory

#### Test site1:

Company name: Jiangsu TÜV Product Service Ltd. – Shenzhen Branch  
6th Floor, H Hall,  
Century Craftwork Culture Square,  
No. 4001, Fuqiang Road,  
Futian District 518048,  
Shenzhen, P.R.C.

Telephone: 86 755 8828 6998  
Fax: 86 755 8828 5299

#### Test site2:

Company name: Audix Technology (shenzhen) Co.,Ltd  
Block Shenzhen, Science & Industry Park,  
Nantou, Shenzhen,  
Guangdong,  
China

Telephone: 86 755 2663 9496  
Fax: 86 755 2663 2877

### 3 Description of the Equipment Under Test

#### Description of the Equipment Under Test

Product: Laser receiver and Remote control  
Model no.: REC 410 Line RF  
Brand Name: Stabila  
Options and accessories: NIL  
Rating: 4.5VDC(Supplied by 3\*1.5 V LR6/AA batteries)  
RF Transmission  
Frequency: 2409MHz  
Antenna Gain: 1dBi  
Description of the EUT: NIL  
Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
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## 4 Summary of Test Standards

<b>Test Standards</b>	
FCC Part 15 Subpart C, 10-1-2011 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

## 5 Summary of Test Results

Technical Requirements						
FCC Part 15 Subpart C		Pages	Test Result			Test Location
Test Condition			Pass	Fail	N/A	
§15.205(a), §15.209(a), 15.249(a), §15.249(c), §15.35 Radiated Emissions	8		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test Site2
§15.249(d) Out of Band Emissions	16		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test Site2
FCC §15.215(c) – 20dB Bandwidth Testing	22		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Test Site2

## 6 General Remarks

### Remarks

This submittal(s) (test report) is intended for FCC ID: A7Y-REC410 complies with Section 15.205, 15.209, 15.249 of the FCC Part 15, Subpart C Rules.

The difference between two models only lies in the name, so all the tests were applied on REC 410 Line RF, RRR-L is deemed to fulfill relevant requirement without further testing.

### SUMMARY:

All tests according to the regulations cited on page 5 were

- Performed

- **Not** Performed

The Equipment Under Test

- **Fulfills** the general approval requirements.

- **Does not** fulfill the general approval requirements.

Sample Received Date: 3 December 2011

Testing Start Date: 5 December 2011

Testing End Date: 2 March 2012

- Jiangsu TÜV Product Service Ltd. – Shenzhen Branch -

Reviewed by:

Prepared by:

Tested by:



Ken Li  
EMC Project Manager



Cookies Bu  
EMC Project Engineer



Leo Li  
EMC Test Engineer

## 7 Technical Requirement

### 7.1 Radiated Emissions

#### Test Method

- 1 The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2 The turntable shall be rotated for 360 degrees to determine the position of maximum emission level
- 3 EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.

4 The spectrum analyzer or receiver is set as:

Below 1000MHz:

