

FCC PART 15C TEST REPORT FOR CERTIFICATION  
On Behalf of

ZF Friedrichshafen AG

Wireless Sym. Nano Mouse

Model Number: JF-T02

FCC ID: GDDJF-T02

Prepared for : ZF Friedrichshafen AG  
Cherrystrasse, 91275 Auerbach/Opf., Germany

Prepared By : Audix Technology (Shenzhen) Co., Ltd.  
No. 6, Ke Feng Rd., 52 Block,  
Shenzhen Science & Industrial Park,  
Nantou, Shenzhen, Guangdong, China

Tel: (0755) 26639496

Report Number : ACS-F11246  
Date of Test : Oct.27~29, 2011  
Date of Report : Nov.02, 2011

**TABLE OF CONTENTS**

<u>Description</u>	<u>Page</u>
<b>1. SUMMARY OF STANDARDS AND RESULTS.....</b>	<b>1-1</b>
1.1. Description of Standards and Results .....	1-1
<b>2. GENERAL INFORMATION .....</b>	<b>2-1</b>
2.1. Description of Device (EUT) .....	2-1
2.2. Tested Supporting System Details .....	2-2
2.3. EUT Configuration and operation conditions for test.....	2-2
2.4. Test Facility .....	2-2
2.5. Measurement Uncertainty (95% confidence levels, k=2) .....	2-3
<b>3. POWER LINE CONDUCTED EMISSION TEST .....</b>	<b>3-1</b>
<b>4. RADIATED EMISSION TEST .....</b>	<b>4-1</b>
4.1. Test Equipment .....	4-1
4.2. Block Diagram of Test Setup.....	4-1
4.3. Radiated Emission Limit Standard: FCC 15.209 and 15.249 .....	4-2
4.4. EUT Configuration on Test.....	4-3
4.5. Operating Condition of EUT.....	4-3
4.6. Test Procedure.....	4-3
4.7. Radiated Emission Test Results .....	4-4
<b>5. 20 DB BANDWIDTH TEST .....</b>	<b>5-1</b>
5.1. Test Equipment .....	5-1
5.2. Limit.....	5-1
5.3. Test Results .....	5-1
<b>6. BAND EDGE COMPLIANCE TEST .....</b>	<b>6-1</b>
6.1. Test Equipment .....	6-1
6.2. Limit.....	6-1
6.3. Test Produce .....	6-1
6.4. Test Results .....	6-2
<b>7. ANTENNA REQUIREMENT .....</b>	<b>7-1</b>
<b>8. RADIO FRREQUENCY EXPOSURE COMPLIANCE.....</b>	<b>8-1</b>
<b>9. DEVIATION TO TEST SPECIFICATIONS.....</b>	<b>9-1</b>
<b>10. PHOTOGRAPH OF TEST .....</b>	<b>10-1</b>
10.1. Photos of Radiated Emission Test (30-1000MHz) .....	10-1
<b>11. PHOTOGRAPH OF EUT .....</b>	<b>11-1</b>

### TEST REPORT CERTIFICATION

Applicant : ZF Friedrichshafen AG  
Manufacturer : G. tech Technology Ltd.  
EUT Description : Wireless Sym. Nano Mouse  
FCC ID : GDDJF-T02  
(A) MODEL NO. : JF-T02  
(B) SERIAL NO. : N/A  
(C) POWER SUPPLY : DC 1.5V  
(D) TEST VOLTAGE : DC 1.5V

Tested for comply with:  
FCC Rules and Regulations Part 15 Subpart C:2008

Test procedure used:  
ANSI C63.10:2009

The device described above is tested by AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. to confirm comply with all the FCC Part 15 Subpart C requirements.

The test results are contained in this test report and AUDIX TECHNOLOGY (SHENZHEN) CO., LTD. is assumed full responsibility for the accuracy and completeness of these tests. This report contains data that are not covered by the NVLAP accreditation. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This Report is made under FCC Part 2.1075. No modifications were required during testing to bring this product into compliance.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of AUDIX TECHNOLOGY (SHENZHEN) CO., LTD.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Date of Test : Oct.27~29, 2011 Report of date: Nov.02, 2011

Prepared by : Selina Lin for Reviewer by : Sunny Lu  
Blove Ye/ Assistant      Audix Technology (Shenzhen) Co., Ltd. Supervisor



Approved & Authorized Signer : Ken Lu  
Ken Lu / Manager

## 1. SUMMARY OF STANDARDS AND RESULTS

### 1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION		
Description of Test Item	Standard	Results
Power Line Conducted Emission Test	FCC Part 15C: 15.207 ANSI C63.10-2009	N/A
Radiated Emission Test	FCC Part 15C: 15.209 FCC Part 15C: 15.249 ANSI C63.10-2009	PASS
Band Edge Compliance Test	FCC Part 15: 15.249 ANSI C63.10-2009	PASS
20dB Bandwidth Test	FCC Part 15: 15.215 ANSI C63.10-2009	PASS

N/A is an abbreviation for Not Applicable.

## 2. GENERAL INFORMATION

### 2.1. Description of Device (EUT)

Product Name	: Wireless Sym. Nano Mouse
Model Number	: JF-T02
FCC ID	: GDDJF-T02
Operation frequency	: 2402MHz-2479MHz
Antenna	: Integrated PCB antenna, 0dBi gain
Modulation	: GFSK
Power Supply	: DC 1.5V (Note: Batteries were full charged for all the test.)
Applicant	: ZF Friedrichshafen AG Cherrystrasse, 91275 Auerbach/Opf., Germany
Manufacturer	: G. tech Technology Ltd. No.21, Jingding Industrial Park, West Jinfeng Road, Tangjiawan Town, Xiangzhou District Zhuhai Guangdong China
Date of Test	: Oct.27~29, 2011
Date of Receipt	: Oct.17, 2011
Sample Type	: Prototype production

## 2.2. Tested Supporting System Details

N/A

## 2.3. EUT Configuration and operation conditions for test.

EUT
-----

## 2.4. Test Facility

### Site Description

Name of Firm : Audix Technology (Shenzhen) Co., Ltd.  
No. 6, Ke Feng Rd., 52 Block, Shenzhen  
Science & Industrial Park, Nantou,  
Shenzhen, Guangdong, China

3m Anechoic Chamber : Certificated by FCC, USA  
Registration Number: 90454  
Valid Date: Mar.31, 2012

3m & 10m Anechoic Chamber : Certificated by FCC, USA  
Registration Number: 794232  
Valid Date: Dec.30, 2012

EMC Lab. : Certificated by Industry Canada  
Registration Number: IC 5183A-1  
Valid Date: Jun.13, 2014

Certificated by DAkkS, Germany  
Registration No: D-PL-12151-01-01  
Valid Date: Feb.01, 2014

Accredited by NVLAP, USA  
NVLAP Code: 200372-0  
Valid Date: Mar.31, 2012

2.5.Measurement Uncertainty (95% confidence levels, k=2)

Test Item	Uncertainty
Uncertainty for Radiation Emission test in 3m chamber	3.6 dB(30~200MHz, Polarize: H)
	3.7 dB(30~200MHz, Polarize: V)
	4.0 dB(200M~1GHz, Polarize: H)
	3.7 dB(200M~1GHz, Polarize: V)
Uncertainty for Radiated Spurious Emission test in RF chamber	3.57dB
Uncertainty for Conduction Spurious emission test	2.00 dB
Uncertainty for Output power test	0.73 dB
Uncertainty for Power density test	2.00 dB
Uncertainty for Frequency range test	$7 \times 10^{-8}$
Uncertainty for Bandwidth test	83 kHz
Uncertainty for DC power test	0.038 %
Uncertainty for test site temperature and humidity	0.6°C
	3%

### **3. POWER LINE CONDUCTED EMISSION TEST**

According to Paragraph (c) of FCC Part 15 section 15.207, Tests to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.



## 4. RADIATED EMISSION TEST

### 4.1. Test Equipment

Frequency rang: 30~1000MHz

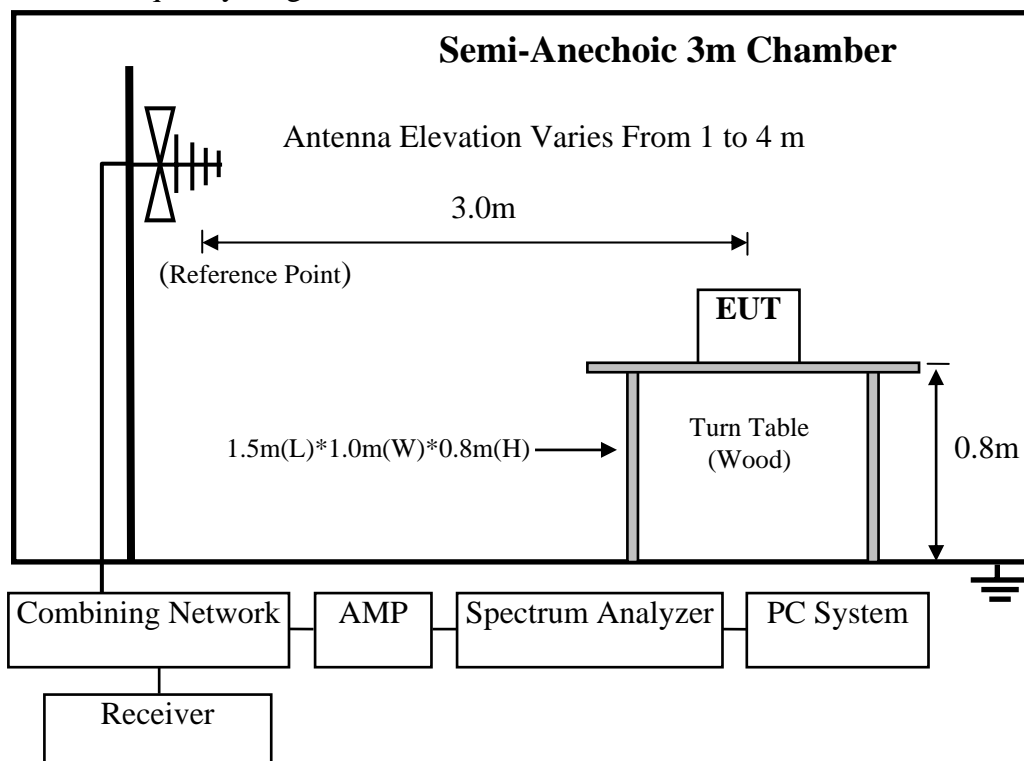
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	3#Chamber	AUDIX	N/A	N/A	Dec.06,10	1 Year
2	EMI Spectrum	Agilent	E4407B	MY41440292	May.08, 11	1 Year
3	Test Receiver	Rohde & Schwarz	ESVS10	834468/011	May.08, 11	1 Year
4	Amplifier	HP	8447D	2648A04738	May.08, 11	1 Year
5	Bilog Antenna	Schaffner	CBL6111C	2598	Oct.26, 10	1 Year
6	RF Cable	MIYAZAKI	8D-FB	3# Chamber No.1	May.08, 11	1 Year
7	Coaxial Switch	Anritsu	MP59B	M73989	May.08, 11	1 Year

