

FCC PART 15C TEST REPORT FOR CERTIFICATION  
On Behalf of

Acrox Technologies Co.,Ltd

2.4GHz Laser Mouse

Model Number: MSS

FCC ID: PRDMU11

Prepared for : Arox Technologies Co.,Ltd  
4F., No.89, Minshan St., Neihu Dist., Taipei City 114,  
Taiwan, R.O.C.

Prepared By : EST Technology Co., Ltd.  
Santun(guantai Road), Houjie Town,  
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Report Number : ESTE-R1205003  
Date of Test : May.9~May.15, 2012  
Date of Report : May.18, 2012

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## TEST REPORT CERTIFICATION

Applicant : Acrox Technologies Co.,Ltd  
Manufacturer : Acrox Technologies Co.,Ltd  
EUT Description : 2.4GHz Laser Mouse  
FCC ID : PRDMU11  
(A) MODEL NO. : MSS  
(C) SERIAL NO. : N/A  
(D) Trade Name : JASCO; ACROX  
(D) POWER SUPPLY : DC 3V  
(E) TEST VOLTAGE : DC 3V

Tested for comply with:  
FCC Rules and Regulations Part 15 Subpart C:2011

Test procedure used:  
ANSI C63.4:2003

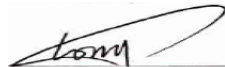
The device described above is tested by EST Technology Co., Ltd. to confirm comply with all the FCC Part 15 Subpart C requirements.

The test results are contained in this test report and EST Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these tests. Also, this report shows that the Equipment under test (EUT) is to be technically compliant with the FCC requirements.

Prepared by:

Tested by:

Approved by:



Ada / Assistant

Tony.Tang/ Engineer

Iceman Hu / Manager

*This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of EST Technology Co., Ltd.*

# 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 C63.4-2003	N/A
Radiated Emission Test	FCC Part 15C: 15.209 FCC Part 15C: 15.249 ANSI C63.4-2003	PASS
Band Edge Compliance Test	FCC Part 15: 15.249 ANSI C63.4-2003	PASS
20dB Bandwidth Test	FCC Part 15: 15.215 ANSI C63.4-2003	PASS

## 2. GENERAL INFORMATION

### 2.1. Description of Device (EUT)

Product Name : 2.4GHz Laser Mouse

Model Number : MSS

FCC ID : PRDMU11

Operation frequency : 2403MHz~2480MHz

Number of channel : 78

Antenna : Integrated PCB antenna, -5.83 dBi gain

Modulation : GFSK

Power Supply : DC 3V

Applicant : Acrox Technologies Co., Ltd.  
4F., No.89, Minshan St., Neihu Dist., Taipei City 114,  
Taiwan, R.O.C.

Manufacturer : Acrox Technologies Co., Ltd.  
Hsinmin Industria, Changan Town, Dongguan City,  
Guangdong, China

Sample Type : Prototype production

## 2.2. Test Facilities

EMC Lab	:	Certificated by CNAL, CHINA Registration No.: L5288 Date of registration: October 28, 2011
		Certificated by FCC, USA Registration No.: 989591 Date of registration: December 07, 2010
		Certificated by Industry Canada Registration No.: 46405-9405 Date of registration: December 16, 2010
		Certificated by VCCI, Japan Registration No.: R-3663 & C-4103 Date of registration: July 25, 2011
		Certificated by TUV Rheinland, Germany Registration No.: UA 50195514 0001 Date of registration: January 07, 2011
		Certificated by TUV/PS, Shenzhen Registration No.: SCN1017 Date of registration: January 27, 2011
		Certificated by Intertek ETL SEMKO Registration No.: 2011-RTL-L1-18 Date of registration: April 28, 2011
		Certificated by Siemic, Inc. Registration No.: SLCN021 Date of registration: November 8, 2011
		Certificated by Nemko, Hong Kong Registration No.: 175193 Date of registration: May 4, 2011
Name of Firm	:	EST Technology Co., Ltd.
Site Location	:	San Tun Management Zone, Houjie Town, Dongguan, Guangdong, China

## 2.3. Tested Supporting System Details

None

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

EUT

EUT work continues Tx mode and frequency as below:

Channel	Frequency
Low	2403MHz
Middle	2440MHz
High	2480MHz

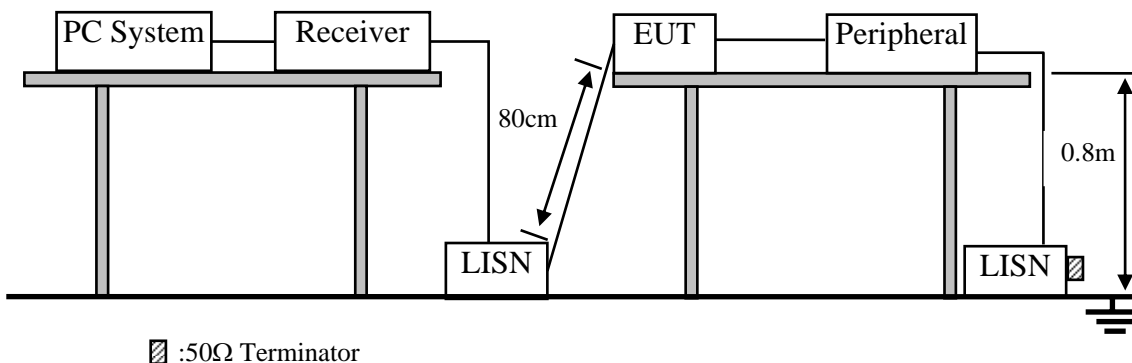
Note: A typical modulation was applied when performance test.

### 3. POWER LINE CONDUCTED EMISSION TEST

#### 3.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESHS10	838693/001	Nov.05, 11	1 Year
2.	L.I.S.N.#1	Rohde & Schwarz	ESH2-Z5	834066/011	Nov.05, 11	1 Year
3.	L.I.S.N.#3	Kyoritsu	KNW-242C	8-1920-1	May.02, 12	1 Year
4.	Terminator	Hubersuhner	50Ω	No. 1	May.02, 12	1 Year
5.	Terminator	Hubersuhner	50Ω	No. 2	May.02, 12	1 Year
6.	RF Cable	Fujikura	3D-2W	LISN Cable 1#	May.02, 12	1Year
7.	Coaxial Switch	Anritsu	MP59B	M55367	May.02, 12	1 Year
8.	Passive Probe	Rohde & Schwarz	ESH2-Z3	299.7810.52	May.02, 12	1 Year
9.	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100341	May.02, 12	1 Year

#### 3.2. Block Diagram of Test Setup



#### 3.3. Power Line Conducted Emission Test Limits

Frequency range MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0,15 to 0,5	66~56*	56~46*
0,5 to 5	56	46
5 to 30	60	50

Notes: 1. \* Decreasing linearly with logarithm of frequency.  
 2. The lower limit shall apply at the transition frequencies.



### 3.4. Operating Condition of EUT

- 3.4.1. Setup the EUT and simulator as shown as Section 2.3
- 3.4.2. Turn on the power of all equipment.
- 3.4.3. Let the EUT work in test mode (Tx Mode) and measure it.

### 3.5. Test Procedure

The EUT was placed on a non-metallic table, 80cm above the ground plane. The EUT Powered from PC which mains connected to the power mains through a line impedance stabilization network (L.I.S.N. 1#). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N.#3). this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4-2003 on conducted Emission test.

The bandwidth of test receiver (R&S TEST RECEIVER ESHS10) is set at 10kHz.

The frequency range from 150kHz to 30MHz is checked. The test result are reported on Section 3.7.

