

# FCC PART 15.249

## MEASUREMENT AND TEST REPORT

### FOR

**SIIG, Inc.**

**6078 Stewart Avenue, Fremont, CA 94538-3152, U.S.A.**

**FCC ID: FK3WR0712MU01**

<b>Report Concerns:</b> Original Report	<b>Equipment Type:</b> 2.4GHz Wireless Mouse
<b>Model:</b>	<u>JK-WR0712-S1</u>
<b>Report No.:</b>	<u>STR11118216I</u>
<b>Test Date:</b>	<u>2011-11-21 to 2011-11-25</u>
<b>Issue Date:</b>	<u>2011-12-01</u>
<b>Tested By:</b>	<u>Susan Su / Engineer</u> <i>Susan Su</i>
<b>Reviewed By:</b>	<u>Lahm Peng / EMC Manager</u> <i>Lahm peng</i>
<b>Approved &amp; Authorized By:</b>	<u>Jandy so / PSQ Manager</u> <i>Jandyso</i>
<b>Prepared By:</b>	
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by SEM.Test Compliance Service Co., Ltd.

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## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: SIIG, Inc.  
Address of applicant: 6078 Stewart Avenue, Fremont, CA 94538-3152, U.S.A.

Manufacturer: SIIG, Inc.  
Address of manufacturer: 6078 Stewart Avenue, Fremont, CA 94538-3152, U.S.A.

#### General Description of E.U.T

Items	Description
EUT Description:	2.4GHz Wireless Mouse
Trade Name:	SIIG
Model No.:	JK-WR0712-S1
Adding Model:	FK3WKMJK114601
Rated Voltage:	DC 1.5V
Rated Current:	18mA
Frequency Range:	2402-2480 MHz
Antenna Type:	Integral Antenna
For more information refer to the circuit diagram form and the user's manual.	

*The test data is gathered from a production sample, provided by the manufacturer.*

### 1.2 Test Standards

The following report is prepared on behalf of the SIIG, Inc. in accordance with FCC Part 15, Subpart B, Subpart C, and section 15.203, 15.205, 15.209 and 15.249 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.249 of the Federal Communication Commissions rules.

**Maintenance of compliance** is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

### 1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the Operating Instructions and let the EUT keep transmitting.

## 1.4 Test Facility

- **FCC – Registration No.: 994117**

SEM.Test Compliance Services Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 994117.

- **Industry Canada (IC) Registration No.: 7673A**

The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

- **CNAS Registration No.: L4062**

Shenzhen SEM.Test Electronics Service Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C (518101)

## 1.5 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components. The test software is started while the whole system is on.

## 1.6 Accessories Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

## 1.7 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

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## 2. SUMMARY OF TEST RESULTS

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FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.207 (a)	Conducted Emission	N/A
§15.205	Restricted Band of Operation	Compliant
§15.209	Radiated Emission	Compliant
§15.249(a)	Field Strength	Compliant
§15.249(d)	Out of Band Emission	Compliant

### **3. §15.203 - ANTENNA REQUIREMENT**

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#### **3.1 Standard Applicable**

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

#### **3.2 Test Result**

This product has an integral antenna, fulfill the requirement of this section.

## 4. §15.205, §15.209, §15.249 (a)- RADIATED EMISSION

### 4.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is  $\pm 5.10$  dB.

### 4.2 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of fundamental (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

(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.

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

### 4.3 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-12-20	2011-12-19
EMI Test Receiver	R&S	ESVB	825471/005	2010-12-20	2011-12-19
Positioning Controller	C&C	CC-C-1F	N/A	2010-12-20	2011-12-19
RF Switch	EM	EMSW18	SW060023	2010-12-20	2011-12-19
Pre-amplifier	Agilent	8447F	3113A06717	2010-12-20	2011-12-19
Pre-amplifier	Compliance Direction	PAP-0118	24002	2010-12-20	2011-12-19
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2011-01-09	2012-01-08
Horn Antenna	ETS	3117	00086197	2011-01-09	2012-01-08
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2011-01-09	2012-01-08