Frequency rang: above 1000MHz

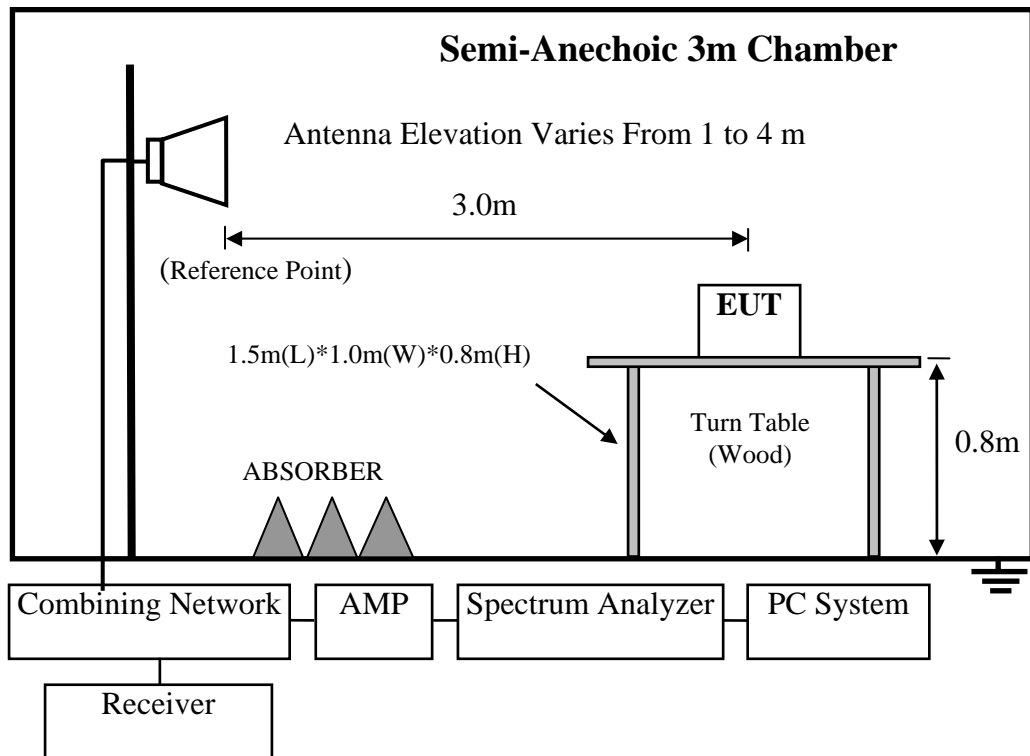
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum Analyzer	Agilent	E4407B	MY41440292	May.08, 11	1 Year
2	Horn Antenna	EMCO	3115	9607-4877	July.01, 11	1 Year
3	Amplifier	Agilent	8449B	3008A00863	May.08, 11	1 Year
4	RF Cable	Hubersuhner	SUCOFLEX102	28622/2	May.08, 11	1 Year
5	RF Cable	Hubersuhner	SUCOFLEX102	29091/2	May.08, 11	1 Year

### 4.2. Block Diagram of Test Setup

For frequency range 30MHz-1000MHz



For frequency range above 1GHz



#### 4.3. Radiated Emission Limit Standard: FCC 15.209 and 15.249

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V}/\text{m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000MHz	3	74.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	
Field Strength of fundamental emissions for 2.4GHz-2.4835GHz	3	114.0 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 94.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

- Remark :
- (1) Emission level  $\text{dB}\mu\text{V} = 20 \log$  Emission level  $\mu\text{V}/\text{m}$
  - (2) The smaller limit shall apply at the cross point between two frequency bands.
  - (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.
  - (4) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

#### 4.4.EUT Configuration on Test

The following equipment are installed on Radiated Emission Test to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

#### 4.5.Operating Condition of EUT

- 4.5.1. Setup the EUT and simulator as shown as Section 4.2.
- 4.5.2. Turned on the power of all equipment.
- 4.5.3. Let EUT work in Tx mode.

#### 4.6.Test Procedure

The EUT and its simulators are placed on a turn table, which is 0.8 meter high above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on Test. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.10-2009 on radiated emission Test.

During the pretest the EUT was rotated through three orthogonal axes to determine the attitude that maximizes the emissions.

After that the EUT was manually handled to find the orientation that has the maximum emission, which is the orientation show in the test setup photos.

The bandwidth of the EMI test receiver (R&S ESVS10) is set at 120kHz for frequency range from 30MHz to 1000 MHz.

The bandwidth of the Spectrum's RBW is set at 1MHz and VBW is set at 3MHz for peak emissions measurement above 1GHz

This device is pulse modulated, a duty cycle factor was used to calculate average level based measured peak level.

The frequency range from 30MHz to 10th harmonic (25GHz) are checked. and no any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

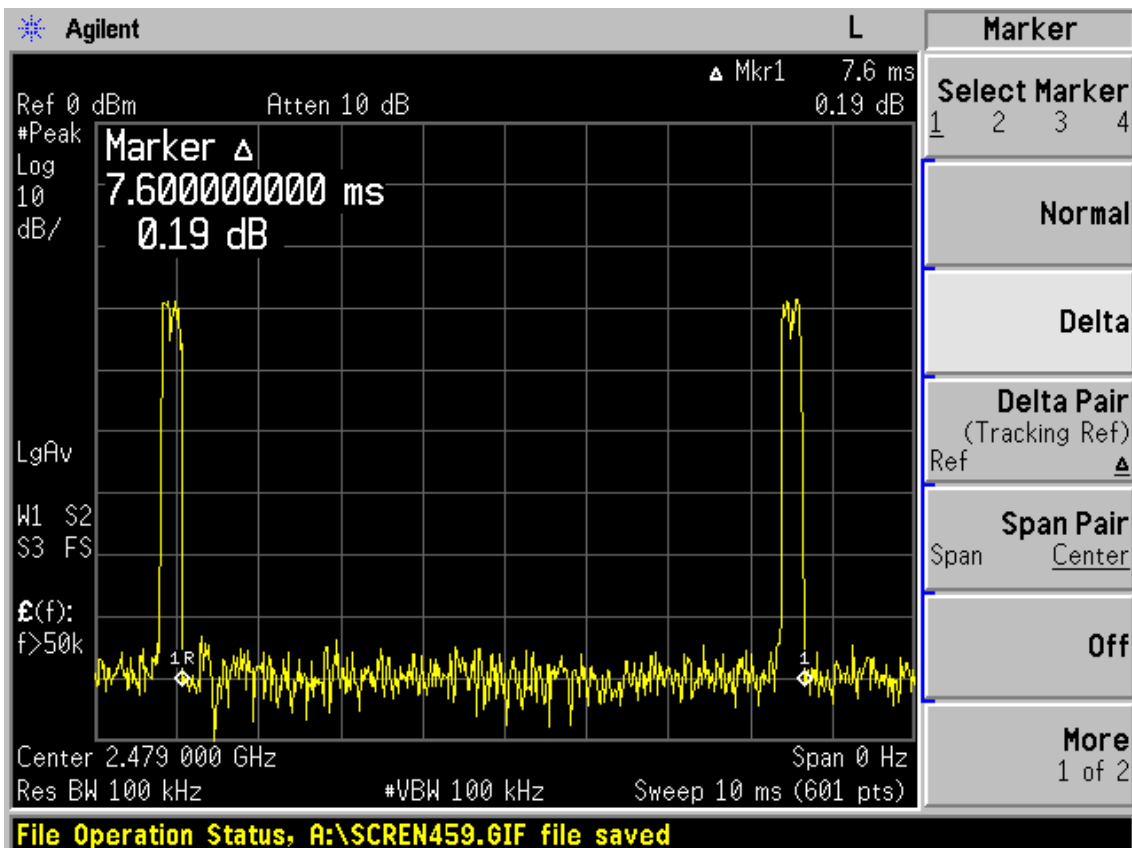
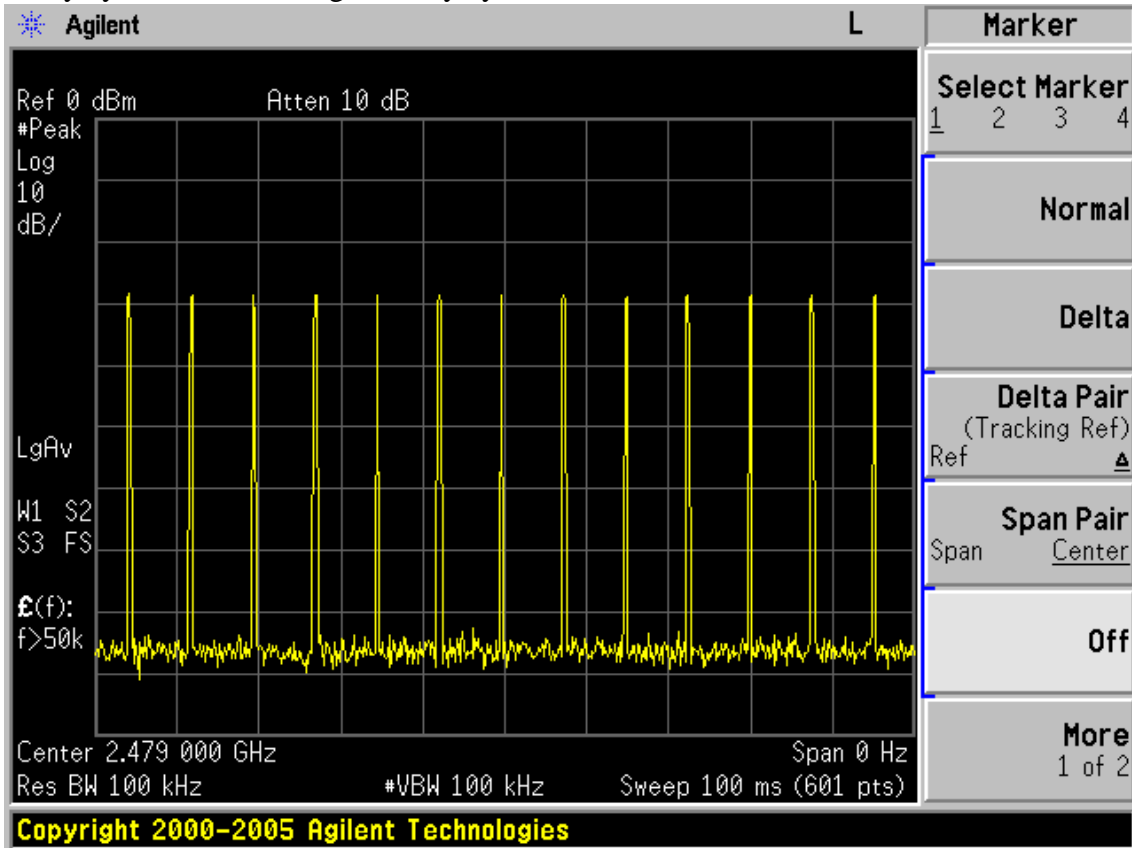
#### 4.7.Radiated Emission Test Results