### 3.6. Conducted Disturbance at Mains Terminals Test Results

N/A

## 4. RADIATED EMISSION TEST

### 4.1. Test Equipment

Frequency rang: 30~1000MHz

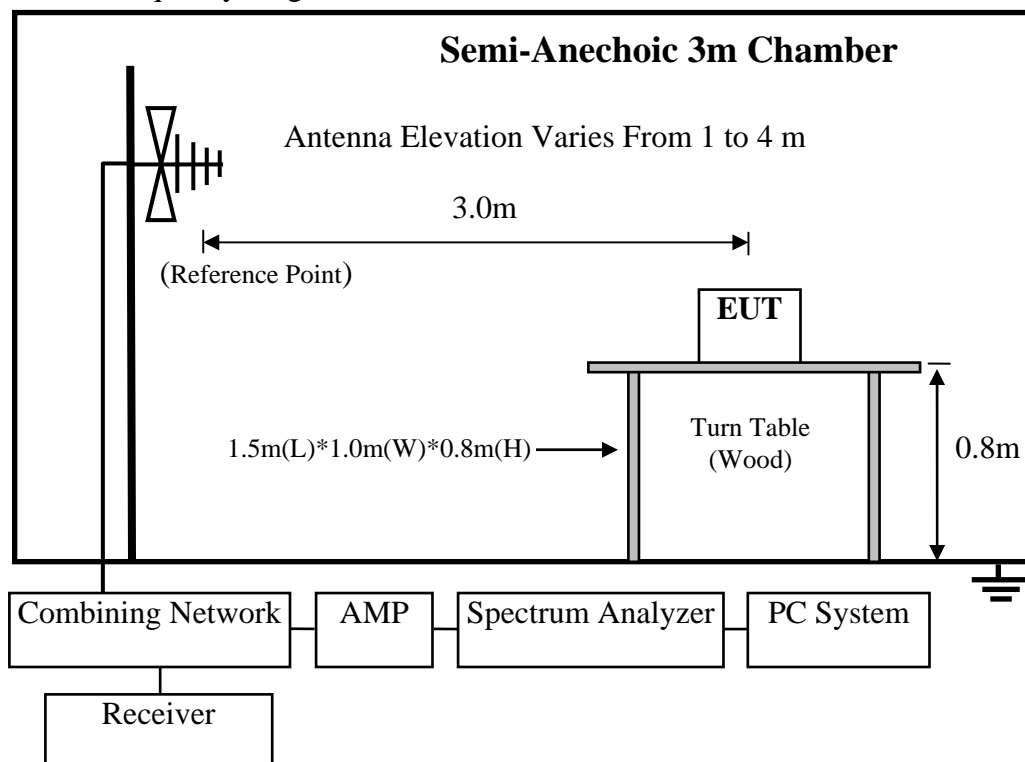
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	3#Chamber	AUDIX	N/A	N/A	Dec.05, 11	1 Year
2	EMI Spectrum	Agilent	E4407B	MY41440292	May.02, 12	1 Year
3	Test Receiver	Rohde & Schwarz	ESVS10	834468/011	May.02, 12	1 Year
4	Amplifier	HP	8447D	2648A04738	May.02, 12	1 Year
5	Bilog Antenna	Schaffner	CBL6112D	25237	Mar. 26,12	1 Year
6	RF Cable	MIYAZAKI	8D-FB	3# Chamber No.1	May.02, 12	1 Year
7	Coaxial Switch	Anritsu	MP59B	M73989	May.02, 12	1 Year

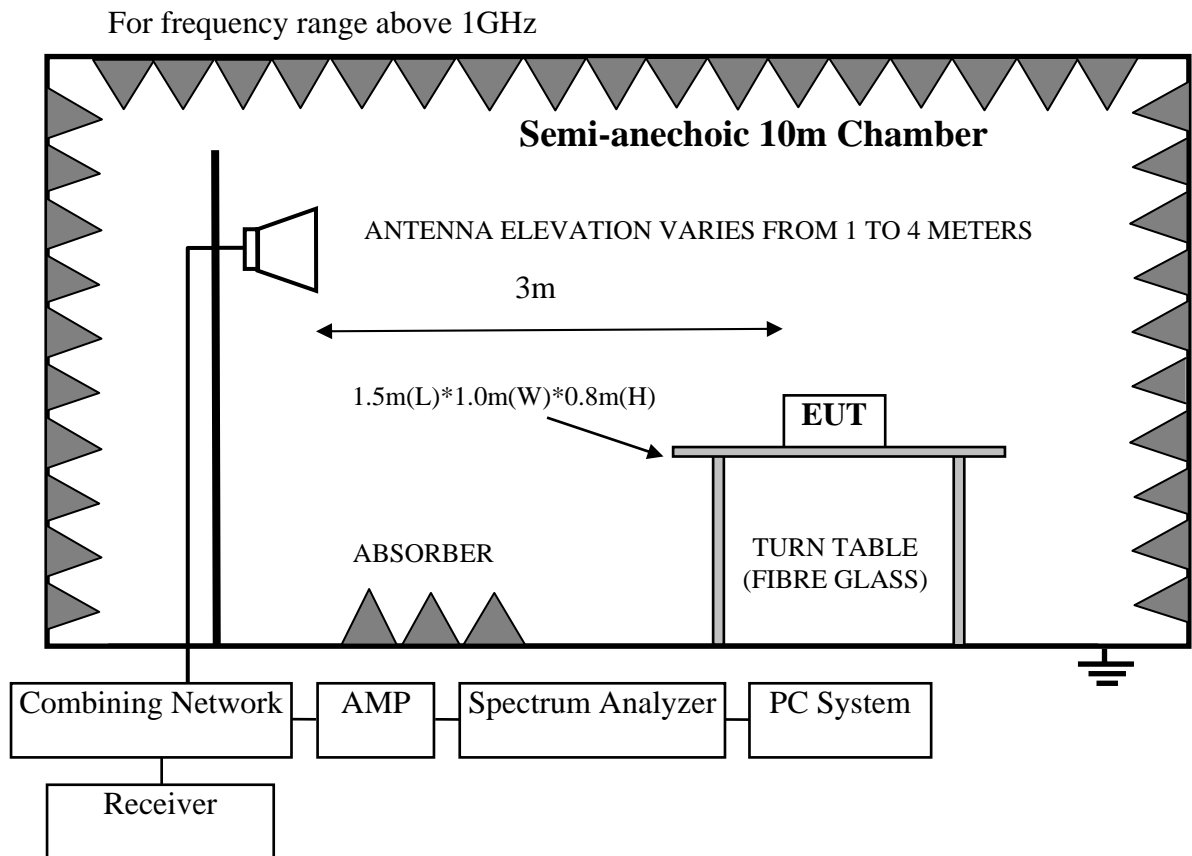
Frequency rang: above 1000MHz

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Spectrum Analyzer	Agilent	E4408B	MY44211139	May.02, 12	1 Year
2	Horn Antenna	EMCO	3115	9607-4877	May.02, 12	1.5 Year
3	Horn Antenna	EMCO	3116	00060089	May.02, 12	1.5 Year
4	Amplifier	Agilent	8449B	3008A00863	May.02, 12	1 Year
5	RF Cable	Hubersuhner	SUCOFLEX102	28620/2	May.02, 12	1 Year
6	RF Cable	Hubersuhner	SUCOFLEX102	29091/2	May.02, 12	1 Year

### 4.2. Block Diagram of Test Setup

For frequency range 30MHz-1000MHz





4.3. Radiated Emission Limit Standard: FCC 15.209 and 15.249

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		µV/m	dB(µV)/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 dB(µV)/m (Peak) 54.0 dB(µV)/m (Average)	
Field Strength of fundamental emissions for 2.4GHz-2.4835GHz	3	114.0 dB(µV)/m (Peak) 94.0 dB(µV)/m (Average)	

- Remark :
- (1) Emission level dBµV = 20 log Emission level µV/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. Operating Condition of EUT

- 4.4.1. Setup the EUT and simulator as shown as Section 4.2.
- 4.4.2. Turned on the power of all equipment.
- 4.4.3. Let EUT work in test mode(Tx mode) and test it.