Quasi-Peak: RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto

(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

5 Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

6 Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

#### Limits for radiated emissions measurements

According to §15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

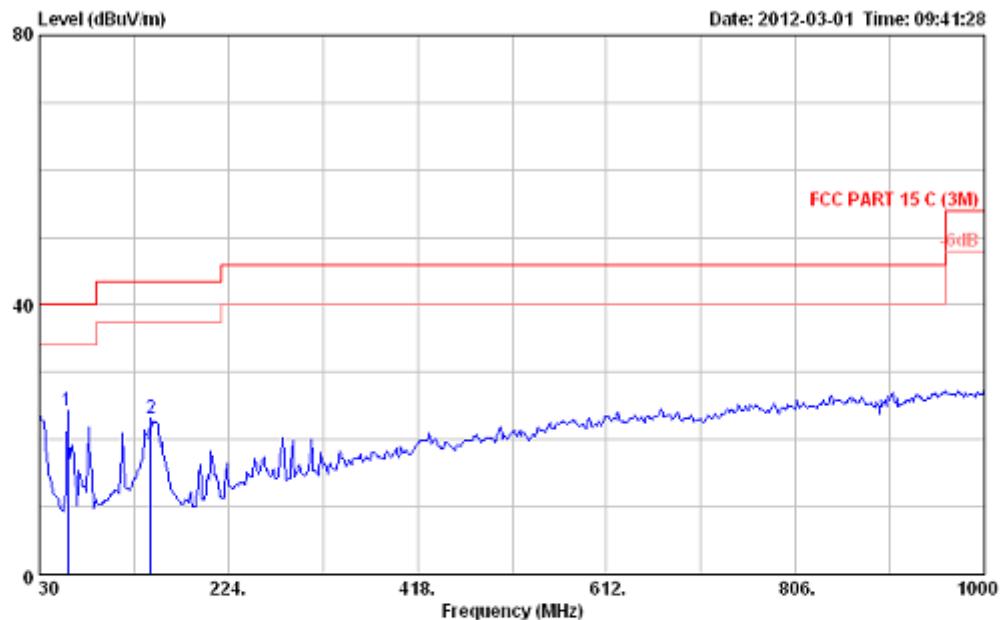
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

According to §15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

## Radiated Emissions

30MHz-1GHz, Vertical

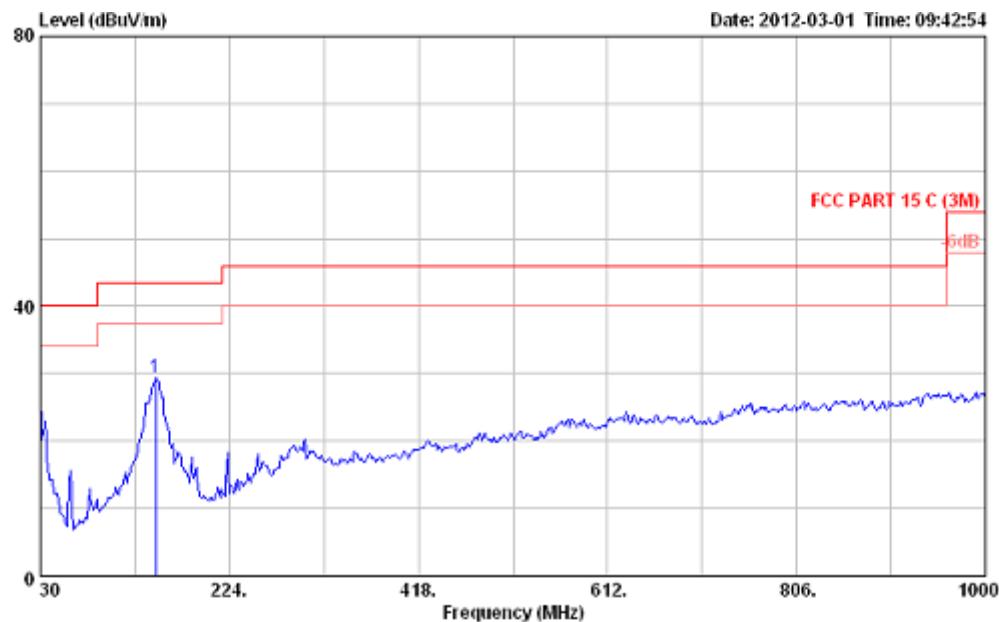


Site : 3m Chamber  
 Condition : FCC PART 15 C (3M) 3m 2010 CBL6111C 2598 VERTICAL  
 : RBW:120.000KHz VBW:1000.000KHz SWT:Auto  
 Env./Ins. : 24°C/56%  
 Engineer : Vicent  
 EUT : Measure Instrument  
 Power rating: DC 4.5V  
 Test Mode : Tx

	Antenna Freq	Limit Factor	Cable Line	Read Loss	Read Level	Over Level	Over Limit	Remark
	MHz	dB/m	dBuV/m	dB	dBuV	dBuV/m	dB	
1 max	59.10	6.22	40.00	0.40	44.99	24.35	-15.65	Peak
2	144.46	11.92	43.50	0.80	37.68	23.15	-20.35	Peak