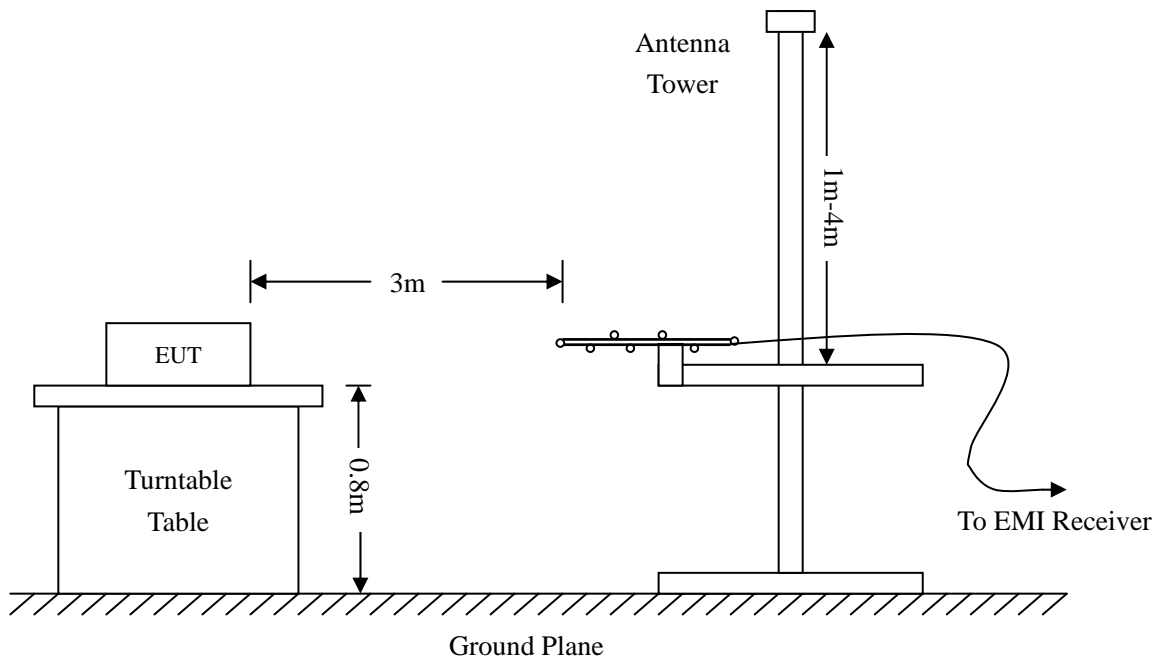
**Statement of Traceability:** All calibrations have been performed per the NVLAP requirements traceable to the NIST.

### 4.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.205 15.249(a) and FCC Part 15.209 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.



### 4.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB $\mu$ V means the emission is 6dB $\mu$ V below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