#### 4.5. 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 C63.4-2003 on radiated emission Test.

The bandwidth of the EMI test receiver is set at 120kHz for frequency range from 30MHz to 1000 MHz

The bandwidth of the Spectrum Analyzer's RBW is set at 1MHz and VBW is set at 3MHz for peak emissions measurement above 1GHz, and 1MHz RBW, 10Hz VBW for average measurement above 1GHz.

Note: For fundamental emissions, it's bandwidth is about 1.3MHz, so the Spectrum Analyzer's RBW was set at 2MHz and VBW was set at 3MHz for fundamental emissions measure.

#### 4.6. Radiated Emission Test Results

##### **PASS.**

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

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

Emissions from 30MHz to 1GHz:

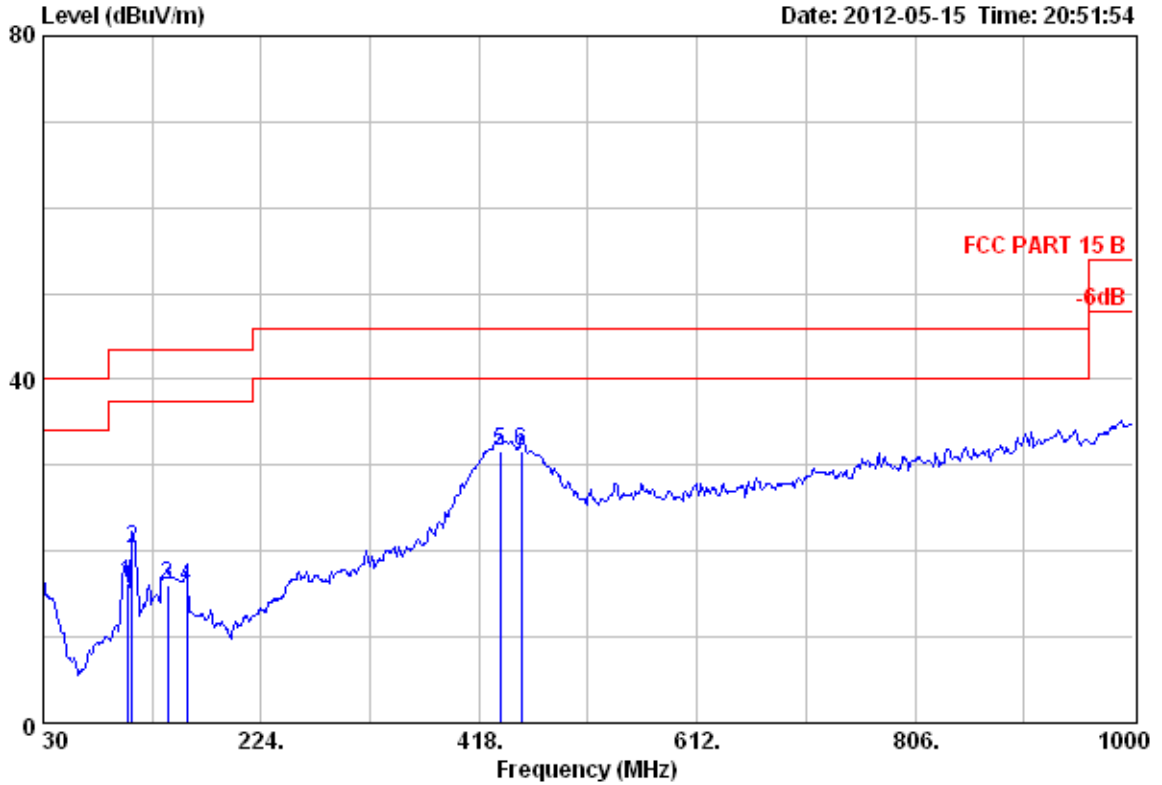
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Data: 182

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 20:51:54



Site no. : 3m Chamber Data no. : 182  
 Dis. / Ant. : 3m 27137 Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 B  
 Env. / Ins. : Temp:25.6'; Humi:56%; Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2403MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark (dB)
1	104.69	9.95	3.11	3.31	16.37	43.50	27.13	QP
2	109.54	10.44	3.20	6.60	20.24	43.50	23.26	QP
3	140.58	11.40	3.66	0.99	16.05	43.50	27.45	QP
4	158.04	10.48	3.87	1.45	15.80	43.50	27.70	QP
5	436.43	16.18	6.29	9.14	31.61	46.00	14.39	QP
6	455.83	16.69	6.41	8.45	31.55	46.00	14.45	QP

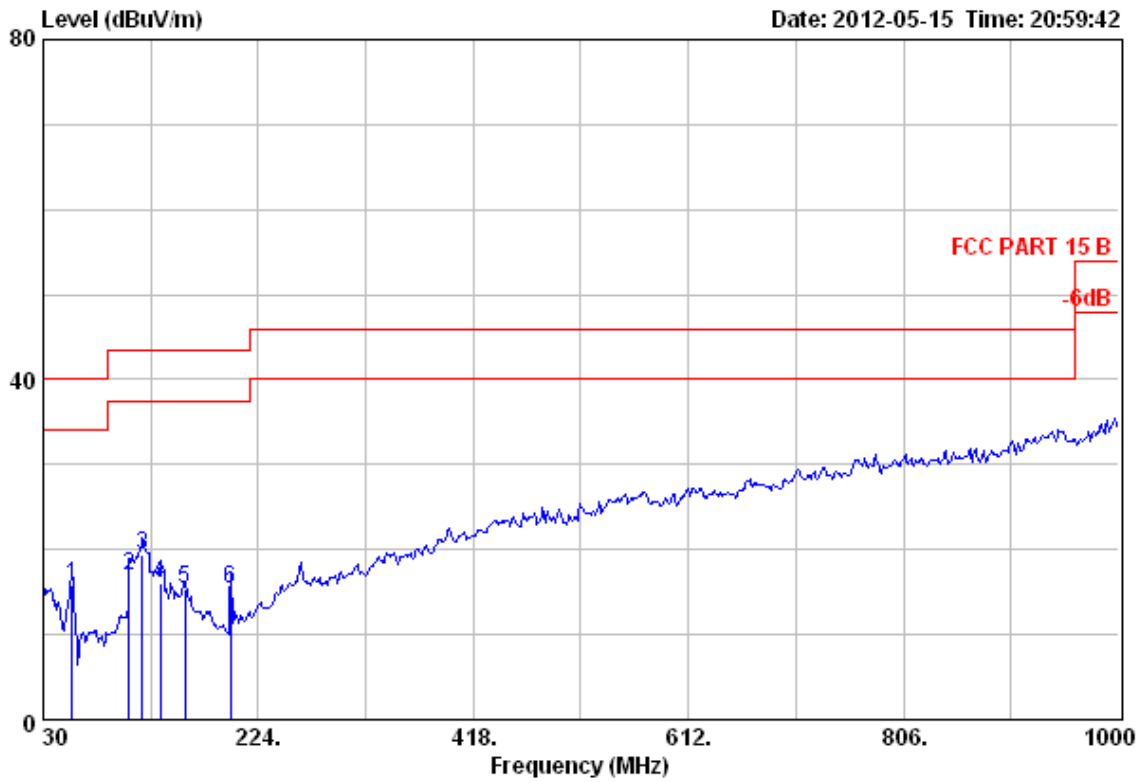
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Fax: +86-769-83081878

Data: 183

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 20:59:42



Site no. : 3m Chamber Data no. : 183  
 Dis. / Ant. : 3m 27137 Ant. pol. : VERTICAL  
 Limit : FCC PART 15 B  
 Env. / Ins. : Temp:25.6'; Humi:56%; Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2403MHz