## Radiated Emissions

30MHz-1GHz, Horizontal

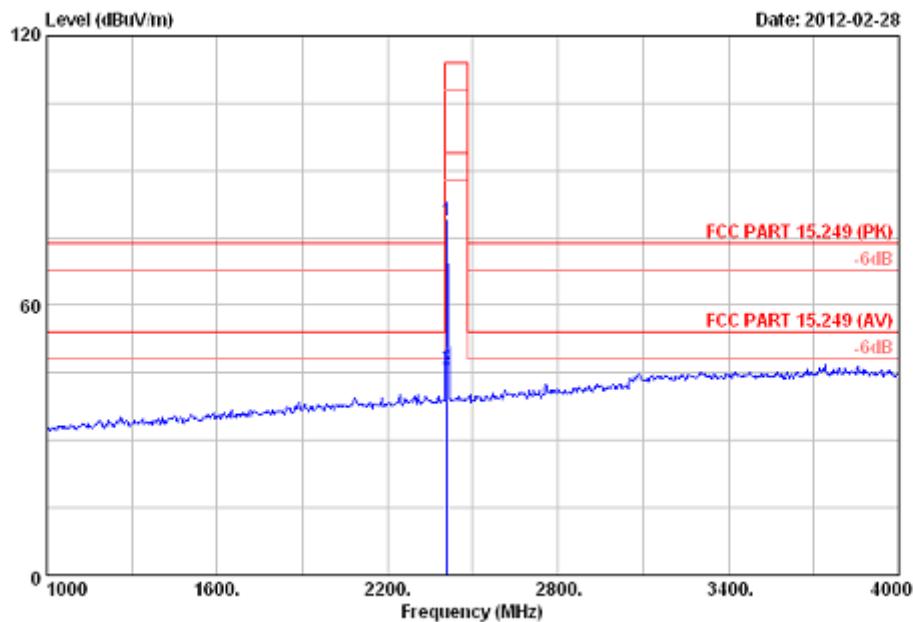


Site : 3m Chamber  
 Condition : FCC PART 15 C (3M) 3m 2010 CBL6111C 2598 HORIZONTAL  
 : RBW:120.000KHz VBW:1000.000KHz SWT:Auto  
 Env./Ins. : 24°C/50%  
 Engineer : Vicent  
 EUT : Measure Instrument  
 Power rating: DC 4.5V  
 Test Mode : Tx

	Antenna Freq	Limit Factor	Cable Line	Read Loss	Read Level	Over Level	Over Limit	Remark
	MHz	dB/m	dBuV/m	dB	dBuV	dBuV/m	dB	
1 max	148.34	11.72	43.50	0.80	44.14	29.44	-14.06	Peak

## Radiated Emissions

Above 1GHz, Vertical



Site no. : 3m Chamber Data no. : 53  
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL  
 Limit : FCC PART 15.249 (PK)  
 Env. / Ins. : 23°C/54% Engineer : Leo-Li  
 EUT : Measure Instrument  
 Power supply : DC 4.5V  
 Test mode : Tx Mode

Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Emission				
				Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1 2409.000	27.98	6.03	34.44	79.21	78.78	114.00	35.22	Peak
2 2409.000	27.98	6.03	34.44	46.06	45.63	94.00	48.37	Average