### 4.6 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar



### 4.7 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.249 standards, and had the worst margin of:

**-3.30 dB $\mu$ V at 4882 MHz in the Vertical polarization Low CH, 9 kHz to 25 GHz, 3Meters**

*Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*

#### Plot of Radiation Emissions Test

*Radiated Disturbance*

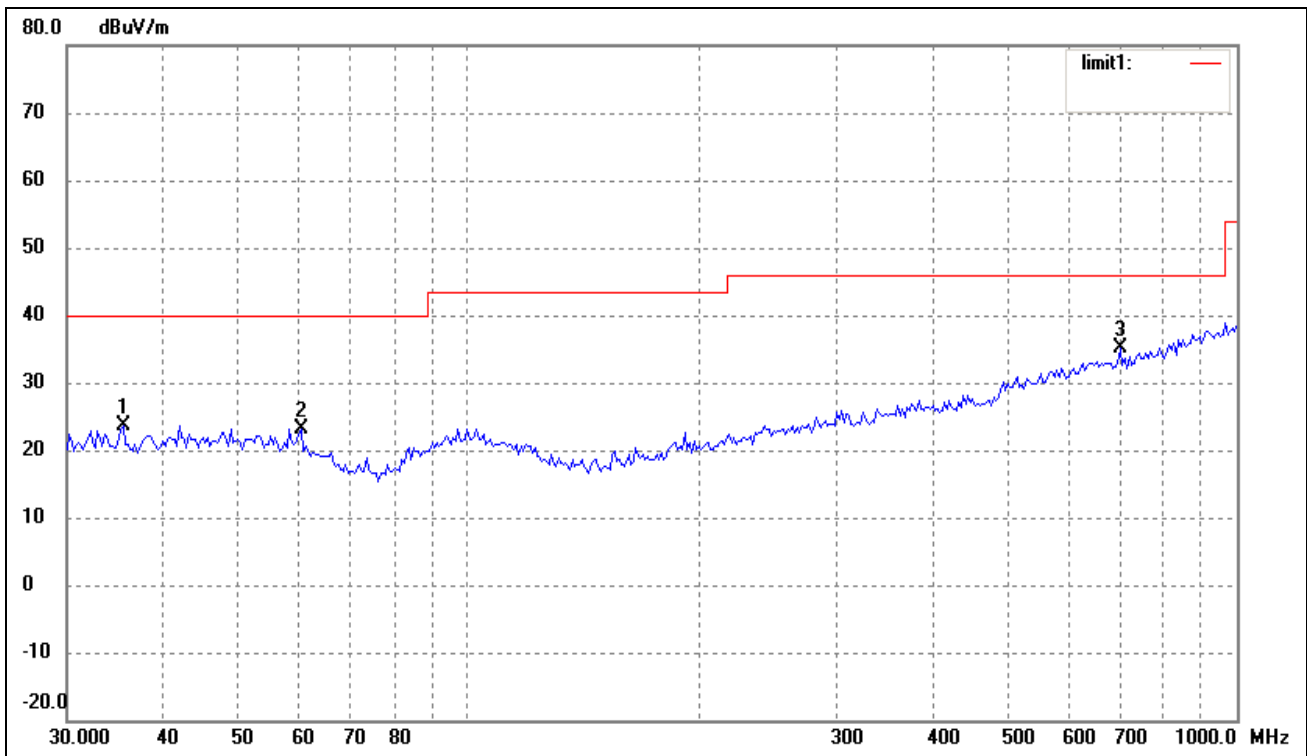
*EUT: 2.4GHz Wireless Mouse*

*M/N: JW-WR0712-S1*

*Operating Condition: Transmitting Low channel (2402MHz)*

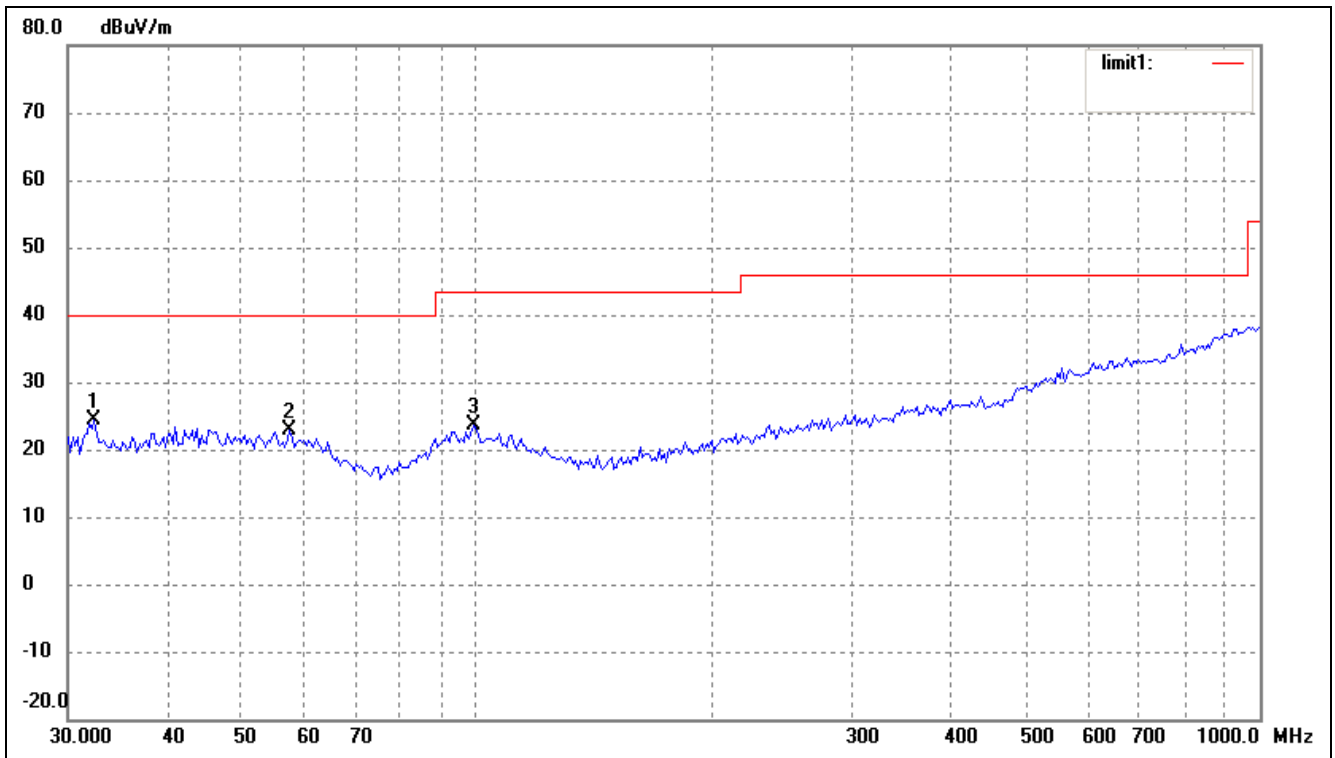
*Test Specification: Horizontal & Vertical*

*Horizontal:*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	35.4993	16.67	6.90	23.57	40.00	-16.43	145	100	peak
2	60.4919	15.79	7.33	23.12	40.00	-16.88	21	100	peak
3	704.2261	17.49	17.56	35.05	46.00	-10.95	72	100	peak

Vertical:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	32.4059	17.63	6.77	24.40	40.00	-15.60	306	100	peak
2	57.5939	15.16	7.65	22.81	40.00	-17.19	24	100	peak
3	98.8326	15.37	8.34	23.71	43.50	-19.79	74	100	peak