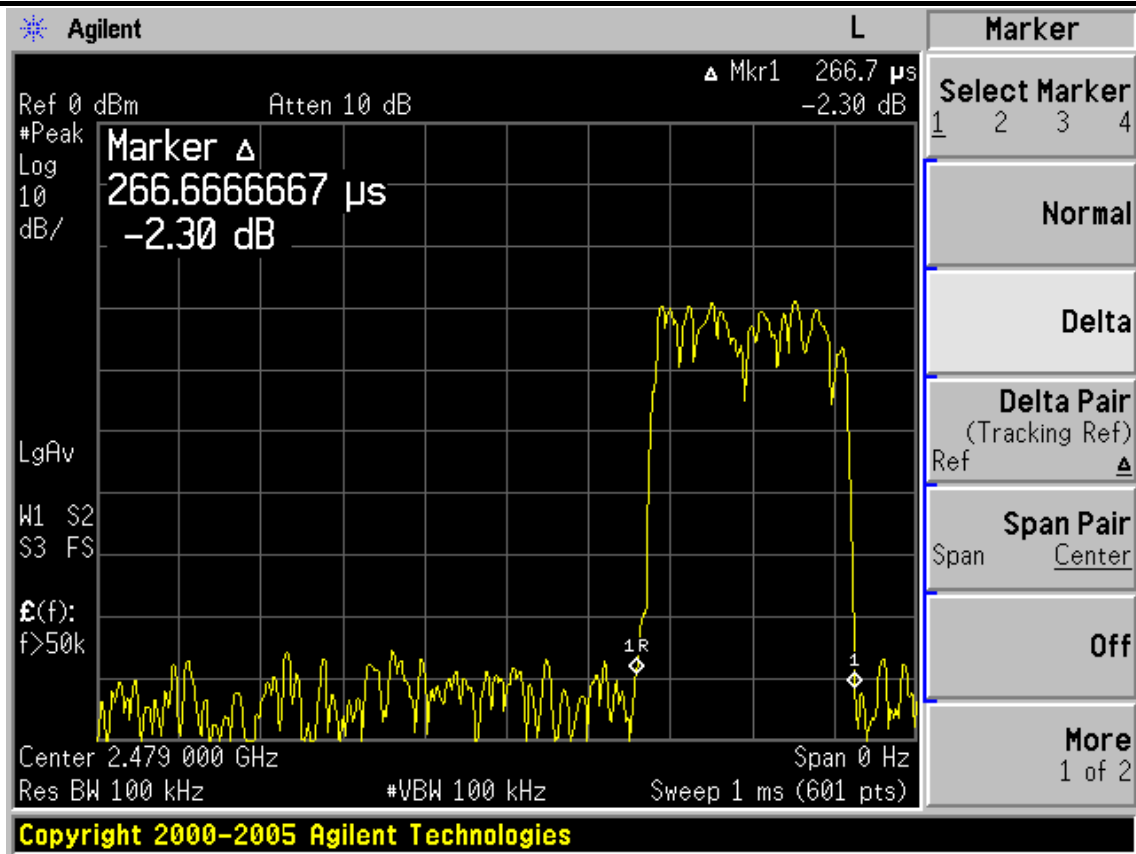
**PASS.**

All the emissions from 30MHz to 25GHz were comply with the 15.209 Limit.

Note: The duty cycle factor for calculate average level is 28.64dB, and average limit is 20dB below peak limit, so if peak measured level comply with peak limit, the average level was deemed to comply with average limit.

Duty cycle:  $0.2667\text{ms} / 7.6\text{ms} * 100\% = 3.5\%$   
 Duty cycle factor =  $20\log (1/\text{duty cycle}) = 29.09\text{dB}$



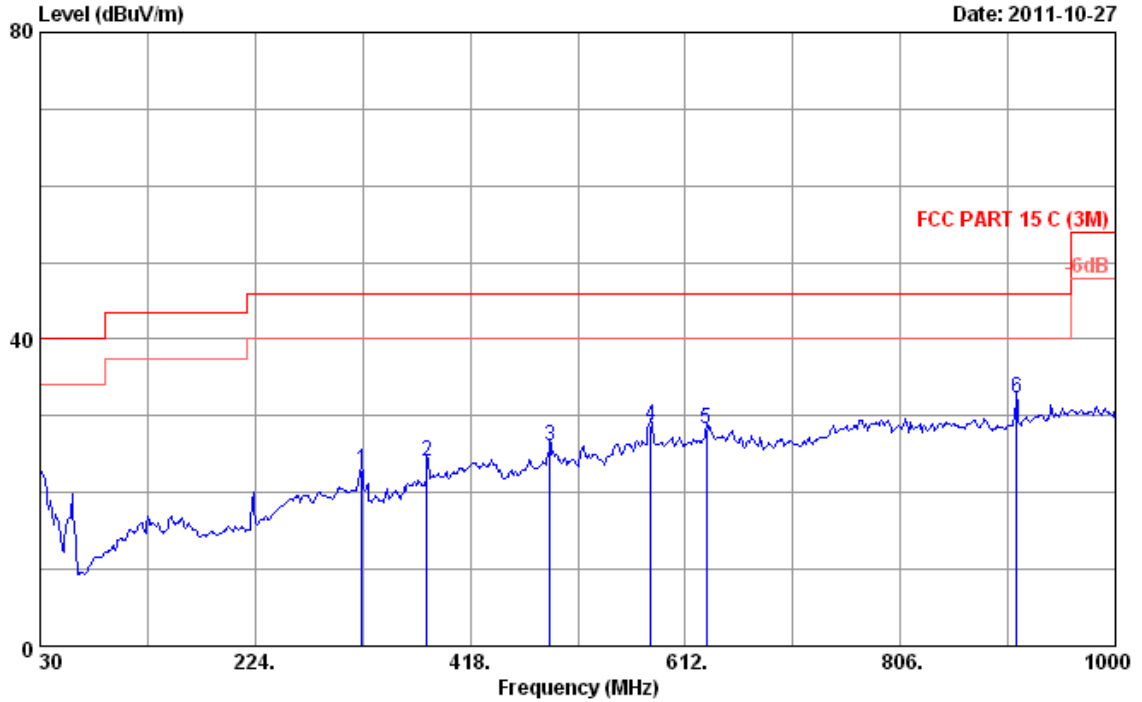


**Frequency: 30MHz~1GHz**

Data: 1

File: E:\2011 Report data\Z\F\ACS11Q2030R1.EM6 (2)

Date: 2011-10-27

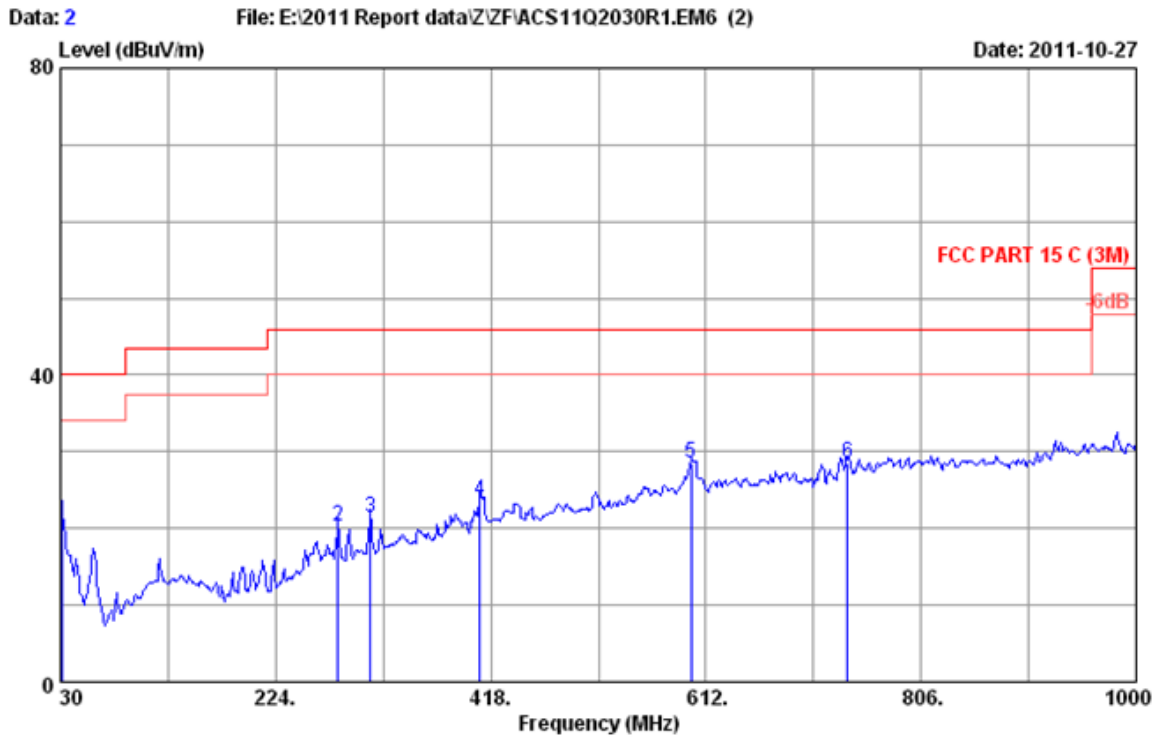


Site no. : 3m Chamber  
 Dis. / Ant. : 3m 2010 CBL6111C 2598  
 Limit : FCC PART 15 C (3M)  
 Env. / Ins. : 24°C/56%  
 EUT : Wireless Sym.Nano Mouse  
 Power rating : DC 1.5V  
 Test Mode : Tx Mode  
 M/N:JF-T02

Data no. : 1  
 Ant. pol. : HORIZONTAL  
 Engineer : Gary\_zeng

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	320.030	14.20	3.07	5.67	22.94	46.00	23.06	QP
2	379.200	15.68	3.26	5.11	24.05	46.00	21.95	QP
3	489.780	18.20	3.93	3.83	25.96	46.00	20.04	QP
4	580.960	19.62	4.41	4.70	28.73	46.00	17.27	QP
5	631.400	20.23	4.66	3.41	28.30	46.00	17.70	QP
6	910.760	23.14	5.71	3.35	32.20	46.00	13.80	QP