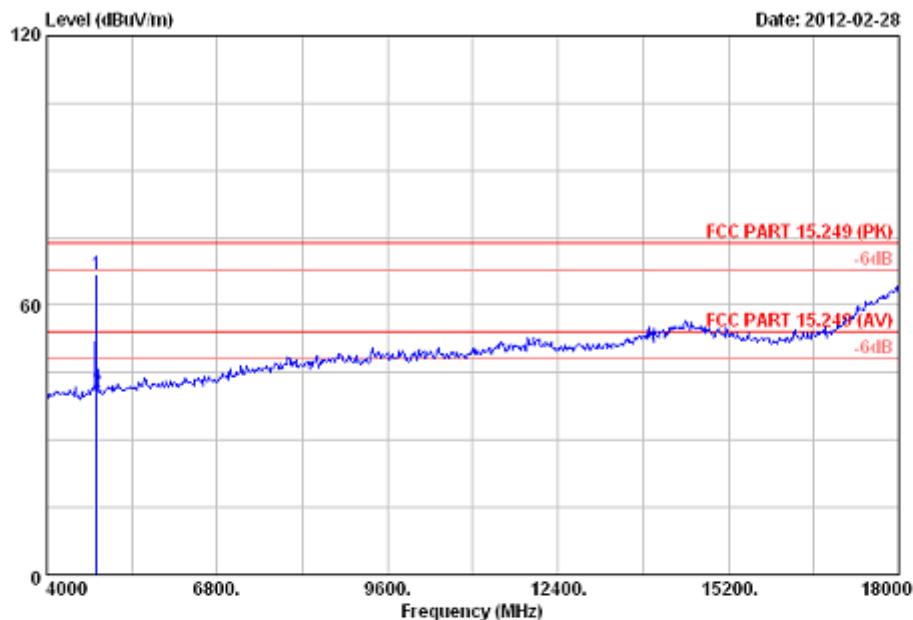
Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



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## Radiated Emissions



Site no. : 3m Chamber Data no. : 51  
Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL  
Limit : FCC PART 15.249 (PK)  
Env. / Ins. : 23°C/54% Engineer : Leo-Li  
EUT : Measure Instrument  
Power supply : DC 4.5V  
Test mode : Tx Mode

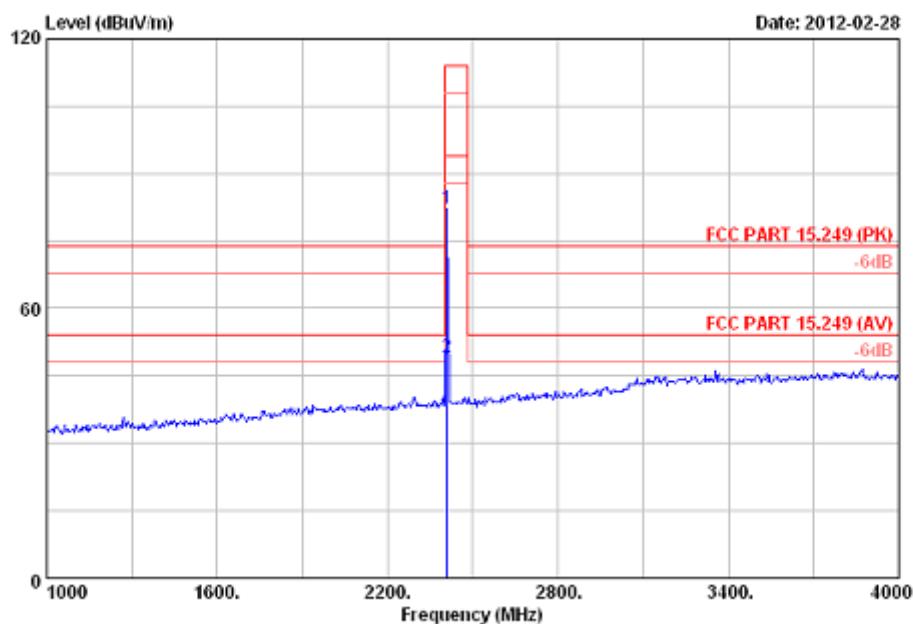
Freq. (MHz)	Ant. Factor	Cable loss	Amp. Factor	Emission				
				Reading	Level	Limits	Margin	Remark
1 4818.000	32.89	8.53	34.60	59.93	66.75	74.00	7.25	Peak
2 4818.000	32.89	8.53	34.60	34.03	40.85	54.00	13.15	Average