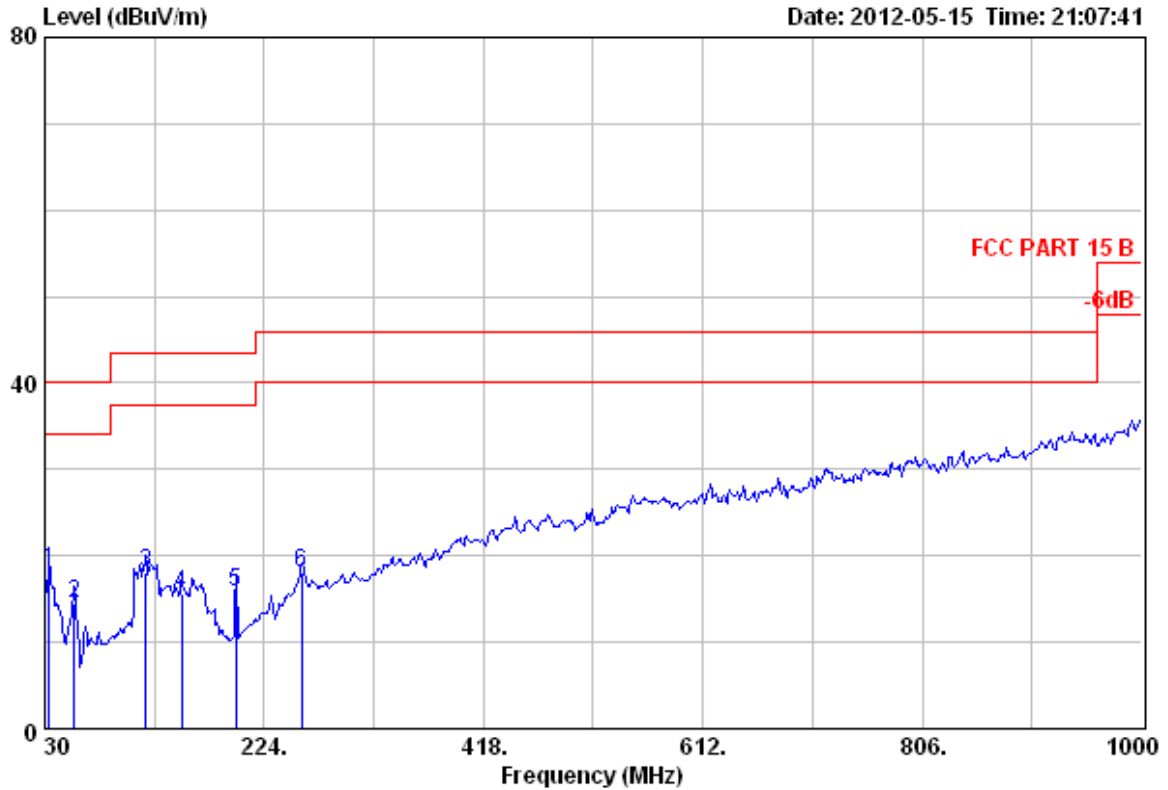
Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission		Margin (dB)	Remark (dB)	
				Level (dBuV/m)	Limits (dBuV/m)			
1	56.19	5.21	2.46	8.17	15.84	40.00	24.16	QP
2	107.60	10.24	3.20	3.49	16.93	43.50	26.57	QP
3	119.24	11.11	3.34	4.96	19.41	43.50	24.09	QP
4	135.73	11.38	3.60	1.17	16.15	43.50	27.35	QP
5	158.04	10.48	3.87	0.93	15.28	43.50	28.22	QP
6	198.78	7.71	4.24	3.38	15.33	43.50	28.17	QP

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Data: 184 File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 21:07:41



Site no. : 3m Chamber Data no. : 184  
 Dis. / Ant. : 3m 27137 Ant. pol. : VERTICAL  
 Limit : FCC PART 15 B  
 Env. / Ins. : Temp:25.6'; Humi:56%; Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2440MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark (dB)
1	33.88	16.11	1.99	0.25	18.35	40.00	21.65	QP
2	56.19	5.21	2.46	6.91	14.58	40.00	25.42	QP
3	119.24	11.11	3.34	3.53	17.98	43.50	25.52	QP
4	151.25	10.82	3.79	0.99	15.60	43.50	27.90	QP
5	198.78	7.71	4.24	3.81	15.76	43.50	27.74	QP
6	256.98	12.63	4.91	0.61	18.15	46.00	27.85	QP

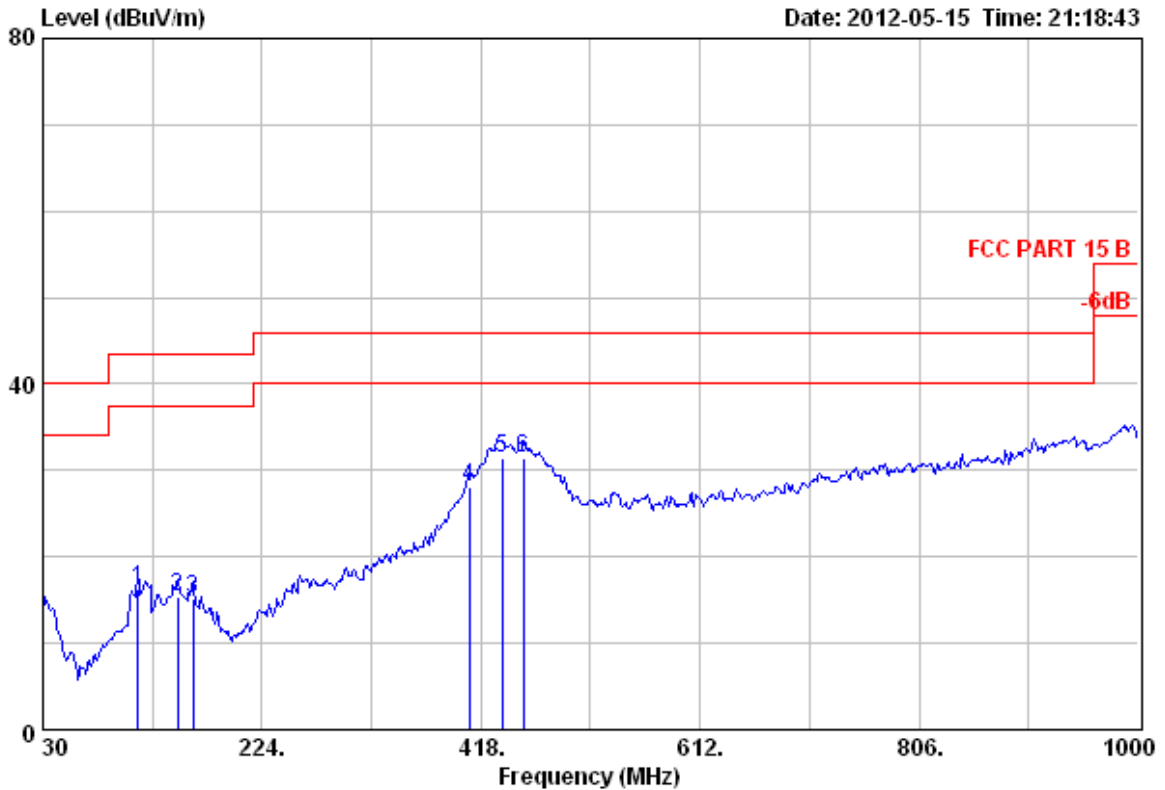
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Data: 185

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 21:18:43



Site no. : 3m Chamber Data no. : 185  
 Dis. / Ant. : 3m 27137 Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 B  
 Env. / Ins. : Temp:25.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2440MHz

	Ant.	Cable	Emission			Margin	Remark	
Freq. (MHz)	Factor (dB/m)	Loss (dB)	Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	(dB)	(dB)	
1	114.39	10.85	3.26	2.14	16.25	43.50	27.25	QP
2	149.31	10.93	3.77	0.68	15.38	43.50	28.12	QP
3	162.89	10.01	3.91	1.24	15.16	43.50	28.34	QP
4	407.33	16.22	6.08	5.88	28.18	46.00	17.82	QP
5	436.43	16.18	6.29	9.03	31.50	46.00	14.50	QP
6	455.83	16.69	6.41	8.30	31.40	46.00	14.60	QP