*Radiated Disturbance*

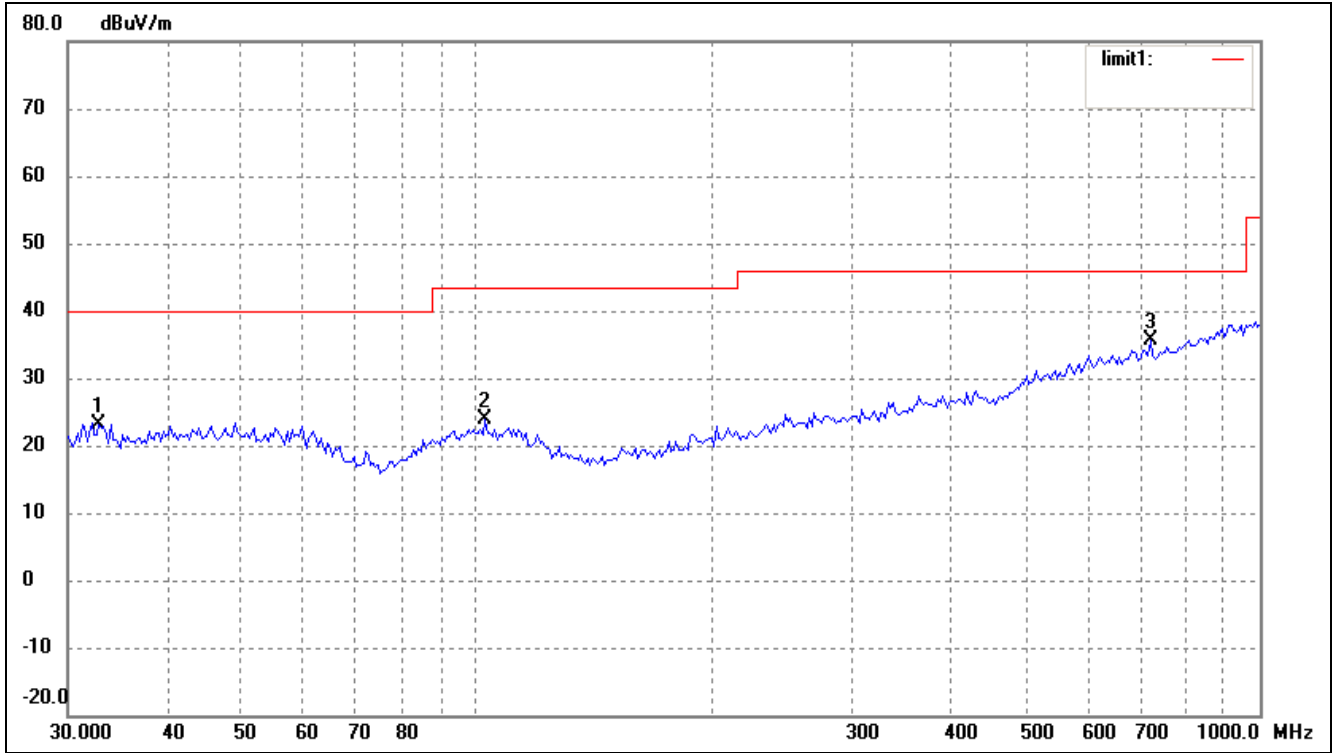
*EUT: 2.4GHz Wireless Mouse*

*M/N: JW-WR0712-S1*

*Operating Condition: Transmitting Middle channel (2441MHz)*

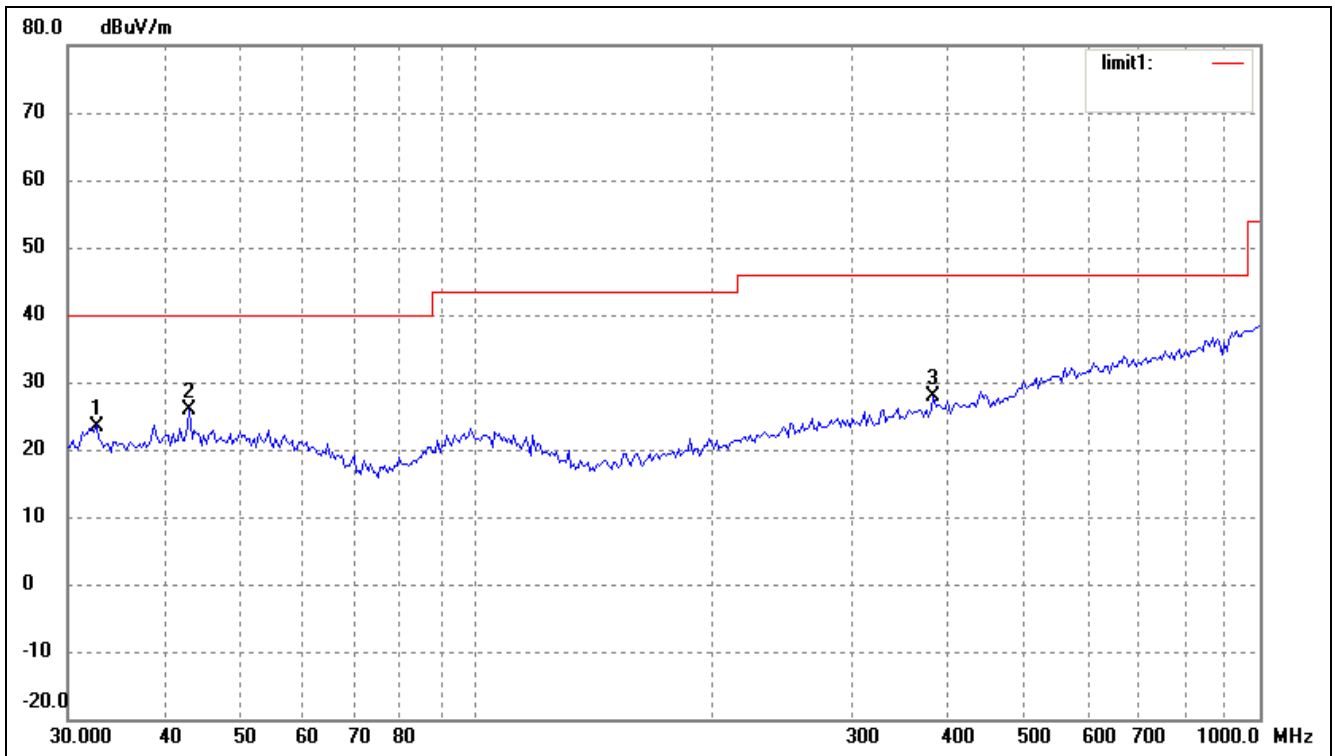
*Test Specification: Horizontal & Vertical*