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



```

Site no.      : 3m Chamber
Dis. / Ant.   : 3m 2010 CBL6111C 2598
Limit         : FCC PART 15 C (3M)
Env. / Ins.   : 24°C/56%
EUT          : Wireless Sym.Nano Mouse
Power rating  : DC 1.5V
Test Mode     : Tx Mode
M/N:JF-T02

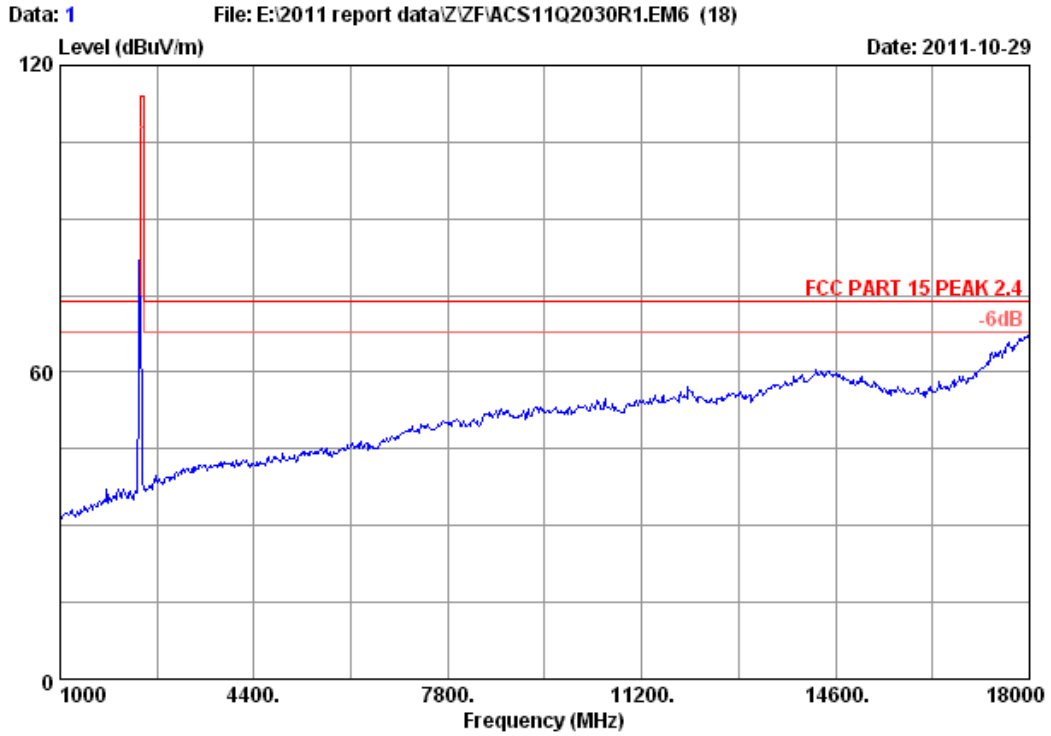
Data no.     : 2
Ant. pol.    : VERTICAL
Engineer     : Gary_zeng
    
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No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	31.940	18.88	0.61	1.52	21.01	40.00	18.99	QP
2	280.260	13.20	2.77	4.36	20.33	46.00	25.67	QP
3	309.360	13.97	3.03	4.48	21.48	46.00	24.52	QP
4	408.300	16.48	3.38	3.78	23.64	46.00	22.36	QP
5	598.420	19.88	4.49	4.05	28.42	46.00	17.58	QP
6	740.040	21.80	5.20	1.50	28.50	46.00	17.50	QP

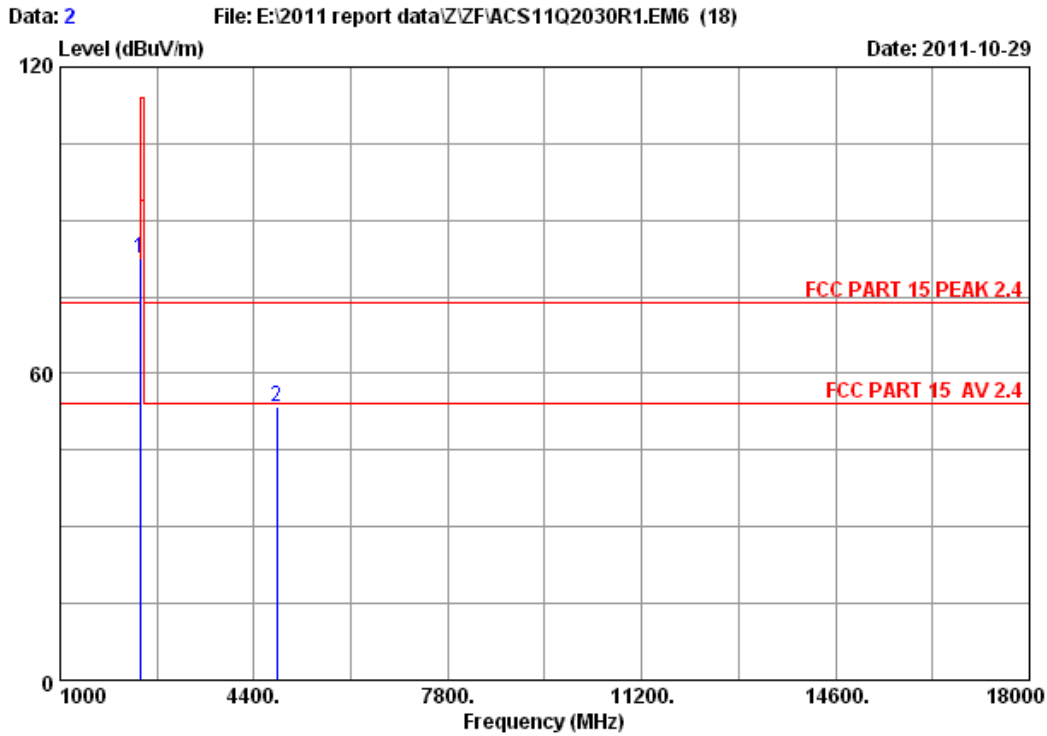
Remarks: 1. Emission Level= Antenna Factor + Cable Loss + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.



Frequency: 1GHz~18GHz



Site no.	: 3m Chamber	Data no.	: 1
Dis. / Ant.	: 3m 2011 3115 4580	Ant. pol.	: VERTICAL
Limit	: FCC PART 15 PEAK 2.4		
Env. / Ins.	: 23°C/54%	Engineer	: Paul Tian
EUT	: Wireless Sym.Nano Mouse		
Power	: DC 1.5V		
Test mode	: Tx 2402MHz		
M/N	: JF-T02		

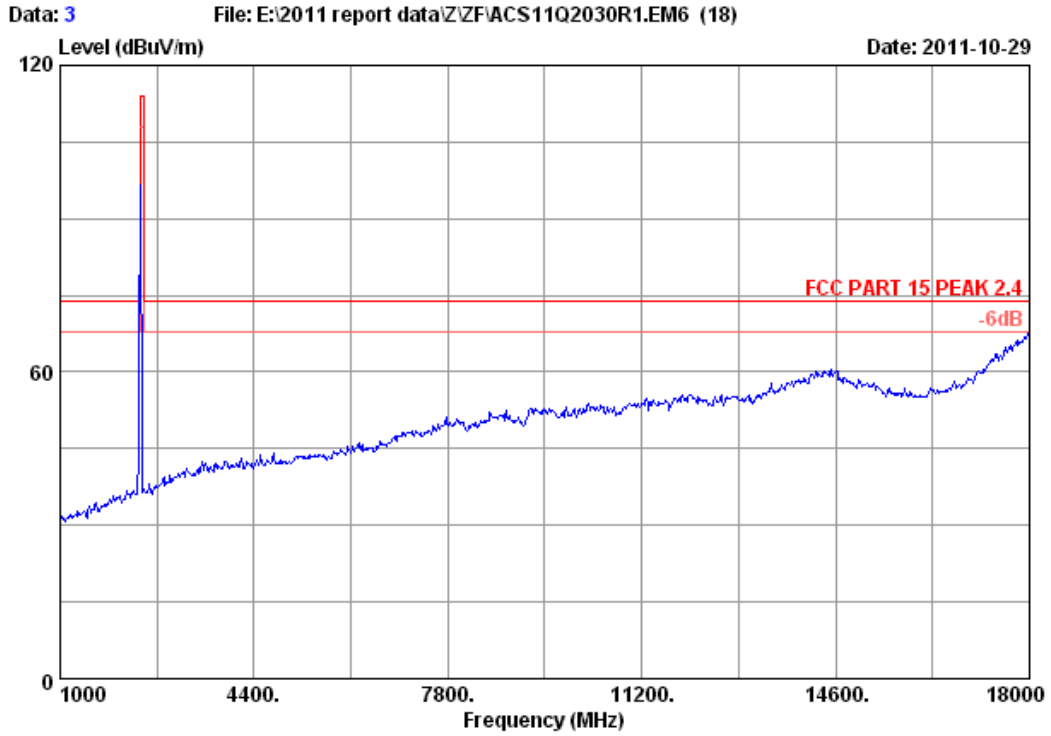


Site no. : 3m Chamber Data no. : 2  
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23°C/54% Engineer : Paul Tian  
 EUT : Wireless Sym.Nano Mouse  
 Power : DC 1.5V  
 Test mode : Tx 2402MHz  
 M/N : JF-T02

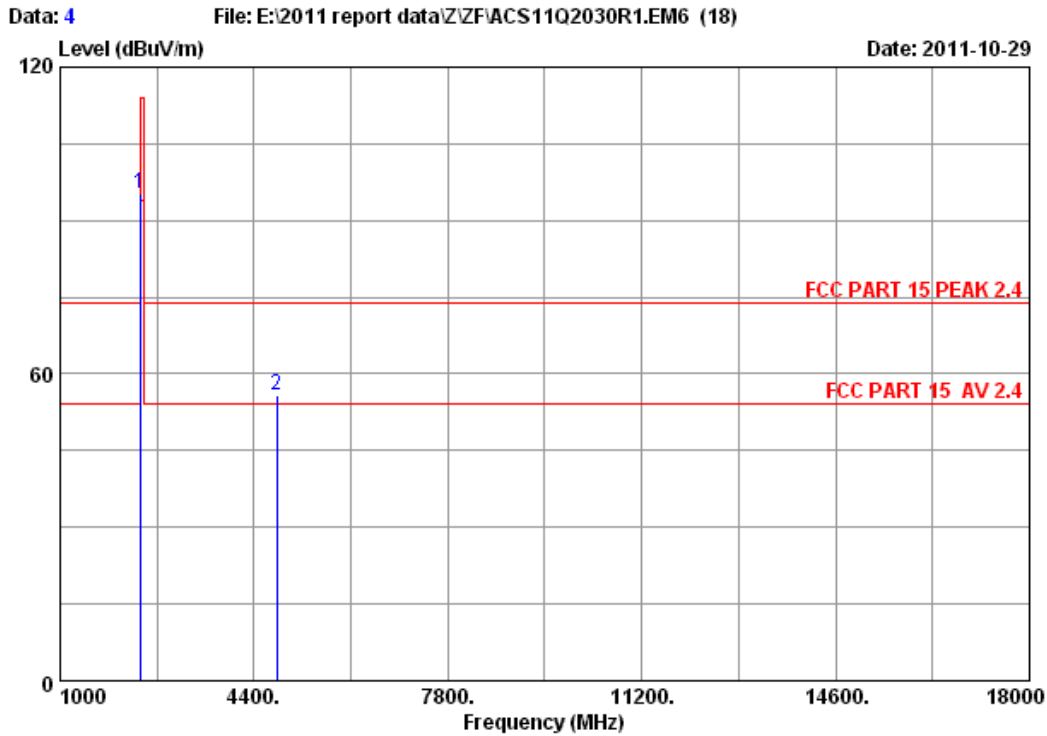
	Ant. Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.000	27.96	6.75	34.44	82.13	82.40	114.00	31.60	Peak
2	4804.000	32.86	9.55	34.60	45.54	53.35	74.00	20.65	Peak

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.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
2402	82.40	29.09	53.31	94	Pass
4804	53.35	29.09	24.26	54	Pass



Site no. : 3m Chamber Data no. : 3  
Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL  
Limit : FCC PART 15 PEAK 2.4  
Env. / Ins. : 23°C/54% Engineer : Paul Tian  
EUT : Wireless Sym.Nano Mouse  
Power : DC 1.5V  
Test mode : Tx 2402MHz  
M/N : JF-T02

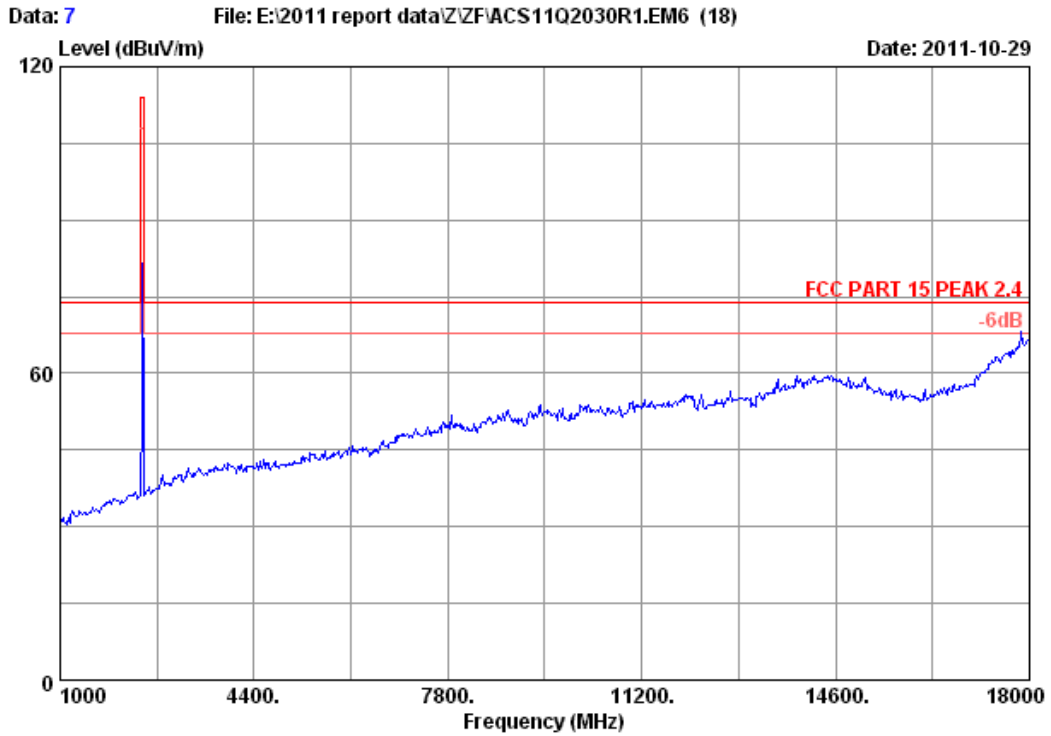


Site no. : 3m Chamber Data no. : 4  
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23\*C/54% Engineer : Paul Tian  
 EUT : Wireless Sym.Nano Mouse  
 Power : DC 1.5V  
 Test mode : Tx 2402MHz  
 M/N : JF-T02

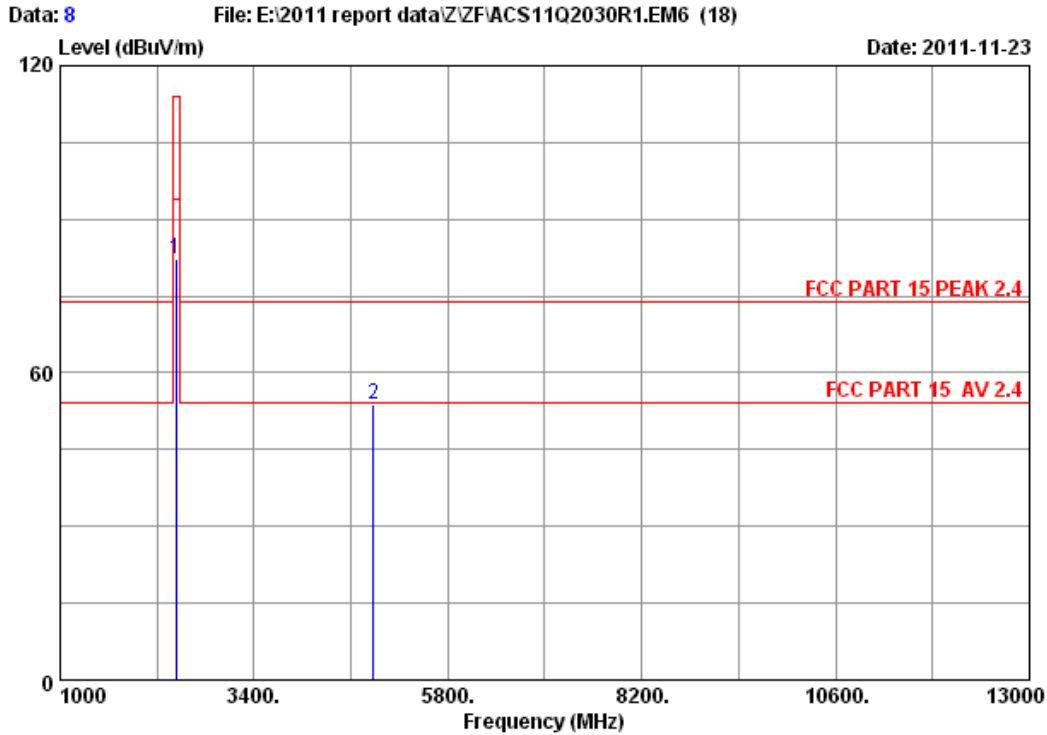
	Ant. Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2402.000	27.96	6.75	34.44	94.88	95.15	114.00	18.85	Peak
2	4804.000	32.86	9.55	34.60	47.87	55.68	74.00	18.32	Peak

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.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
2402	95.15	29.09	66.06	94	Pass
4804	55.68	29.09	26.59	54	Pass



Site no.	: 3m Chamber	Data no. :	7
Dis. / Ant.	: 3m 2011 3115 4580	Ant. pol. :	VERTICAL
Limit	: FCC PART 15 PEAK 2.4		
Env. / Ins.	: 23°C/54%	Engineer :	Paul Tian
EUT	: Wireless Sym.Nano Mouse		
Power	: DC 1.5V		
Test mode	: Tx 2439MHz		
M/N	: JF-T02		



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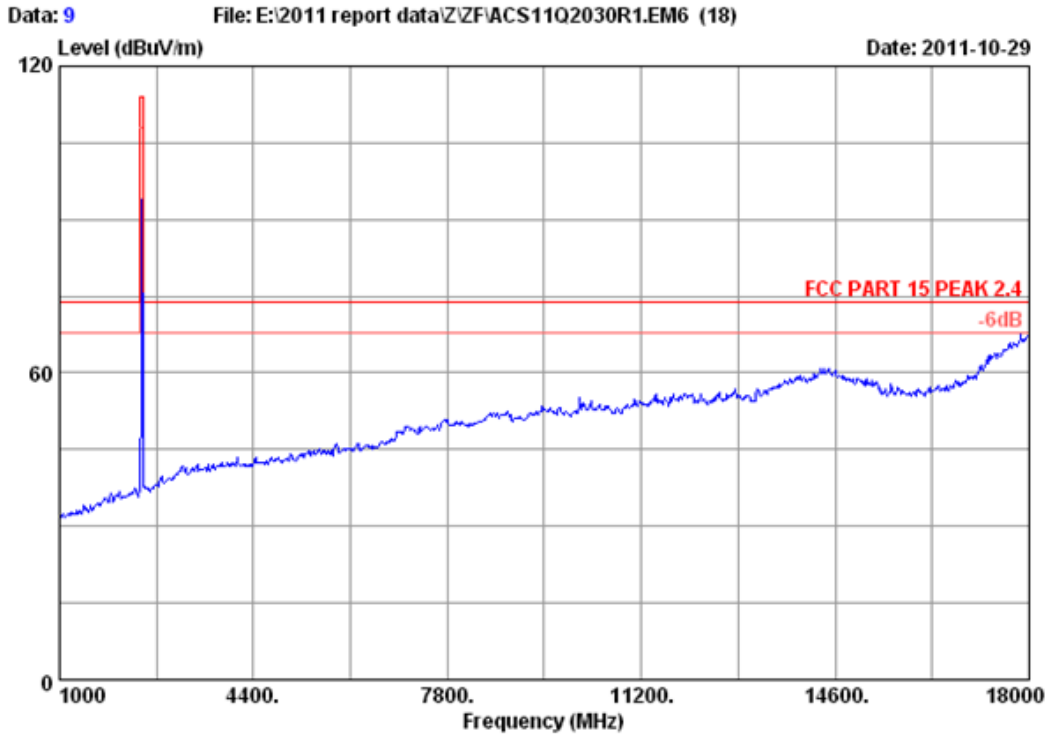
Site no.      : 3m Chamber                Data no. : 8
Dis. / Ant.  : 3m 2011 3115 4580         Ant. pol. : VERTICAL
Limit        : FCC PART 15 PEAK 2.4
Env. / Ins.  : 23*C/54%                  Engineer  : Paul Tian
EUT          : Wireless Sym.Nano Mouse
Power        : DC 1.5V
Test mode    : Tx 2439MHz
M/N         : JF-T02
    
```