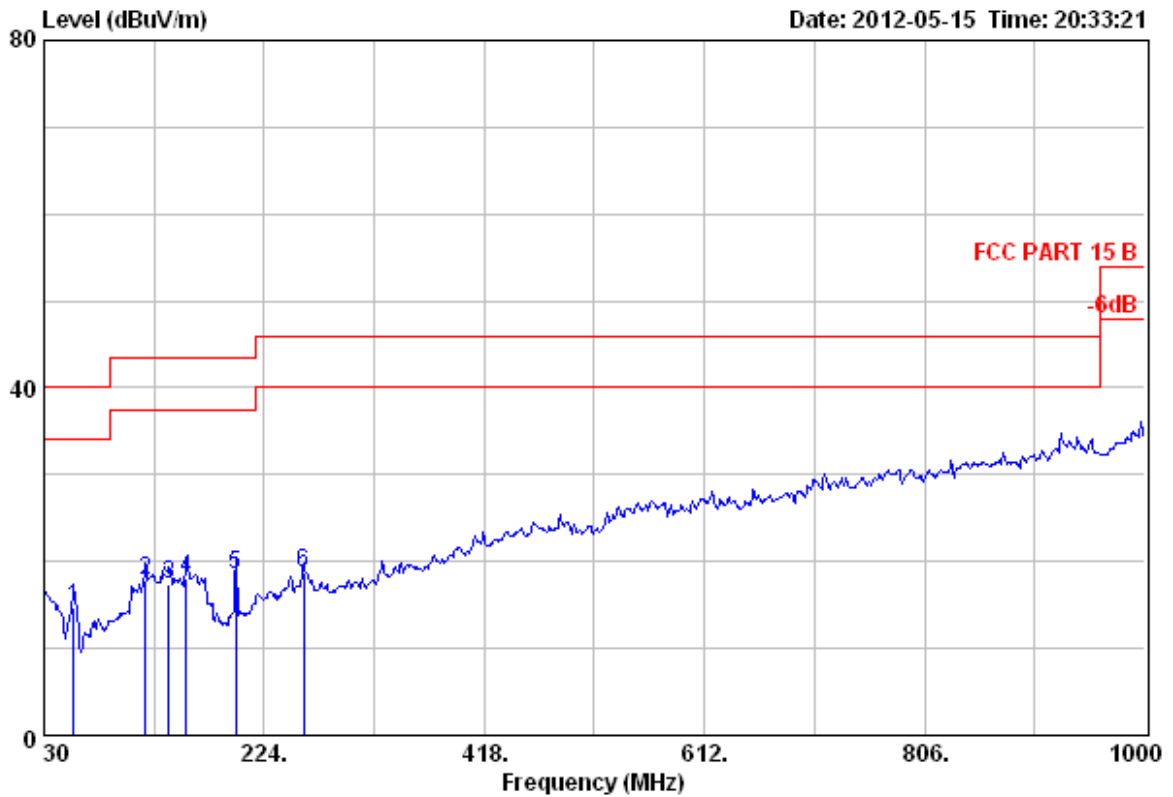
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Dongguan City, Guangdong, China  
Tel: +86-769-83081888  
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Data: 180

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 20:33:21



Site no. : 3m Chamber Data no. : 180  
 Dis. / Ant. : 3m 27137 Ant. pol. : VERTICAL  
 Limit : FCC PART 15 B  
 Env. / Ins. : Temp:25.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2480MHz

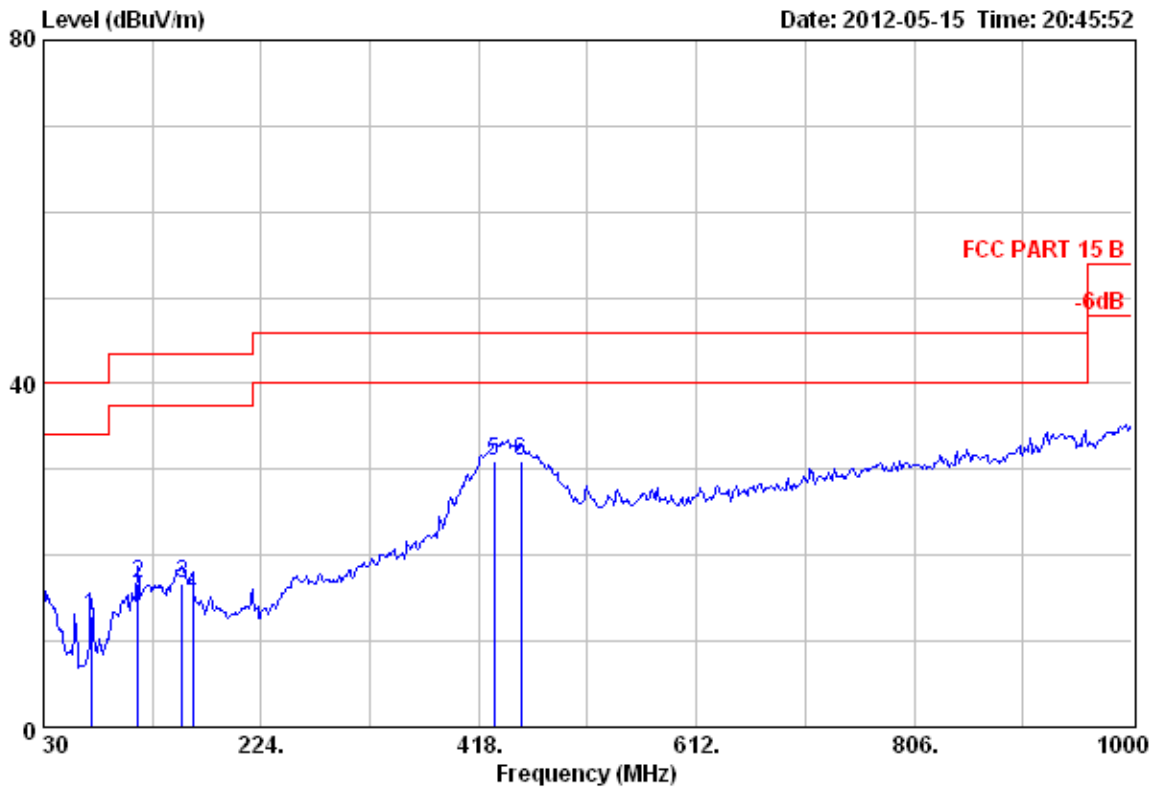
	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Emission Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark (dB)
1	56.19	5.21	2.46	7.02	14.69	40.00	25.31	QP
2	119.24	11.11	3.34	3.37	17.82	43.50	25.68	QP
3	139.61	11.43	3.65	2.27	17.35	43.50	26.15	QP
4	155.13	10.67	3.82	3.47	17.96	43.50	25.54	QP
5	198.78	7.71	4.24	6.57	18.52	43.50	24.98	QP
6	258.92	12.86	4.92	0.95	18.73	46.00	27.27	QP

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Data: 181 File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 20:45:52



Site no. : 3m Chamber Data no. : 181  
 Dis. / Ant. : 3m 27137 Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 B  
 Env. / Ins. : Temp:25.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2480MHz

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Emission		Margin (dB)	Remark
				Reading (dBUV)	Level (dBUV/m)		
1	72.68	6.12	2.83	3.90	12.85	40.00	27.15 QP
2	114.39	10.85	3.26	2.52	16.63	43.50	26.87 QP
3	153.19	10.75	3.81	2.16	16.72	43.50	26.78 QP
4	162.89	10.01	3.91	1.39	15.31	43.50	28.19 QP
5	431.58	16.09	6.26	8.67	31.02	46.00	14.98 QP
6	455.83	16.69	6.41	7.94	31.04	46.00	14.96 QP