*Horizontal*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	32.8637	16.44	6.77	23.21	40.00	-16.79	216	100	peak
2	102.3597	15.62	8.23	23.85	43.50	-19.65	24	100	peak
3	724.2611	17.72	17.86	35.58	46.00	-10.42	33	100	peak

Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	32.6340	16.73	6.77	23.50	40.00	-16.50	33	100	peak
2	42.8998	17.65	8.20	25.85	40.00	-14.15	47	100	peak
3	382.5879	16.66	11.23	27.89	46.00	-18.11	51	100	peak

*Radiated Disturbance*

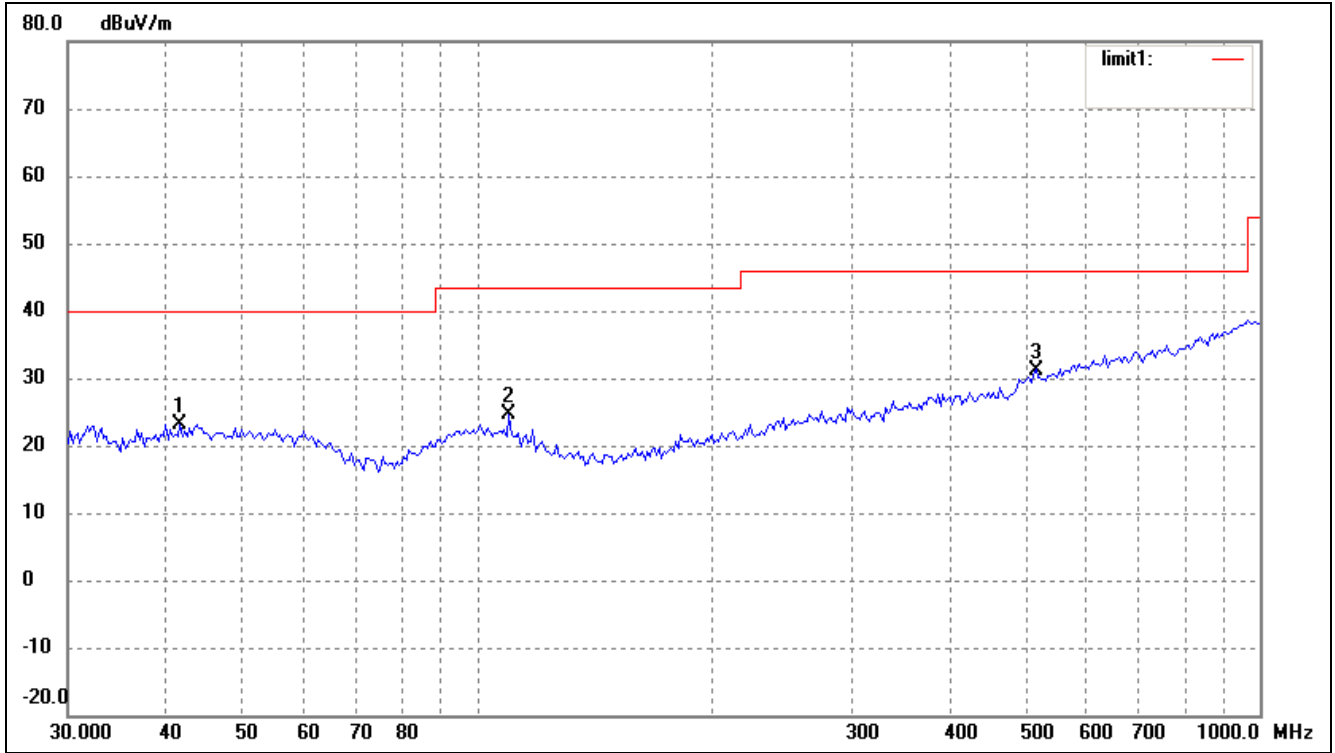
*EUT: 2.4GHz Wireless Mouse*

*M/N: JW-WR0712-S1*

*Operating Condition: Transmitting High channel (2480MHz)*

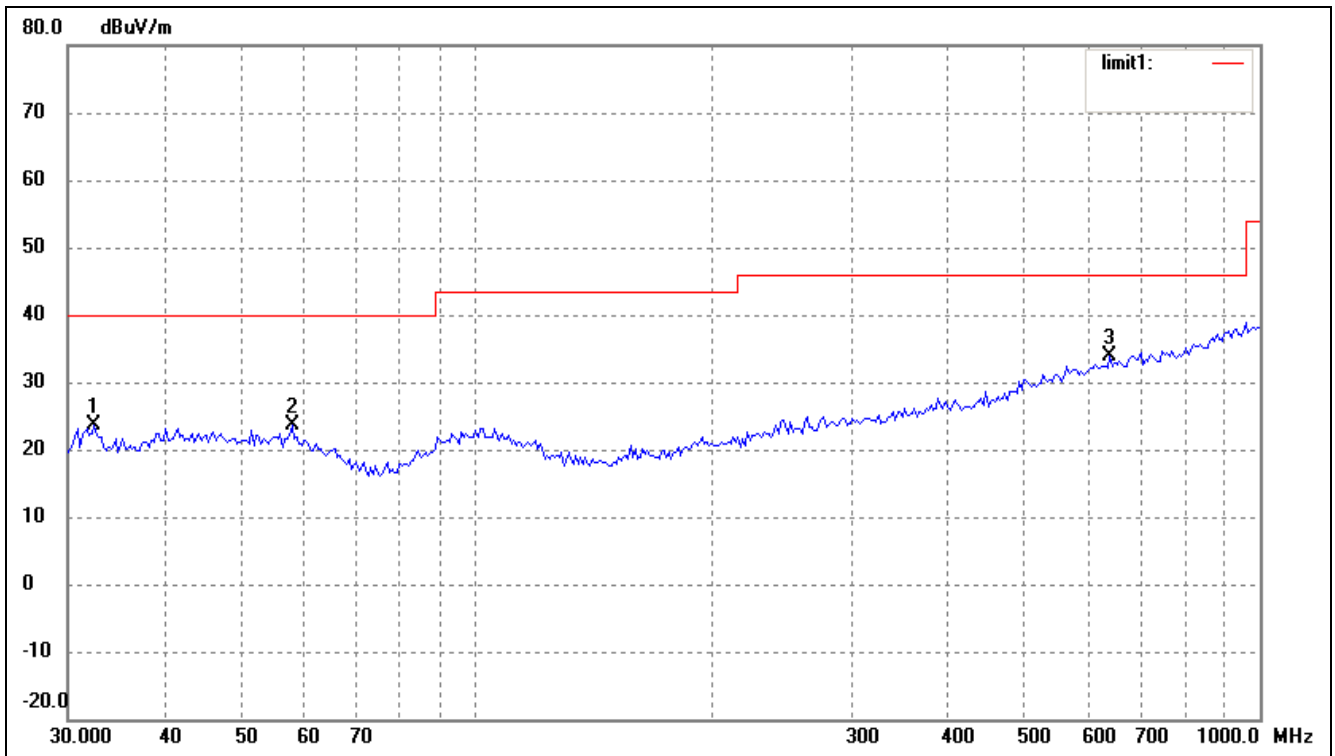
*Test Specification: Horizontal & Vertical*

*Horizontal*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	41.7130	15.04	8.17	23.21	40.00	-16.79	56	100	peak
2	109.7960	17.10	7.61	24.71	43.50	-18.79	24	100	peak
3	517.2480	16.45	14.80	31.25	46.00	-14.75	14	100	peak

Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( ° )	Height (cm)	Remark
1	32.4059	16.93	6.77	23.70	40.00	-16.30	204	100	peak
2	57.9993	16.08	7.63	23.71	40.00	-16.29	57	100	peak
3	642.8613	16.91	17.02	33.93	46.00	-12.07	36	100	peak

Spurious Emission Above 1GHz

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low CH (2402MHz)										
4804	AV	43.4	24	V	34.1	5.2	33	49.7	54	-4.3
4804	AV	44.1	341	H	34.1	5.2	33	50.4	54	-3.6
4804	PK	45.4	24	V	34.1	5.2	33	51.7	74	-22.3