	Ant. 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	2439.000	28.03	6.81	34.44	81.85	82.25	114.00	31.75	Peak
2	4878.000	32.98	9.62	34.60	45.87	53.87	74.00	20.13	Peak

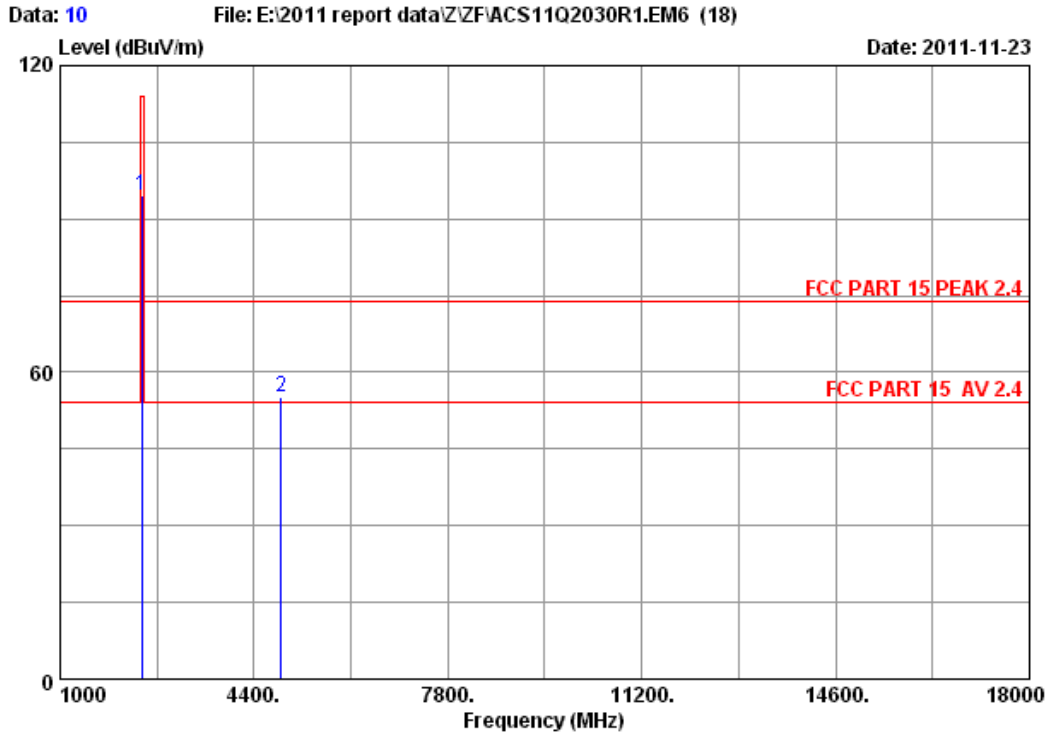
Remarks:

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

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
2439	81.25	29.09	52.16	94	Pass
4878	52.73	29.09	23.64	54	Pass



Site no.	: 3m Chamber	Data no.	: 9
Dis. / Ant.	: 3m 2011 3115 4580	Ant. pol.	: HORIZONTAL
Limit	: FCC PART 15 PEAK 2.4		
Env. / Ins.	: 23°C/54%	Engineer	: Paul Tian
EUT	: Wireless Sym.Nano Mouse		
Power	: DC 1.5V		
Test mode	: Tx 2439MHz		
M/N	: JF-T02		



Site no. : 3m Chamber Data no. : 10  
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23\*C/54% Engineer : Paul Tian  
 EUT : Wireless Sym.Nano Mouse  
 Power : DC 1.5V  
 Test mode : Tx 2439MHz  
 M/N : JF-T02