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

## Radiated Emissions

Above 1GHz, Horizontal



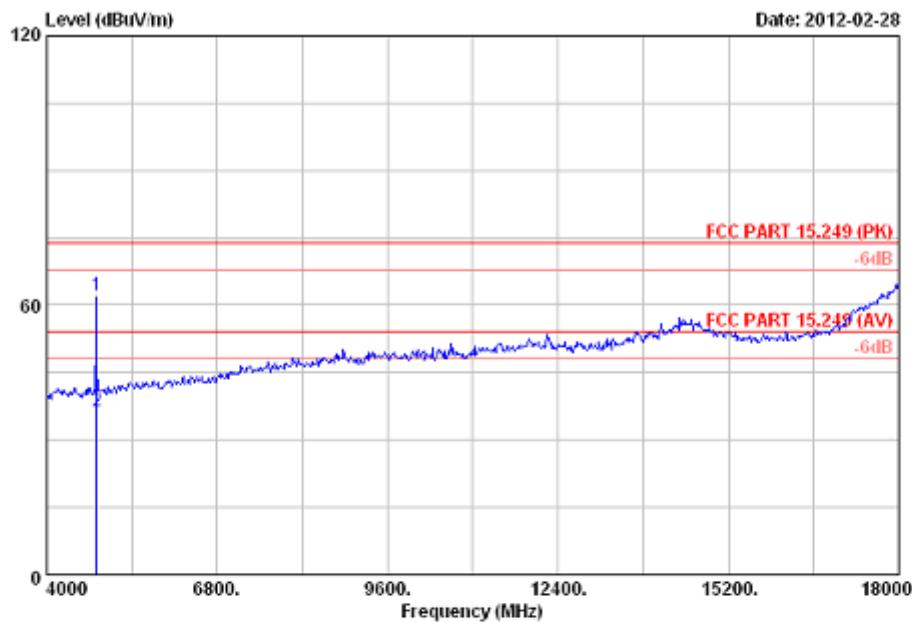
Site no. : 3m Chamber Data no. : 52  
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15.249 (PK)  
 Env. / Ins. : 23°C/54% Engineer : Leo-Li  
 EUT : Measure Instrument  
 Power supply : DC 4.5V  
 Test mode : Tx Mode

Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Emission				
				Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1 2409.000	27.98	6.03	34.44	82.58	82.15	114.00	31.85	Peak
2 2409.000	27.98	6.03	34.44	49.43	49.00	94.00	45.00	Average

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

## Radiated Emissions



Site no. : 3m Chamber Data no. : 50  
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15.249 (PK)  
 Env. / Ins. : 23°C/54% Engineer : Leo-Li  
 EUT : Measure Instrument  
 Power supply : DC 4.5V  
 Test mode : Tx Mode

Freq. (MHz)	Ant. Factor	Cable loss	Amp. Factor	Emission				
				Reading	Level	Limits	Margin	Remark
				(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1 4818.000	32.89	8.53	34.60	55.38	62.20	74.00	11.80	Peak
2 4818.000	32.89	8.53	34.60	29.48	36.30	54.00	17.70	Average

### Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



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## Test Equipment

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DUE DATE
Spectrum	Agilent	E4446A	US44300459	May 08, 2013
Amp	HP	8449B	3008A02495	May 08, 2013
Antenna	EMCO	3115	9607-4877	May 17, 2012
Bilog Antenna	Schaffner	CBL6111C	2598	Dec.14, 2012
HF Cable	Hubersuhne	Sucoflex104	---	May 08, 2013

## 7.2 Out of Band Emissions

### Test Method

- 1 The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2 The turntable shall be rotated for 360 degrees to determine the position of maximum emission level
- 3 EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 4 The spectrum analyzer or receiver is set as:
  - (1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
  - (2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto
- 5 Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 6 Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