4804	PK	45.9	341	H	34.1	5.2	33	52.2	74	-21.8
7206	AV	32.2	77	V	37.4	6.1	33.5	42.2	54	-11.8
7206	AV	33.0	267	H	37.4	6.1	33.5	43.0	54	-11.0
7206	PK	34.5	77	V	37.4	6.1	33.5	44.5	74	-29.5
7206	PK	35.4	267	H	37.4	6.1	33.5	45.4	74	-28.6
2402	AV	66.8	33	V	29.1	3.7	34.0	65.6	94	-28.4
2402	AV	68.7	34	H	29.1	3.7	34.0	67.5	94	-26.5
2402	PK	69.2	33	V	29.1	3.7	34.0	68.0	114	-46.0
2402	PK	70.7	34	H	29.1	3.7	34.0	69.5	114	-44.5
Middle CH (2441MHz)										
4882	AV	44.4	90	V	34.1	5.2	33.0	50.7	54	-3.3
4882	AV	43.2	270	H	34.1	5.2	33.0	49.5	54	-4.5
4882	PK	47.4	90	V	34.1	5.2	33.0	53.7	74	-20.3
4882	PK	47.1	270	H	34.1	5.2	33.0	53.4	74	-20.6
7323	AV	33.8	270	V	37.4	6.1	33.5	43.8	54	-10.2
7323	AV	35.6	180	H	37.4	6.1	33.5	45.6	54	-8.4
7323	PK	36.8	270	V	37.4	6.1	33.5	46.8	74	-27.2
7323	PK	37.1	180	H	37.4	6.1	33.5	47.1	74	-26.9
2441	AV	63.9	45	V	29.1	3.7	34.0	62.7	94	-31.3
2441	AV	68.0	90	H	29.1	3.7	34.0	66.8	94	-27.2
2441	PK	67.8	45	V	29.1	3.7	34.0	66.6	114	-47.4
2441	PK	70.1	90	H	29.1	3.7	34.0	68.9	114	-45.1
High CH (2480MHz)										
4960	AV	42.8	66	V	34.1	5.2	33.0	49.1	54	-4.9
4960	AV	41.3	135	H	34.1	5.2	33.0	47.6	54	-6.4
4960	PK	45.5	66	V	34.1	5.2	33.0	51.8	74	-22.2
4960	PK	42.4	135	H	34.1	5.2	33.0	48.7	74	-25.3
7440	AV	35.3	56	V	37.4	6.1	33.5	45.3	54	-8.7
7440	AV	36.2	60	H	37.4	6.1	33.5	46.2	54	-7.8
7440	PK	37.7	56	V	37.4	6.1	33.5	47.7	74	-26.3
7440	PK	38.5	60	H	37.4	6.1	33.5	48.5	74	-25.5