Emissions from 1GHz to 18GHz:

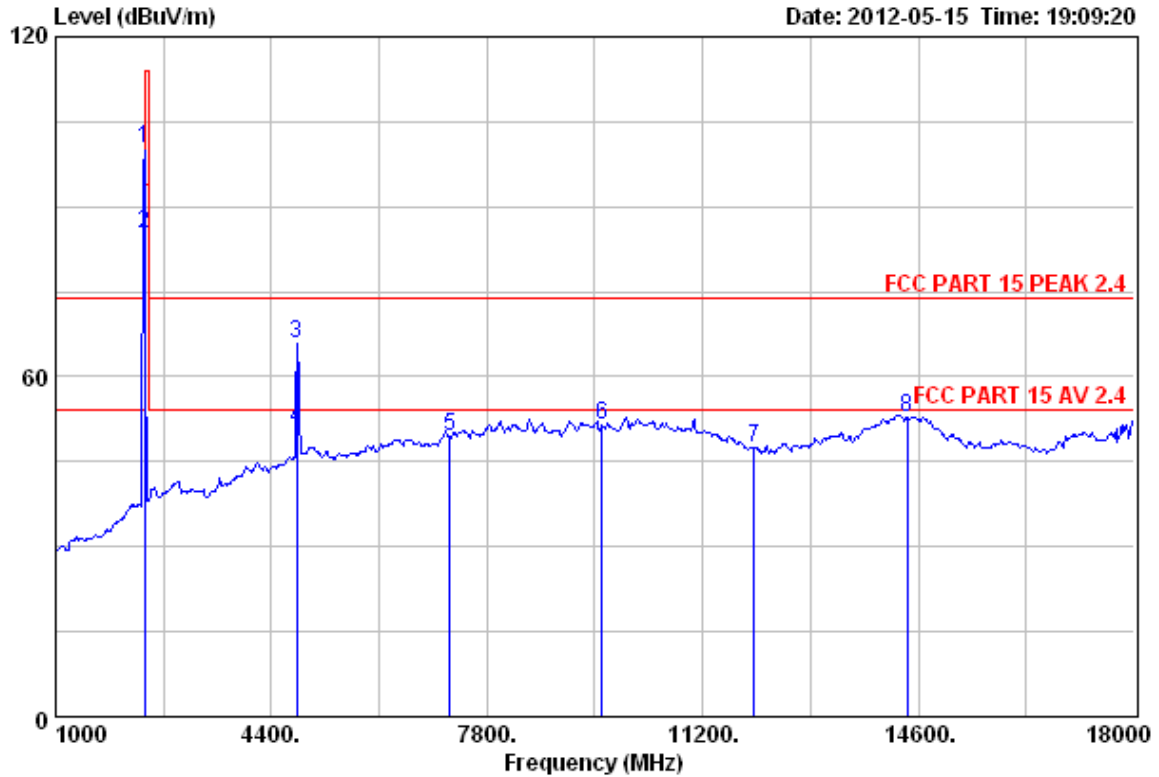
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Data: 164

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 19:09:20



Site no. : 3m Chamber Data no. : 164  
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : Temp:25.6'; Humi:56%; Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2403MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading Level (dBUV)	Emission Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	Remark
1	2403.00	27.61	6.64	34.18	100.31	100.38	114.00	13.62	Peak
2	2403.00	27.61	6.64	34.18	85.31	85.38	94.00	8.62	Average
3	4806.00	31.25	11.77	31.81	54.61	65.82	74.00	8.18	Peak
4	4806.00	31.25	11.77	31.81	39.61	50.82	54.00	3.18	Average
5	7209.00	36.52	11.54	32.09	33.50	49.47	74.00	24.53	Peak
6	9612.00	37.91	11.68	31.93	33.84	51.50	74.00	22.50	Peak
7	12015.00	38.62	11.40	35.53	32.85	47.34	74.00	26.66	Peak
8	14418.00	41.82	10.92	32.84	32.88	52.78	74.00	21.22	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.

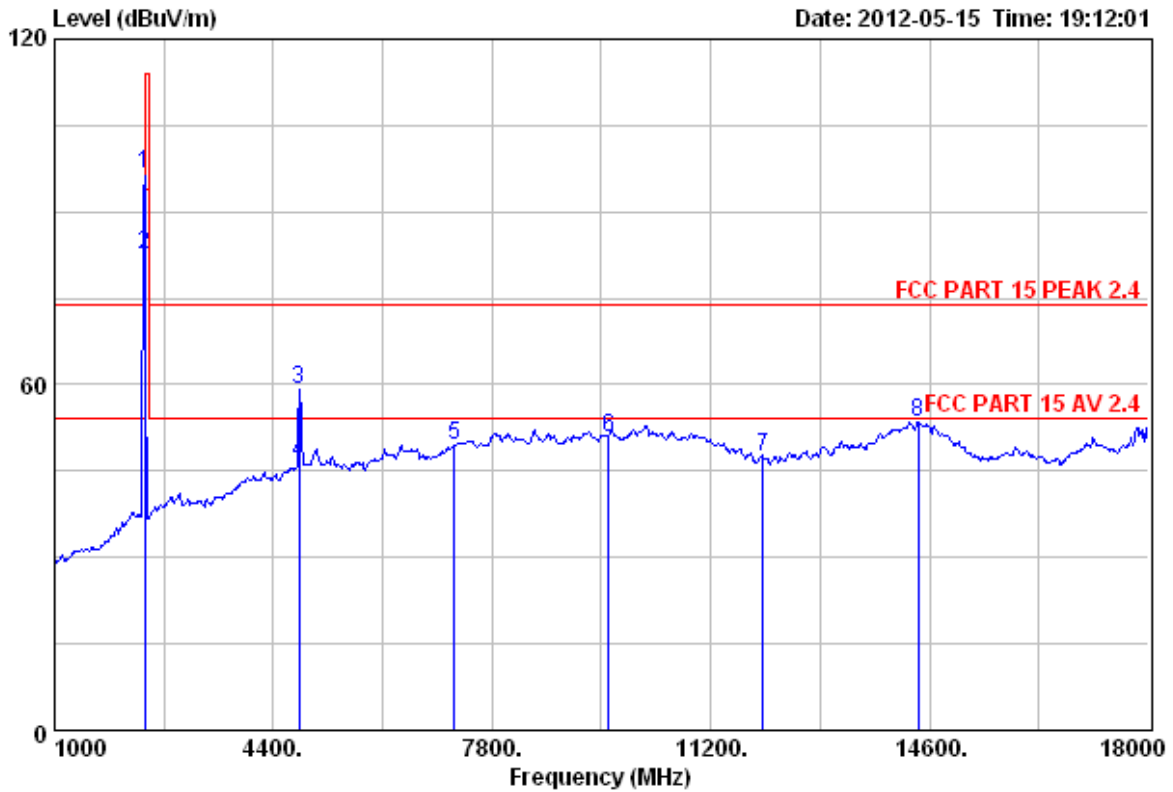
# EST Technology

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Dongguan City, Guangdong, China  
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Fax: +86-769-83081878

Data: 165

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 19:12:01



Site no. : 3m Chamber Data no. : 165  
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : Temp:25.6'; Humi:56%; Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2403MHz

Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Emission			Margin (dB)	Remark	
				Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)			
1	2403.00	27.61	6.64	34.18	96.52	96.59	114.00	17.41	Peak
2	2403.00	27.61	6.64	34.18	82.52	82.59	94.00	11.41	Average
3	4806.00	31.25	11.77	31.81	48.10	59.31	74.00	14.69	Peak
4	4806.00	31.25	11.77	31.81	35.10	46.31	54.00	7.69	Average
5	7209.00	36.52	11.54	32.09	33.37	49.34	74.00	24.66	Peak
6	9612.00	37.91	11.68	31.93	33.31	50.97	74.00	23.03	Peak
7	12015.00	38.62	11.40	35.53	32.98	47.47	74.00	26.53	Peak
8	14418.00	41.82	10.92	32.84	33.74	53.64	74.00	20.36	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.