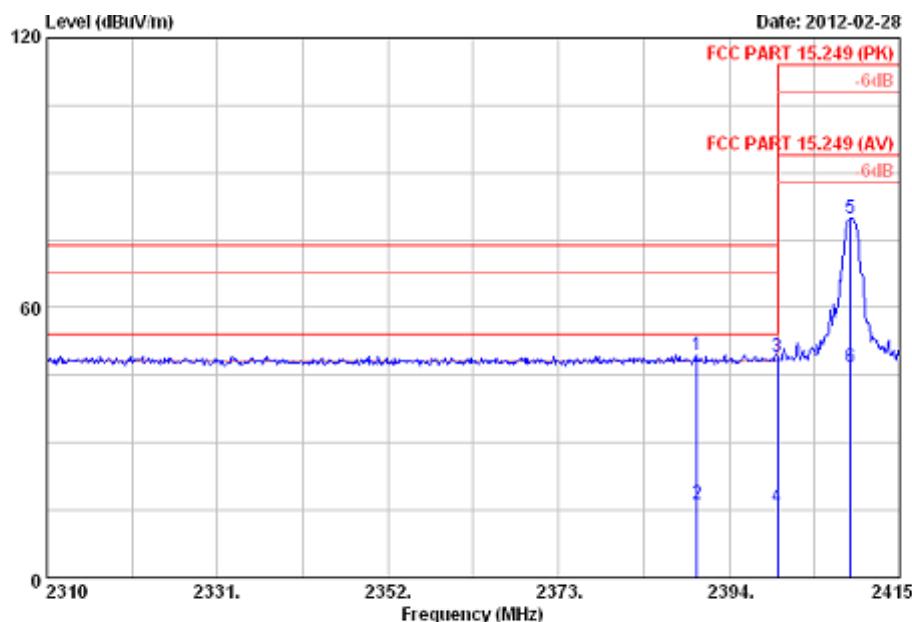
### Limits

According to §15.249 (d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

## Out of Band Emissions

Left band test result

Vertical:



Site no. : 3m Chamber Data no. : 54  
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL  
 Limit : FCC PART 15.249 (PK)  
 Env. / Ins. : 23°C/54% Engineer : Leo-Li  
 EUT : Measure Instrument  
 Power supply : DC 4.5V  
 Test mode : Tx Mode

Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Emission				
				Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1 2390.000	27.96	6.01	34.44	49.95	49.48	74.00	24.52	Peak
2 2390.000	27.96	6.01	34.44	16.75	16.28	54.00	37.72	Average
3 2400.000	27.96	6.01	34.44	49.53	49.06	74.00	24.94	Peak
4 2400.000	27.96	6.01	34.44	16.33	15.86	54.00	38.14	Average
5 2408.910	27.98	6.03	34.44	80.32	79.89	114.00	34.11	Peak
6 2408.910	27.98	6.03	34.44	47.17	46.74	94.00	47.26	Average

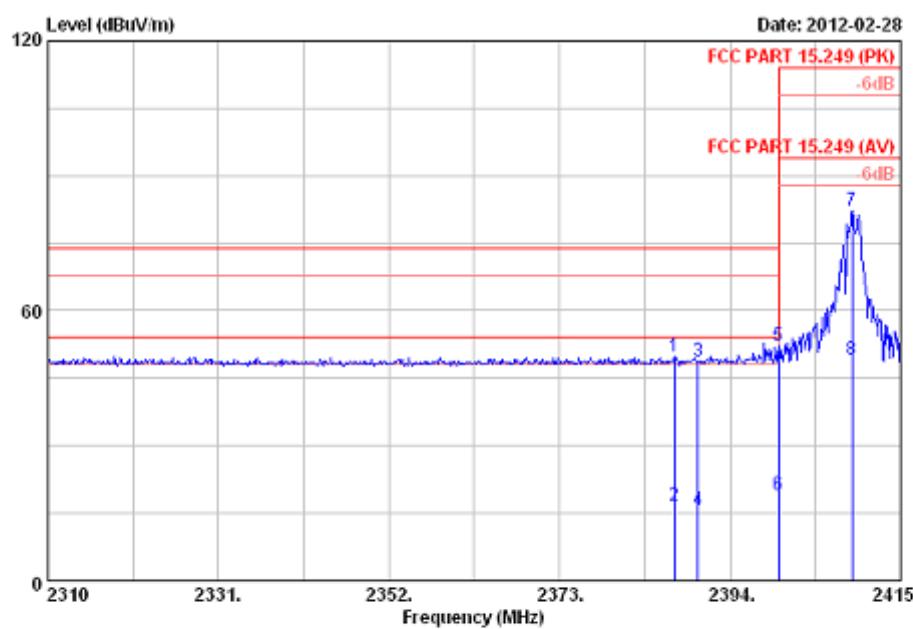
Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