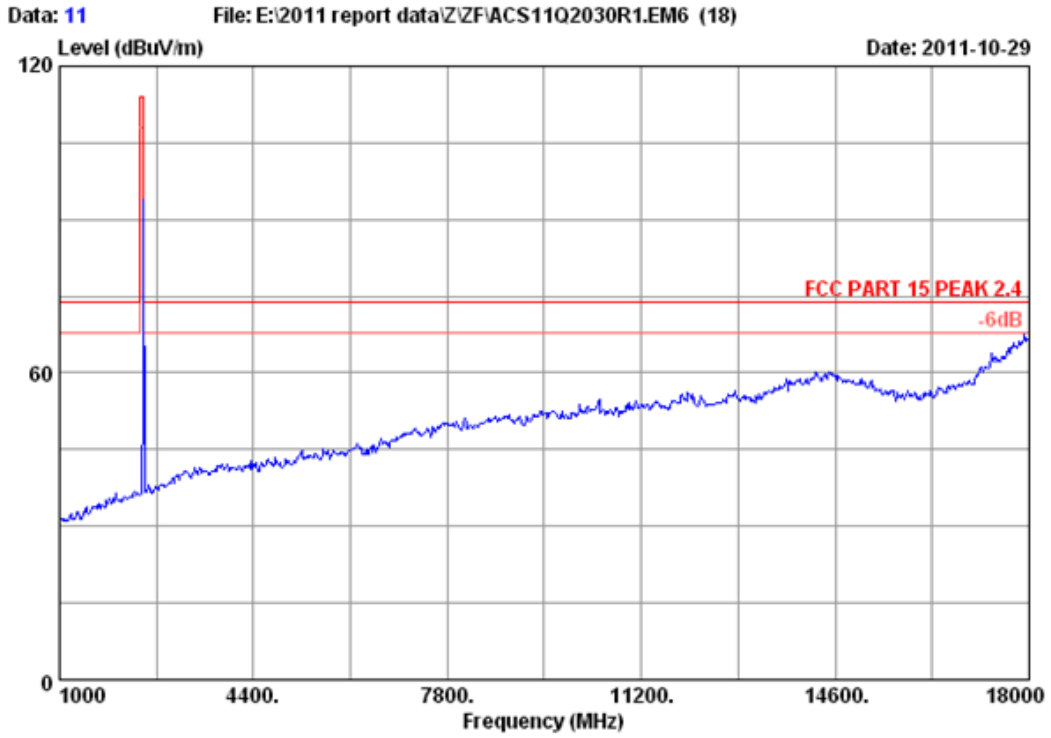
	Ant. Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2439.000	28.03	6.81	34.44	94.07	94.47	114.00	19.53	Peak
2	4878.000	32.98	9.62	34.60	47.26	55.26	74.00	18.74	Peak

Remarks:

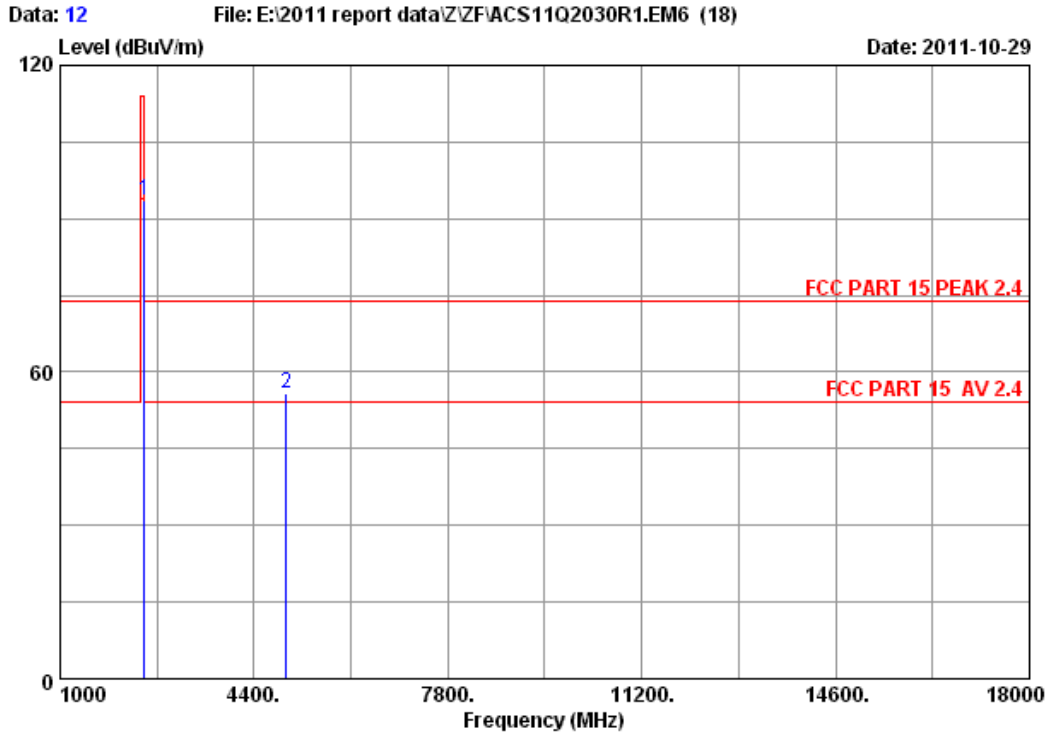
1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
2439	94.47	29.09	65.38	94	Pass
4878	55.26	29.09	26.17	54	Pass





Site no.	: 3m Chamber	Data no. :	11
Dis. / Ant.	: 3m 2011 3115 4580	Ant. pol. :	HORIZONTAL
Limit	: FCC PART 15 PEAK 2.4		
Env. / Ins.	: 23°C/54%	Engineer :	Paul Tian
EUT	: Wireless Sym.Nano Mouse		
Power	: DC 1.5V		
Test mode	: Tx 2479MHz		
M/N	: JF-T02		



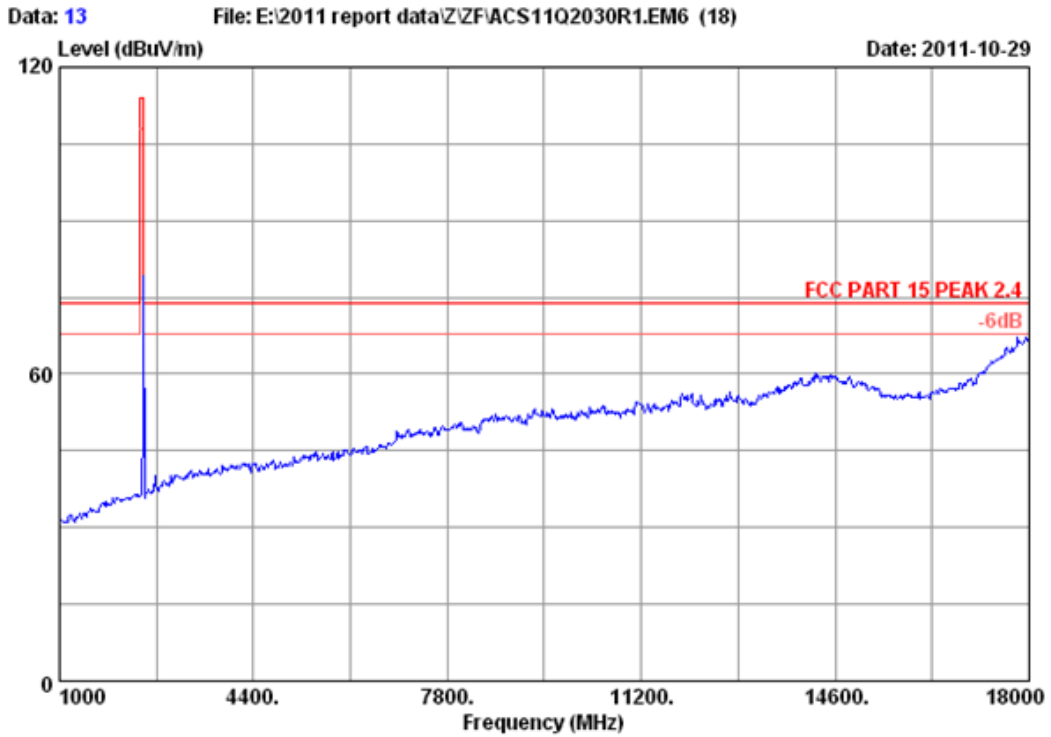
```

Site no.      : 3m Chamber           Data no. : 12
Dis. / Ant.  : 3m 2011 3115 4580    Ant. pol. : HORIZONTAL
Limit        : FCC PART 15 PEAK 2.4
Env. / Ins.  : 23*C/54%             Engineer  : Paul Tian
EUT          : Wireless Sym.Nano Mouse
Power        : DC 1.5V
Test mode    : Tx 2479MHz
M/N         : JF-T02
    
```

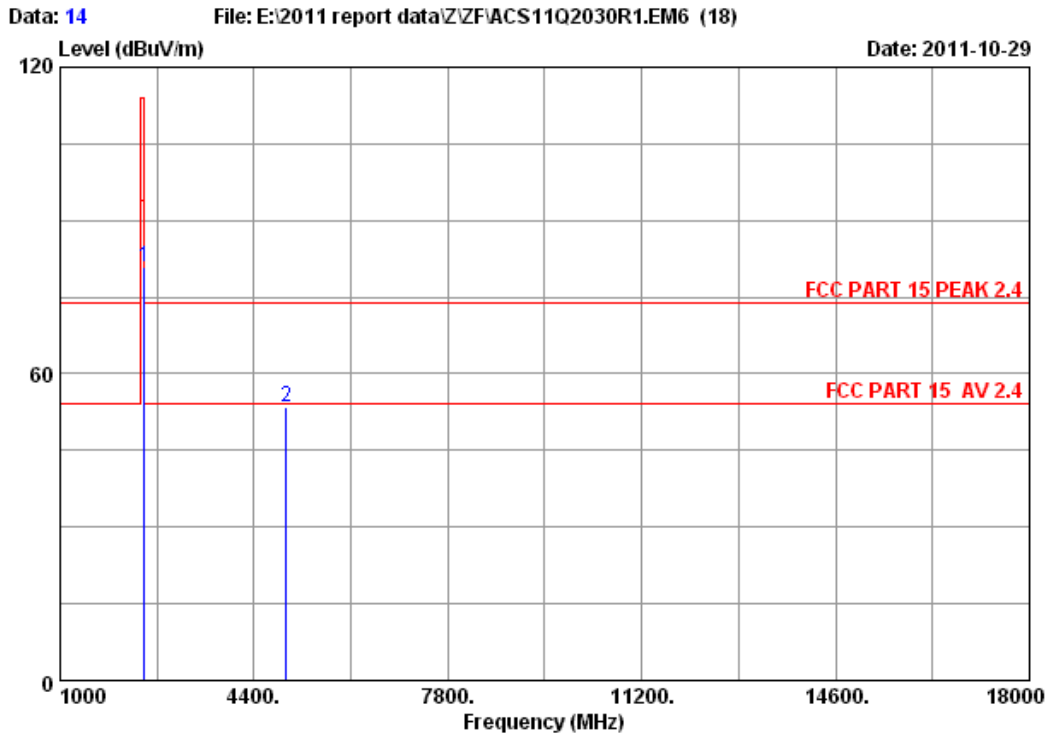
	Ant. Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2479.000	28.08	6.87	34.45	93.08	93.58	114.00	20.42	Peak
2	4958.000	33.14	9.69	34.60	47.53	55.76	74.00	18.24	Peak

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

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
2479	93.58	29.09	64.49	94	Pass
4958	55.76	29.09	26.67	54	Pass



Site no.	: 3m Chamber	Data no. :	13
Dis. / Ant.	: 3m 2011 3115 4580	Ant. pol. :	VERTICAL
Limit	: FCC PART 15 PEAK 2.4	Engineer :	Paul Tian
Env. / Ins.	: 23*C/54%		
EUT	: Wireless Sym.Nano Mouse		
Power	: DC 1.5V		
Test mode	: Tx 2479MHz		
M/N	: JF-T02		



```

Site no.      : 3m Chamber           Data no. : 14
Dis. / Ant.  : 3m 2011 3115 4580     Ant. pol. : VERTICAL
Limit        : FCC PART 15 PEAK 2.4
Env. / Ins.  : 23*C/54%             Engineer  : Paul Tian
EUT          : Wireless Sym.Nano Mouse
Power        : DC 1.5V
Test mode    : Tx 2479MHz
M/N         : JF-T02
    
```

	Ant.	Cable	Amp.	Emission					
Freq.	Factor	loss	Factor	Reading	Level	Limits	Margin	Remark	
(MHz)	(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	dBuV/m)	(dB)		
1 2479.000	28.08	6.87	34.45	80.23	80.73	114.00	33.27	Peak	
2 4958.000	33.14	9.69	34.60	45.32	53.55	74.00	20.45	Peak	