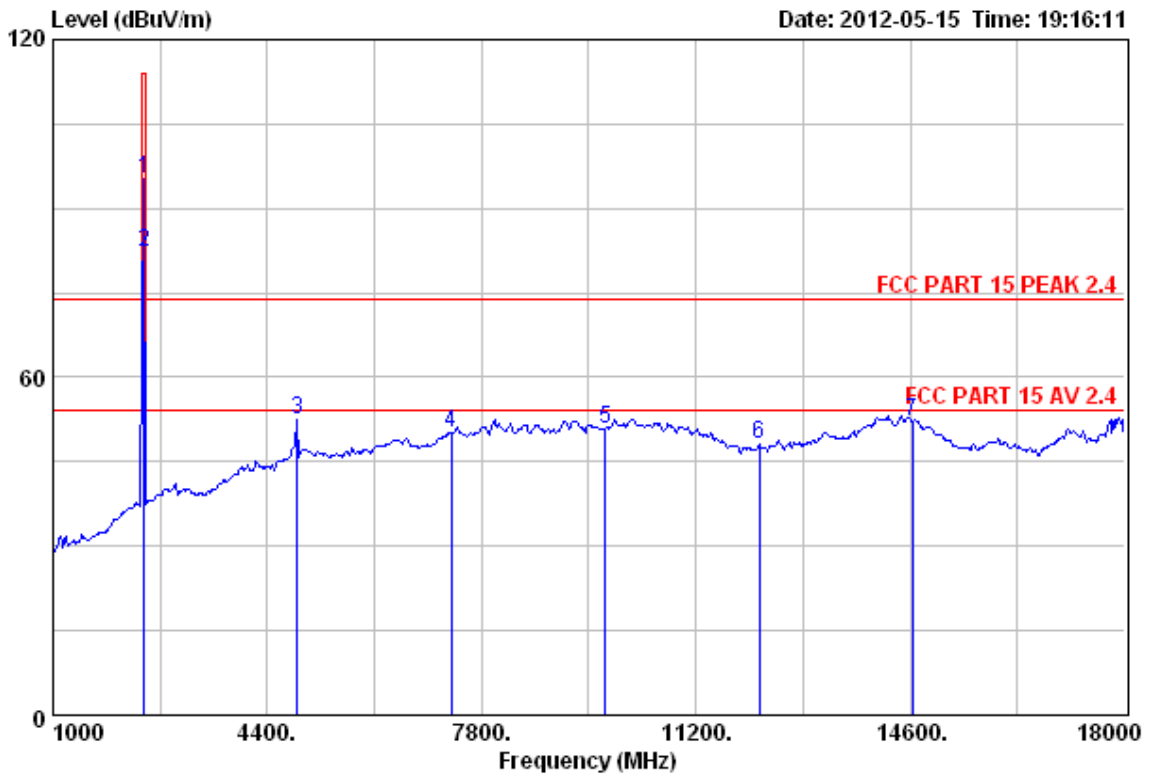
# EST Technology

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Tel: +86-769-83081888  
Fax: +86-769-83081878

Data: 166

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 19:16:11



Site no. : 3m Chamber Data no. : 166  
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : Temp:25.6'; Humi:56%; Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2440MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Emission Reading Level (dBuV)	Emission Limits (dBuV/m)	Margin (dB)	Remark	
1	2440.00	27.60	6.67	34.12	95.16	95.31	114.00	18.69	Peak
2	2440.00	27.60	6.67	34.12	82.16	82.31	94.00	11.69	Average
3	4880.00	31.37	12.07	31.90	40.95	52.49	74.00	21.51	Peak
4	7320.00	36.55	11.57	31.99	33.91	50.04	74.00	23.96	Peak
5	9760.00	38.13	11.65	31.86	33.04	50.96	74.00	23.04	Peak
6	12200.00	38.68	11.20	35.71	33.80	47.97	74.00	26.03	Peak
7	14640.00	41.42	10.91	33.62	33.31	52.02	74.00	21.98	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.

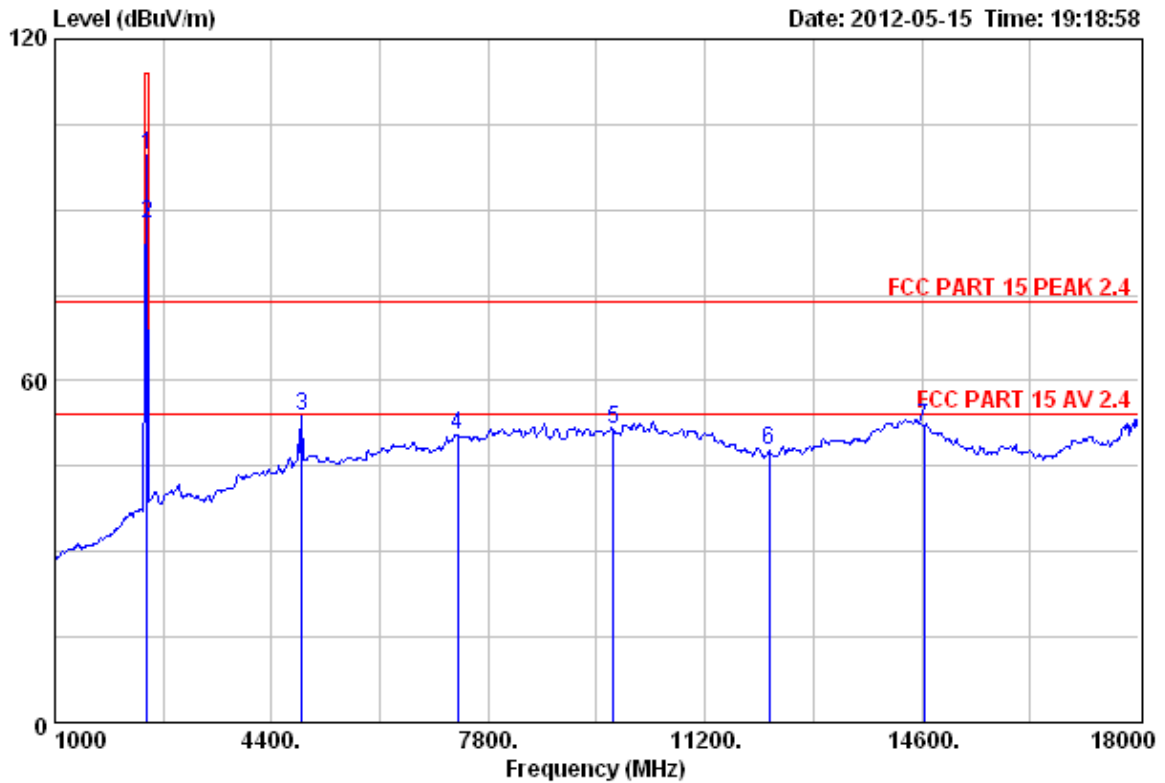
# EST Technology

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Tel: +86-769-83081888  
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Data: 167

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 19:18:58



Site no. : 3m Chamber Data no. : 167  
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : Temp:25.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2440MHz

Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Emission		Limits (dBuV/m)	Margin (dB)	Remark
				Reading (dBuV)	Level (dBuV/m)			
1	27.60	6.67	34.12	99.46	99.61	114.00	14.39	Peak
2	27.60	6.67	34.12	87.46	87.61	94.00	6.39	Average
3	31.37	12.07	31.90	42.37	53.91	74.00	20.09	Peak
4	36.55	11.57	31.99	34.48	50.61	74.00	23.39	Peak
5	38.13	11.65	31.86	33.53	51.45	74.00	22.55	Peak
6	38.68	11.20	35.71	33.50	47.67	74.00	26.33	Peak
7	41.42	10.91	33.62	33.11	51.82	74.00	22.18	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.