## Out of Band Emissions

Left band test result

Horizontal:



Site no. : 3m Chamber Data no. : 55  
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15.249 (PK)  
 Env. / Ins. : 23°C/54% Engineer : Leo-Li  
 EUT : Measure Instrument  
 Power supply : DC 4.5V  
 Test mode : Tx Mode

Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Emission				
				Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1 2387.175	27.96	6.01	34.44	50.34	49.87	74.00	24.13	Peak
2 2387.175	27.96	6.01	34.44	17.14	16.67	54.00	37.33	Average
3 2390.000	27.96	6.01	34.44	49.38	48.91	74.00	25.09	Peak
4 2390.000	27.96	6.01	34.44	16.18	15.71	54.00	38.29	Average
5 2400.000	27.96	6.01	34.44	52.72	52.25	74.00	21.75	Peak
6 2400.000	27.96	6.01	34.44	19.52	19.05	54.00	34.95	Average
7 2409.015	27.98	6.03	34.44	82.69	82.26	114.00	31.74	Peak
8 2409.015	27.98	6.03	34.44	49.54	49.11	94.00	44.89	Average

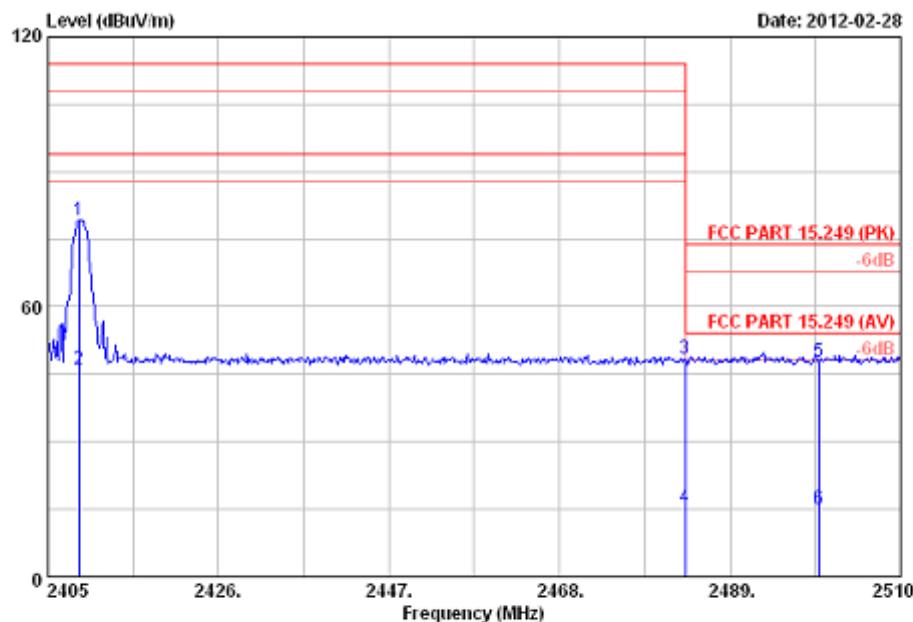
Remarks:

1. Emission Level = Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

## Out of Band Emissions

Right band test result

Vertical:



Site no. : 3m Chamber Data no. : 57  
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL  
 Limit : FCC PART 15.249 (PK)  
 Env. / Ins. : 23°C/54% Engineer : Leo-Li  
 EUT : Measure Instrument  
 Power supply : DC 4.5V  
 Test mode : Tx Mode

Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Emission				
				Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1 2408.885	27.98	6.03	34.44	79.79	79.36	114.00	34.64	Peak
2 2408.885	27.98	6.03	34.44	46.64	46.21	94.00	47.79	Average
3 2403.500	28.08	6.15	34.45	48.71	48.49	74.00	25.51	Peak
4 2403.500	28.08	6.15	34.45	15.76	15.54	54.00	38.46	Average
5 2500.000	28.10	6.18	34.45	48.09	47.92	74.00	26.08	Peak
6 2500.000	28.10	6.18	34.45	15.19	15.02	54.00	38.98	Average