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.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
2479	80.73	29.09	51.64	94	Pass
4958	53.55	29.09	24.46	54	Pass

## 5. 20 DB BANDWIDTH TEST

### 5.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	Agilent	E4446A	US44300459	May.08,11	1 Year

### 5.2. Limit

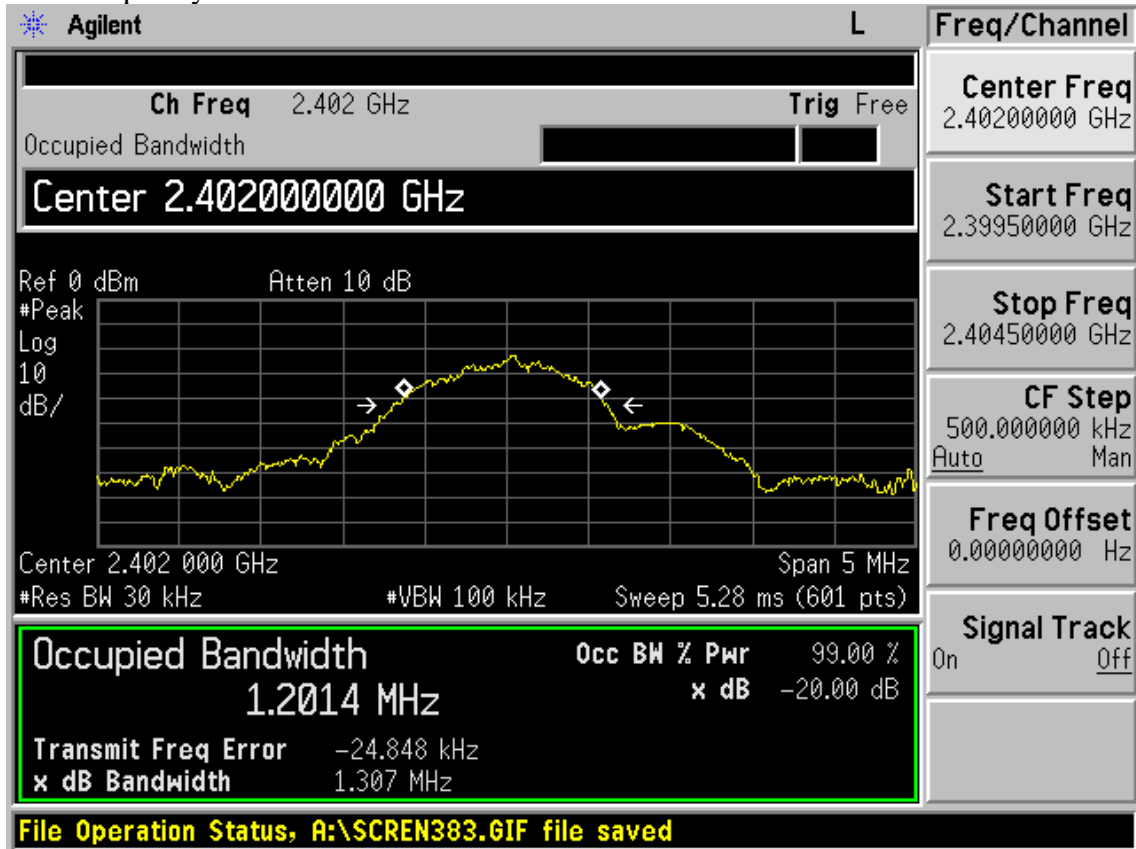
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

### 5.3. Test Results

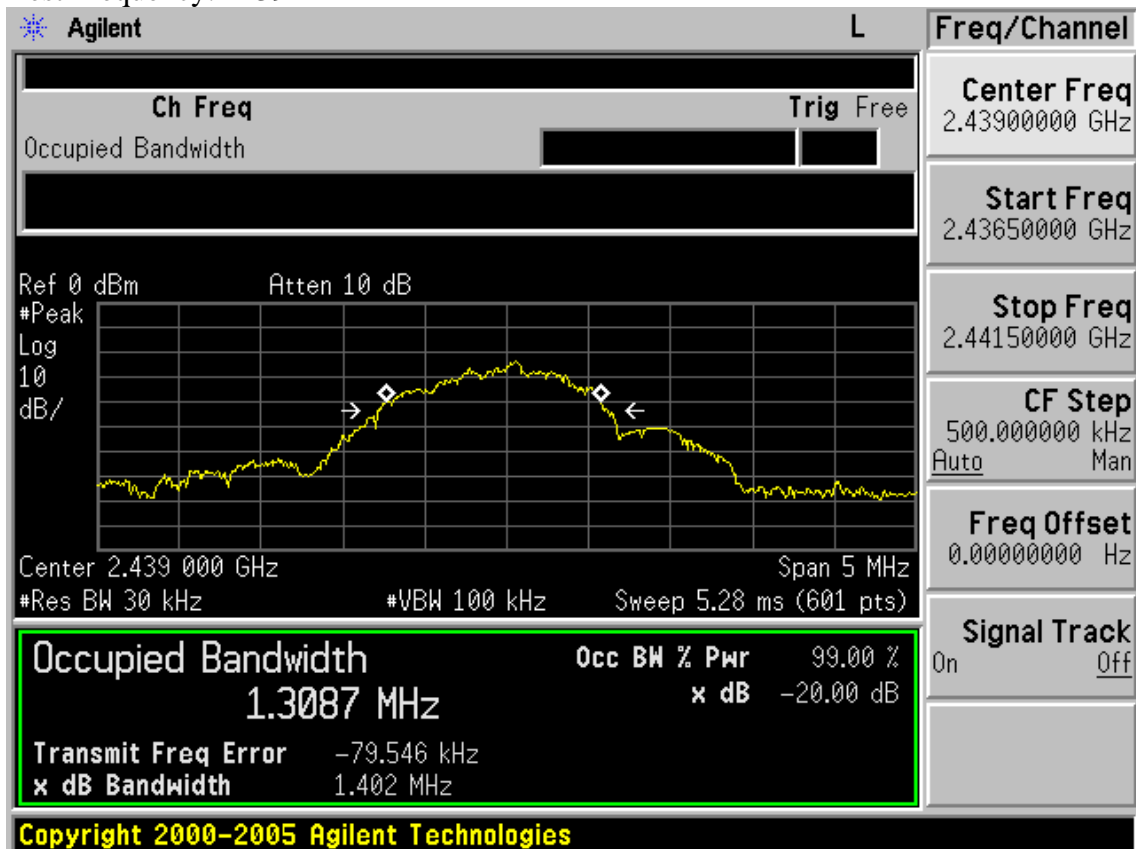
EUT: Wireless Sym. Nano Mouse		
M/N: JF-T02		
Test date:2011-10-29	Pressure: 101.2 kpa	Humidity: 52.6 %
Tested by: Leo-Li	Test site: RF site	Temperature : 25.4 °C

Frequency	20dB bandwidth ( KHz )	Limit (KHz)
2402MHz	1307	N/A
2439MHz	1423	N/A
2479MHz	1402	N/A
Conclusion : PASS		

Test Frequency: 2402MHz



Test Frequency: 2439MHz



Test Frequency: 2479MHz

Agilent
L

**Ch Freq** 2.479 GHz

Occupied Bandwidth

**Center 2.479000000 GHz**

Ref 0 dBm      Atten 10 dB

Center 2.479 000 GHz      Span 5 MHz

#Res BW 30 kHz      #VBW 100 kHz      Sweep 5.28 ms (601 pts)

**Freq/Channel**

**Center Freq**  
2.47900000 GHz

**Start Freq**  
2.47650000 GHz

**Stop Freq**  
2.48150000 GHz

**CF Step**  
500.000000 kHz  
Auto      Man

**Freq Offset**  
0.00000000 Hz

**Signal Track**  
On      Off

**Occupied Bandwidth**  
**1.3159 MHz**

**Transmit Freq Error**      -77.619 kHz

**x dB Bandwidth**      1.423 MHz

**Occ BW % Pwr**      99.00 %

**x dB**      -20.00 dB

**File Operation Status, A:\SCREEN384.GIF file saved**

## 6. BAND EDGE COMPLIANCE TEST

### 6.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	Agilent	E4446A	US44300459	May.08,11	1 Year
2.	Horn Antenna	EMCO	3115	9607-4877	Nov.25, 10	1.5 Year
3.	Amplifier	Agilent	8449B	3008A02495	May.08, 11	1 Year
4.	RF Cable	Hubersuhner	SUCOFLEX102	28620/2	May.08,11	1 Year
5.	RF Cable	Hubersuhner	SUCOFLEX102	28618/2	May.08,11	1 Year
6.	RF Cable	Hubersuhner	SUCOFLEX102	28610/2	May.08,11	1 Year

### 6.2. Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

### 6.3. Test Produce

1. The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.
2. The turntable was 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 emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upperband-edges of the emission:
  - (a) PEAK: RBW=1MHz ;VBW=3MHz, PK detector, Sweep=AUTO
  - (b) This device is pulse modulated, a duty cycle factor was used to calculate average level based measured peak level

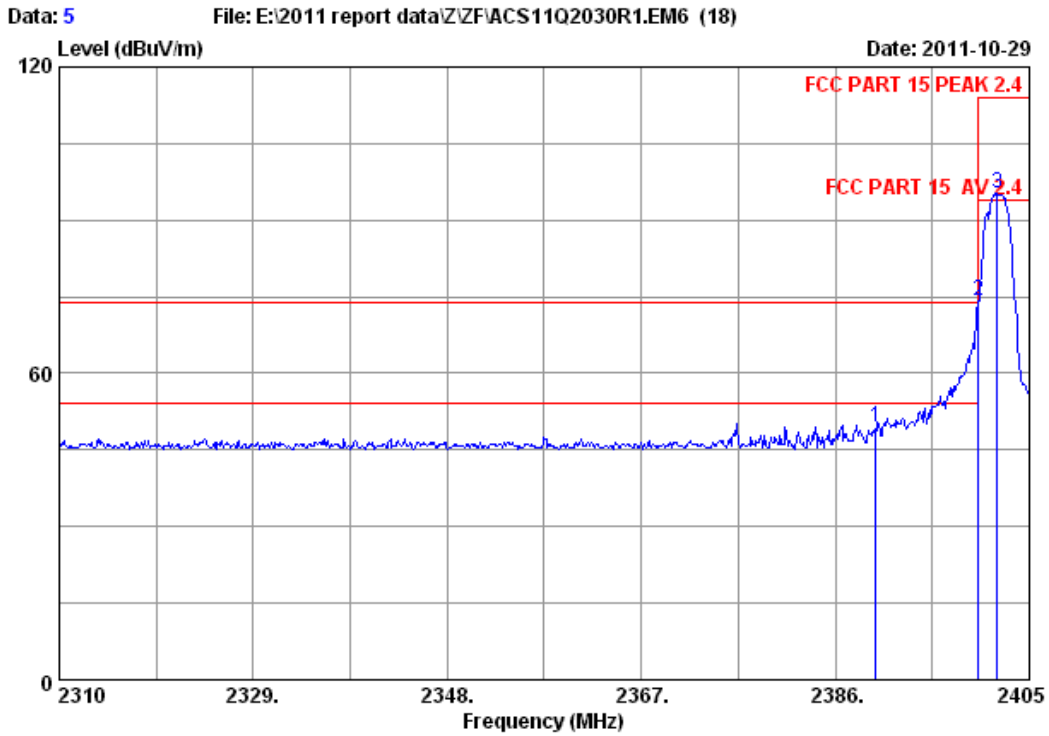


#### 6.4. Test Results

Pass (The testing data was attached in the next pages.)

Note: If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.