2480	AV	70.0	266	V	29.1	3.7	34.0	68.8	94	-25.2
2480	AV	71.2	185	H	29.1	3.7	34.0	70.0	94	-24.0
2480	PK	72.4	266	V	29.1	3.7	34.0	71.2	114	-42.8
2480	PK	73.8	185	H	29.1	3.7	34.0	72.6	114	-41.4

*Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 5<sup>th</sup> Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.*

*The measurements greater than 20dB below the limit from 9kHz to 30MHz..*



## 5. §15.249(b) OUT OF BAND EMISSIONS

### 5.1 Standard Applicable

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.

### 5.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-12-20	2011-12-19
EMI Test Receiver	R&S	ESVB	825471/005	2010-12-20	2011-12-19
Positioning Controller	C&C	CC-C-1F	N/A	2010-12-20	2011-12-19
RF Switch	EM	EMSW18	SW060023	2010-12-20	2011-12-19
Pre-amplifier	Agilent	8447F	3113A06717	2010-12-20	2011-12-19
Pre-amplifier	Compliance Direction	PAP-0118	24002	2010-12-20	2011-12-19
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2011-01-09	2012-01-08
Horn Antenna	ETS	3117	00086197	2011-01-09	2012-01-08

**Statement of Traceability:** All calibrations have been performed per the NVLAP requirements traceable to the NIST.

### 5.3 Test Procedure

As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2483.5MHz, than mark the higher-level emission for comparing with the FCC rules.

### 5.4 Environmental Conditions

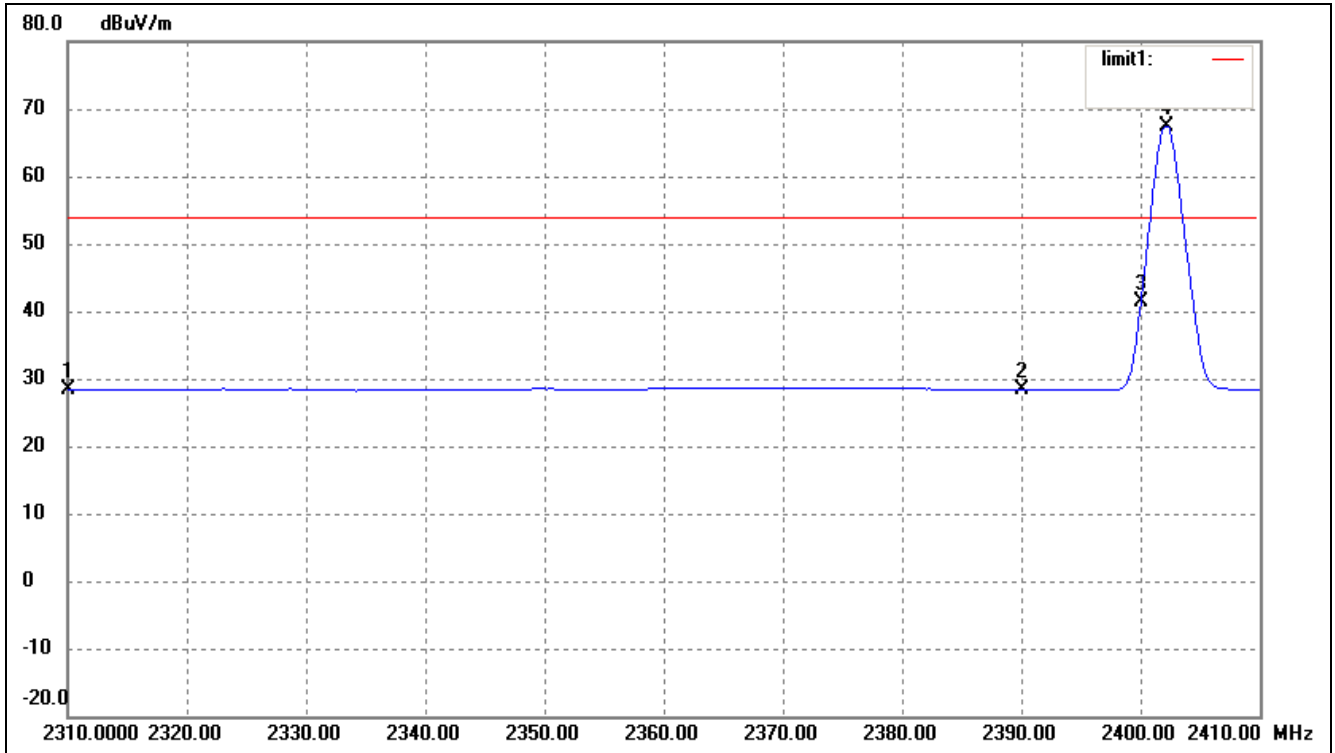
Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