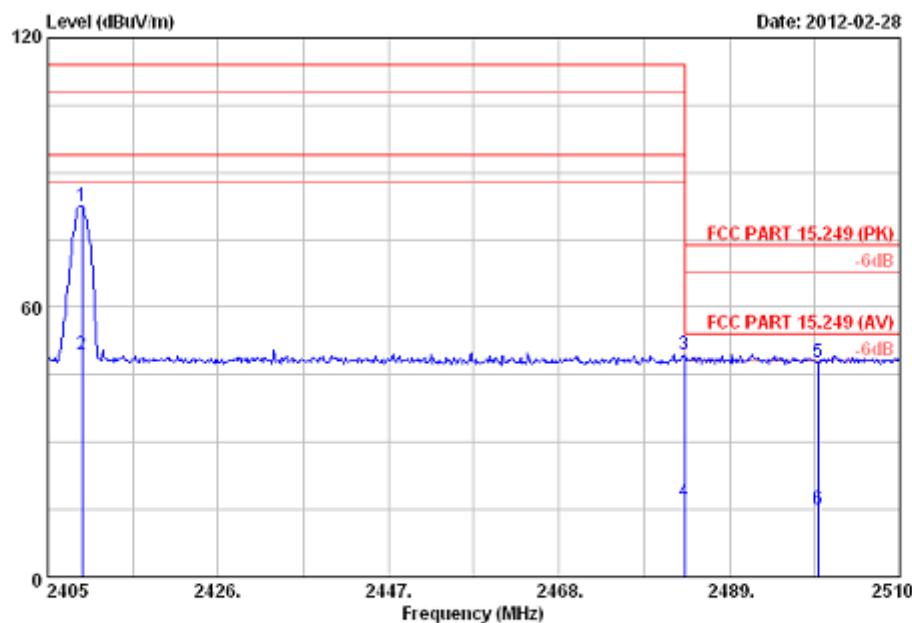
Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

## Out of Band Emissions

Right band test result

Horizontal:



Site no. : 3m Chamber Data no. : 56  
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15.249 (PK)  
 Env. / Ins. : 23°C/54% Engineer : Leo-Li  
 EUT : Measure Instrument  
 Power supply : DC 4.5V  
 Test mode : Tx Mode

Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission			
					Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1 2409.200	27.98	6.03	34.44	83.05	82.62	114.00	31.38	Peak
2 2409.200	27.98	6.03	34.44	49.90	49.47	94.00	44.53	Average
3 2483.500	28.08	6.15	34.45	49.75	49.53	74.00	24.47	Peak
4 2483.500	28.08	6.15	34.45	16.80	16.58	54.00	37.42	Average
5 2500.000	28.10	6.18	34.45	48.07	47.90	74.00	26.10	Peak
6 2500.000	28.10	6.18	34.45	15.17	15.00	54.00	39.00	Average

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.



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## Test Equipment

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DUE DATE
Spectrum	Agilent	E4446A	US44300459	May 08, 2013
Amp	HP	8449B	3008A02495	May 08, 2013
Antenna	EMCO	3115	9607-4877	May 17, 2013
Bilog Antenna	Schaffner	CBL6111C	2598	Dec.14, 2012
HF Cable	Hubersuhne	Sucoflex104	---	May 08, 2013

## 7.3 20dB Bandwidth Testing

### Test Method

- 1 Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2 Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- 3 Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

### Limits:

Per 15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

## 20dB Bandwidth Testing

Frequency (MHz)	20 dB Bandwidth (kHz)	Test Result
2409	551.135	Pass





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## Test Equipment

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DUE DATE
Spectrum	Agilent	E4446A	US44300459	May 08, 2013
HF Cable	Hubersuhne	Sucoflex104	---	May 08, 2013

## 8 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

**System Measurement Uncertainty**

<b>Items</b>		<b>Extended Uncertainty</b>
RE	Field strength (dB $\mu$ V/m)	U=4.32dB (30MHz-25GHz)