Note: The duty cycle factor for calculate average level is 29.09dB, and average limit is 20dB below peak limit, so if peak measured level comply with peak limit, the average level was deemed to comply with average limit.



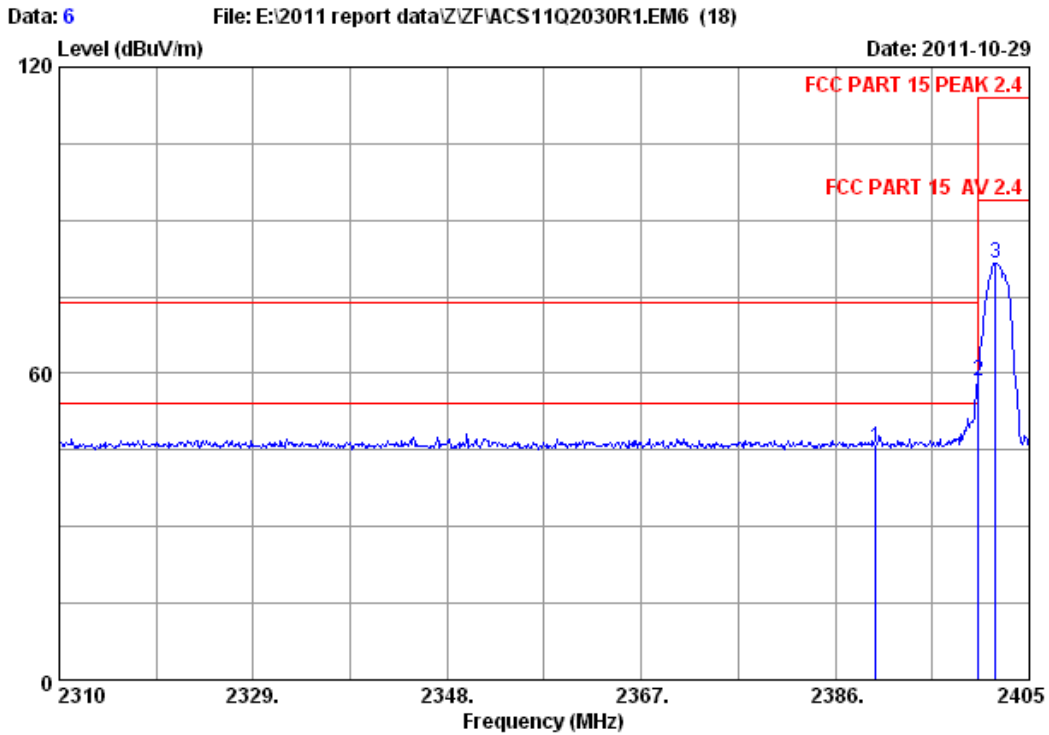
Site no. : 3m Chamber Data no. : 5  
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23°C/54% Engineer : Paul Tian  
 EUT : Wireless Sym.Nano Mouse  
 Power : DC 1.5V  
 Test mode : Tx 2402MHz  
 M/N : JF-T02

	Ant. 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	2390.000	27.96	6.72	34.44	49.32	49.56	74.00	24.44	Peak
2	2400.000	27.96	6.75	34.44	73.85	74.12	74.00	-0.12	Peak
3	2401.865	27.96	6.75	34.44	94.88	95.15	114.00	18.85	Peak

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.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
2390.000	49.56	29.09	20.47	54	Pass
2400.000	74.12	29.09	45.03	54	Pass
2401.865	95.15	29.09	66.06	94	Pass



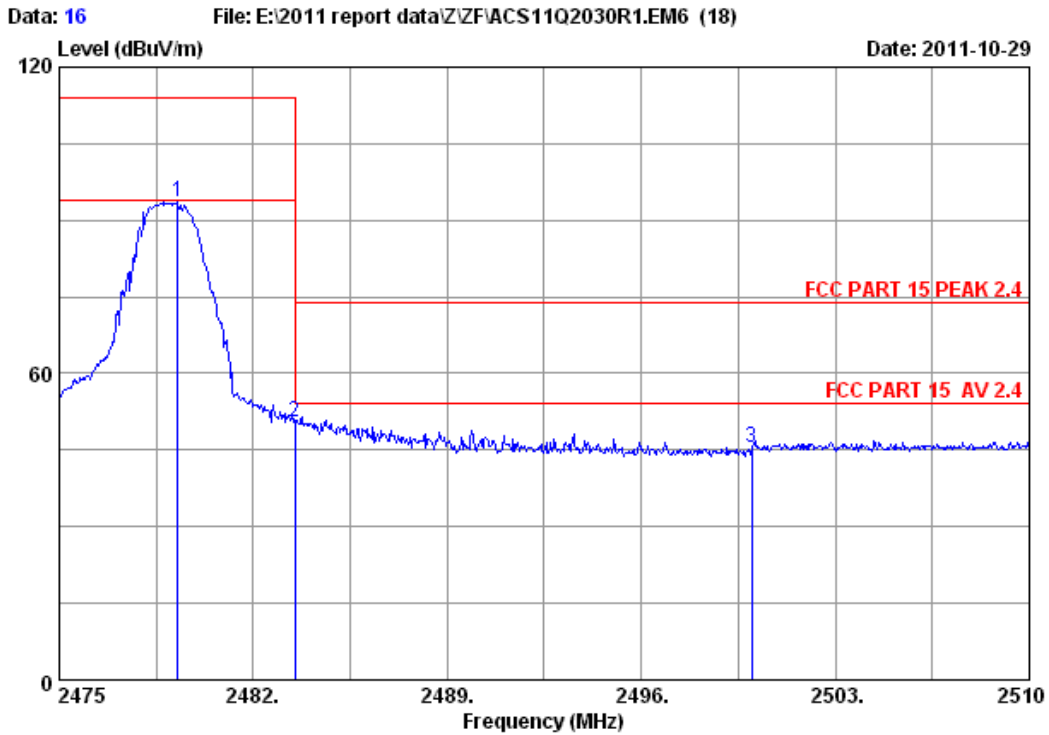
Site no. : 3m Chamber Data no. : 6  
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23°C/54% Engineer : Paul Tian  
 EUT : Wireless Sym.Nano Mouse  
 Power : DC 1.5V  
 Test mode : Tx 2402MHz  
 M/N : JF-T02

	Ant. 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	2390.000	27.96	6.72	34.44	45.35	45.59	74.00	28.41	Peak
2	2400.000	27.96	6.75	34.44	58.36	58.63	74.00	15.37	Peak
3	2401.675	27.96	6.75	34.44	81.37	81.64	114.00	32.36	Peak

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.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
2390.000	45.59	29.09	16.5	54	Pass
2400.000	58.63	29.09	29.54	54	Pass
2401.675	81.64	29.09	52.55	94	Pass



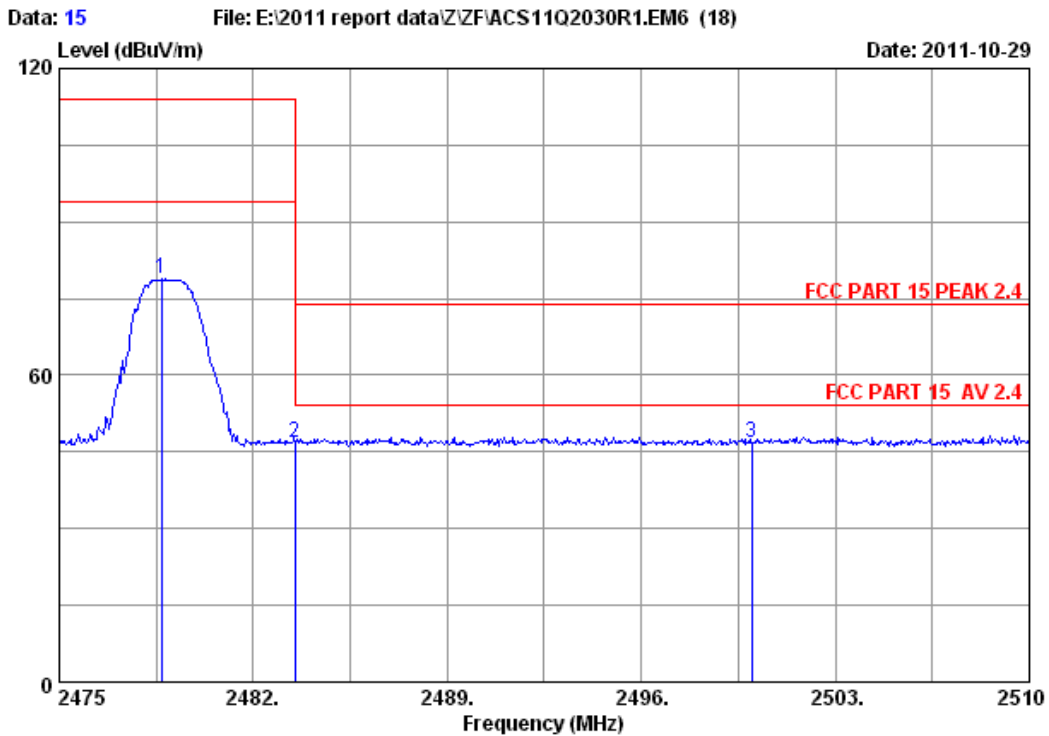
Site no. : 3m Chamber Data no. : 16  
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23°C/54% Engineer : Paul Tian  
 EUT : Wireless Sym.Nano Mouse  
 Power : DC 1.5V  
 Test mode : Tx 2479MHz  
 M/N : JF-T02

	Ant. 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	2479.270	28.08	6.87	34.45	92.94	93.44	114.00	20.56	Peak
2	2483.500	28.08	6.90	34.45	49.91	50.44	74.00	23.56	Peak
3	2500.000	28.10	6.90	34.45	44.96	45.51	74.00	28.49	Peak

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.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
2479.270	93.44	29.09	64.35	94	Pass
2483.500	50.44	29.09	21.35	54	Pass
2500.000	45.51	29.09	16.42	54	Pass



Site no. : 3m Chamber Data no. : 15  
 Dis. / Ant. : 3m 2011 3115 4580 Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : 23°C/54% Engineer : Paul Tian  
 EUT : Wireless Sym.Nano Mouse  
 Power : DC 1.5V  
 Test mode : Tx 2479MHz  
 M/N : JF-T02

	Ant. 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	2478.675	28.08	6.87	34.45	78.26	78.76	114.00	35.24	Peak
2	2483.500	28.08	6.90	34.45	46.32	46.85	74.00	27.15	Peak
3	2500.000	28.10	6.90	34.45	46.21	46.76	74.00	27.24	Peak

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.

Frequency (MHz)	Peak level (dBuV/m)	Duty cycle factor (dB)	AV level (dBuV/m)	Limit(dBuV/m)	Conclusion
2478.675	78.76	29.09	49.67	94	Pass
2483.500	46.85	29.09	17.76	54	Pass
2500.000	46.76	29.09	17.67	54	Pass

## 7. ANTENNA REQUIREMENT

**RESULT** : **PASS**

Test Date : Aug.05, 2011

Test standard : FCC Part 15.203

Limit : the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declared, the EUT has an internal antenna, the directional gain of antenna is 0dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply the provision.

## 8. RADIO FRREQUENCY EXPOSURE COMPLIANCE

**RESULT : PASS**

Test standard : FCC KDB Publication 447498

Since maximum peak output power of the transmitter is  $<60/f(\text{GHz})\text{mW}$ ,  
i.e.  $0.009438\text{mW} < 25(=60/2.4)\text{mW}$ , hence the EUT is excluded from SAR evaluation according  
to FCC KDB Publication 447498 D01:Mobile Portable RF Exposure.

## 9. DEVIATION TO TEST SPECIFICATIONS

[ NONE ]