### 5.5 Summary of Test Results/Plots

Frequency MHz	Limit dBuV	Result
Low Edge	<54	Pass
High Edge	<54	Pass

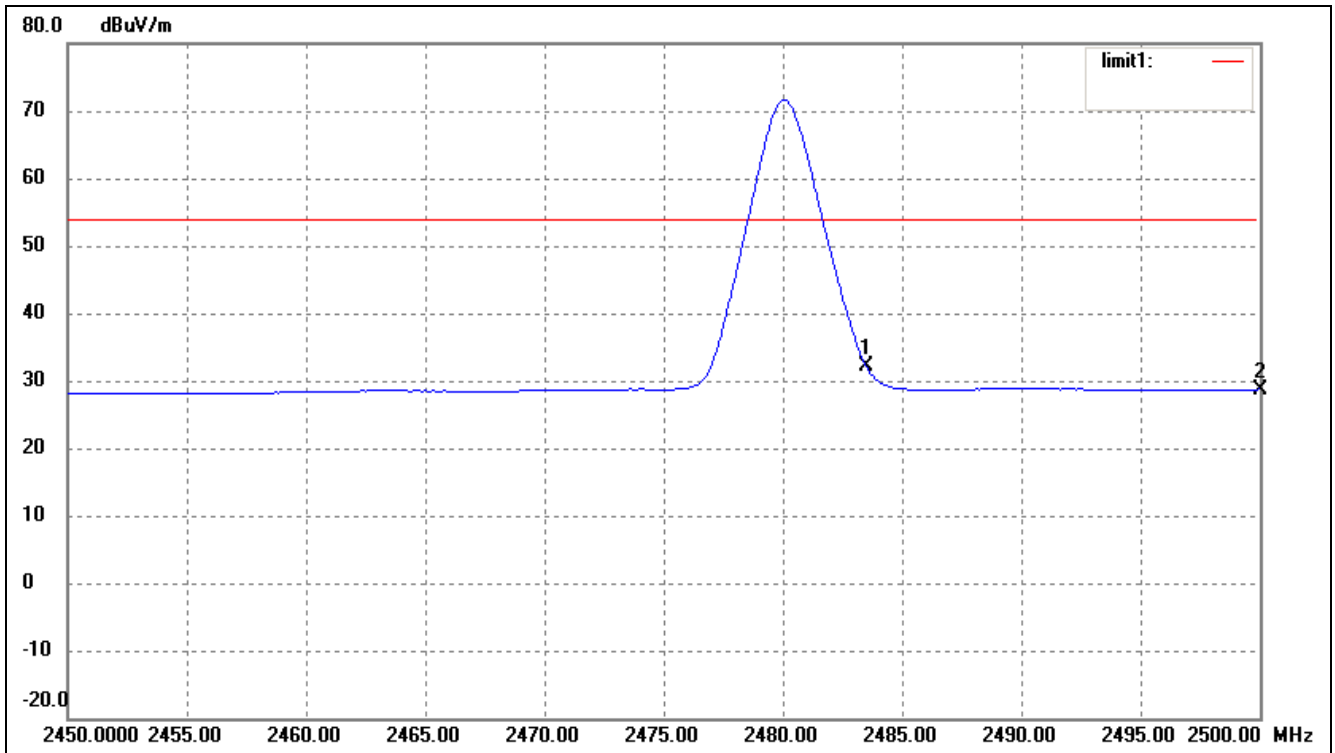
The edge emissions are below the FCC 15.209 Limits. Please refer to the test plots below.

Lowest Bandedge



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	35.82	-7.51	28.31	54.00	-25.69	Ave Detector
	2310.000	50.05	-7.51	42.54	74.00	-31.46	Peak Detector
2	2390.000	35.72	-7.34	28.38	54.00	-25.62	Ave Detector
	2390.000	49.81	-7.34	42.47	74.00	-31.53	Peak Detector
3	2400.000	48.69	-7.31	41.38	54.00	-12.62	Ave Detector
	2400.000	59.85	-7.31	52.54	74.00	-21.46	Peak Detector
4	2402.200	74.80	-7.31	67.49	/	/	Ave Detector

Highest Bandedge



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	39.14	-7.13	32.01	54.00	-21.99	Ave Detector
	2483.500	50.41	-7.13	43.28	74.00	-30.72	Peak Detector
2	2500.000	35.83	-7.08	28.75	54.00	-25.25	Ave Detector
	2500.000	49.67	-7.08	42.59	74.00	-31.41	Peak Detector

\*\*\*\*\* END OF REPORT \*\*\*\*\*