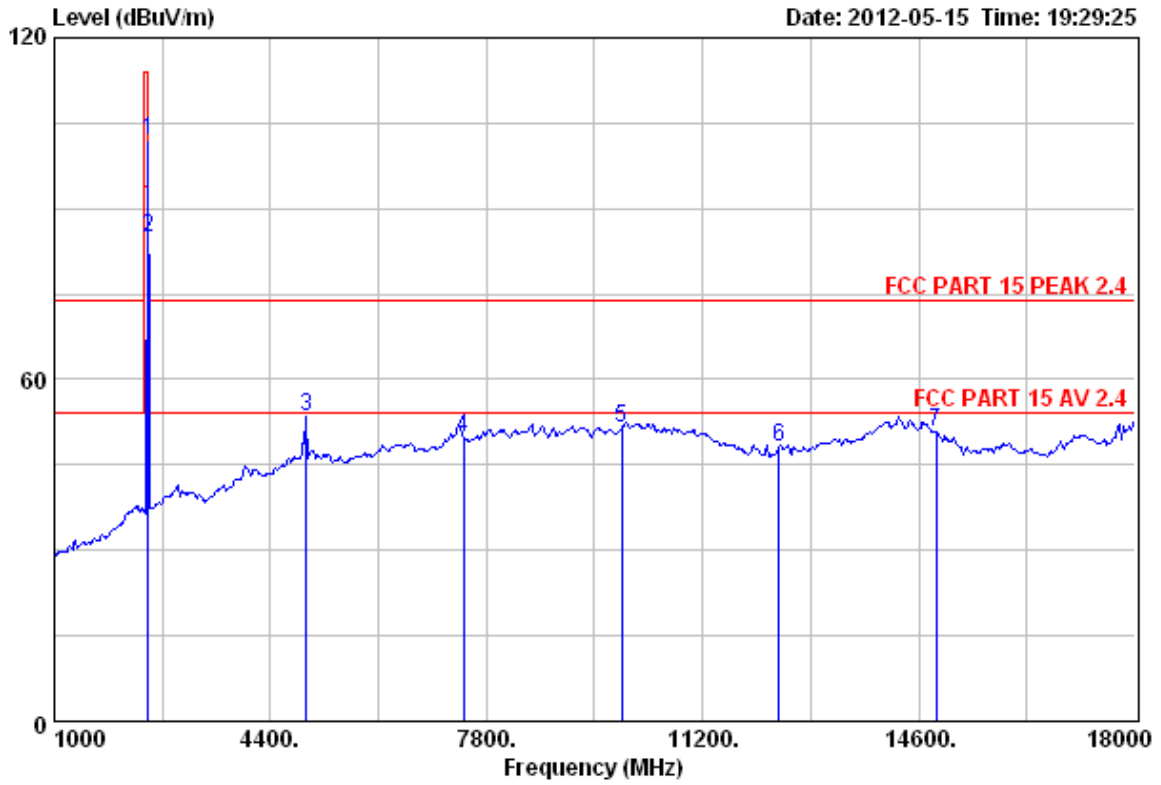
# EST Technology

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Dongguan City, Guangdong, China  
Tel: +86-769-83081888  
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Data: 168

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 19:29:25



Site no. : 3m Chamber Data no. : 168  
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : Temp:25.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2480MHz

Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Emission		Limits (dBuV/m)	Margin (dB)	Remark
				Reading (dBuV)	Level (dBuV/m)			
1	27.58	6.71	34.03	101.81	102.07	114.00	11.93	Peak
2	27.58	6.71	34.03	84.81	85.07	94.00	8.93	Average
3	31.49	12.44	31.97	41.50	53.46	74.00	20.54	Peak
4	36.54	11.61	31.93	33.60	49.82	74.00	24.18	Peak
5	38.14	11.61	31.76	33.52	51.51	74.00	22.49	Peak
6	38.73	10.99	35.36	33.77	48.13	74.00	25.87	Peak
7	40.59	10.88	34.45	33.70	50.72	74.00	23.28	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.





Above 18GHz

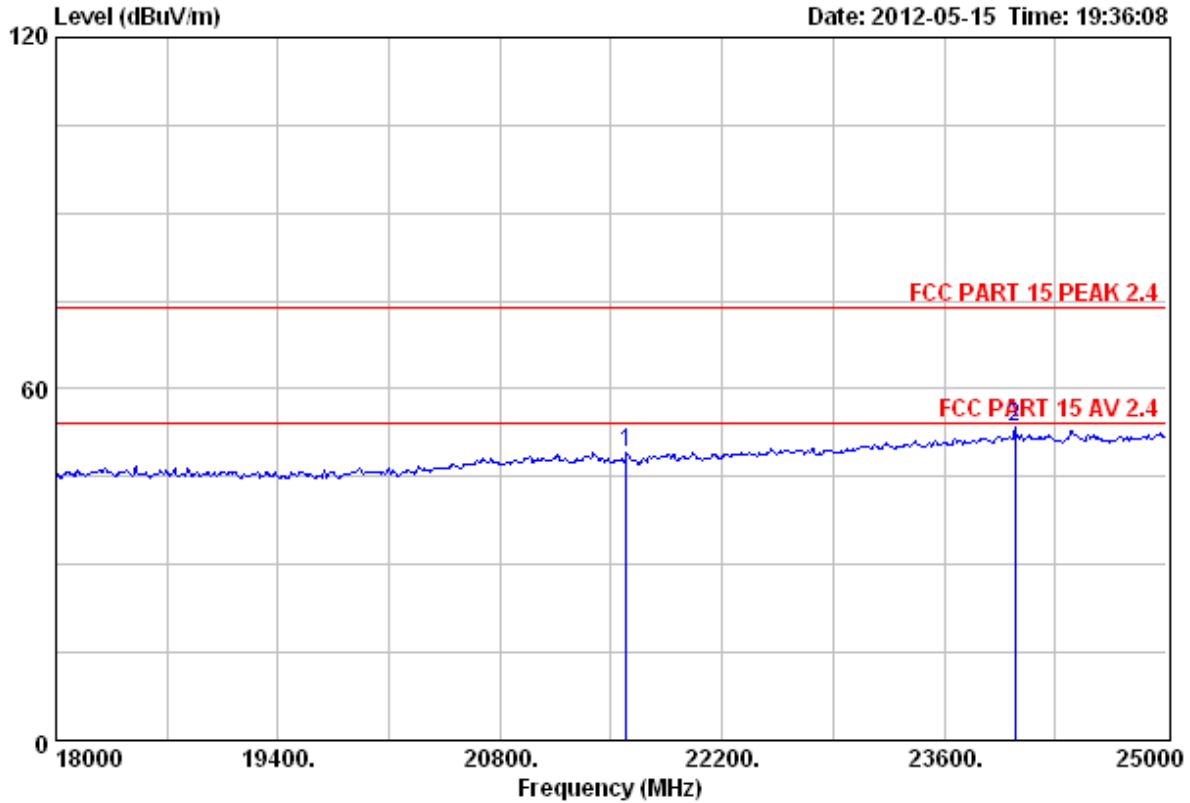
EST Technology

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Data: 174

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 19:36:08



Site no. : 3m Chamber Data no. : 174  
 Dis. / Ant. : 3m ANT ABOVE 18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : Temp:25.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2403MHz

Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Emission		Limits (dBuV/m)	Margin (dB)	Remark
				Reading (dBuV)	Level (dBuV/m)			
1	45.93	20.39	35.26	18.11	49.17	74.00	24.83	Peak
2	45.61	22.07	32.88	18.79	53.59	74.00	20.41	Peak

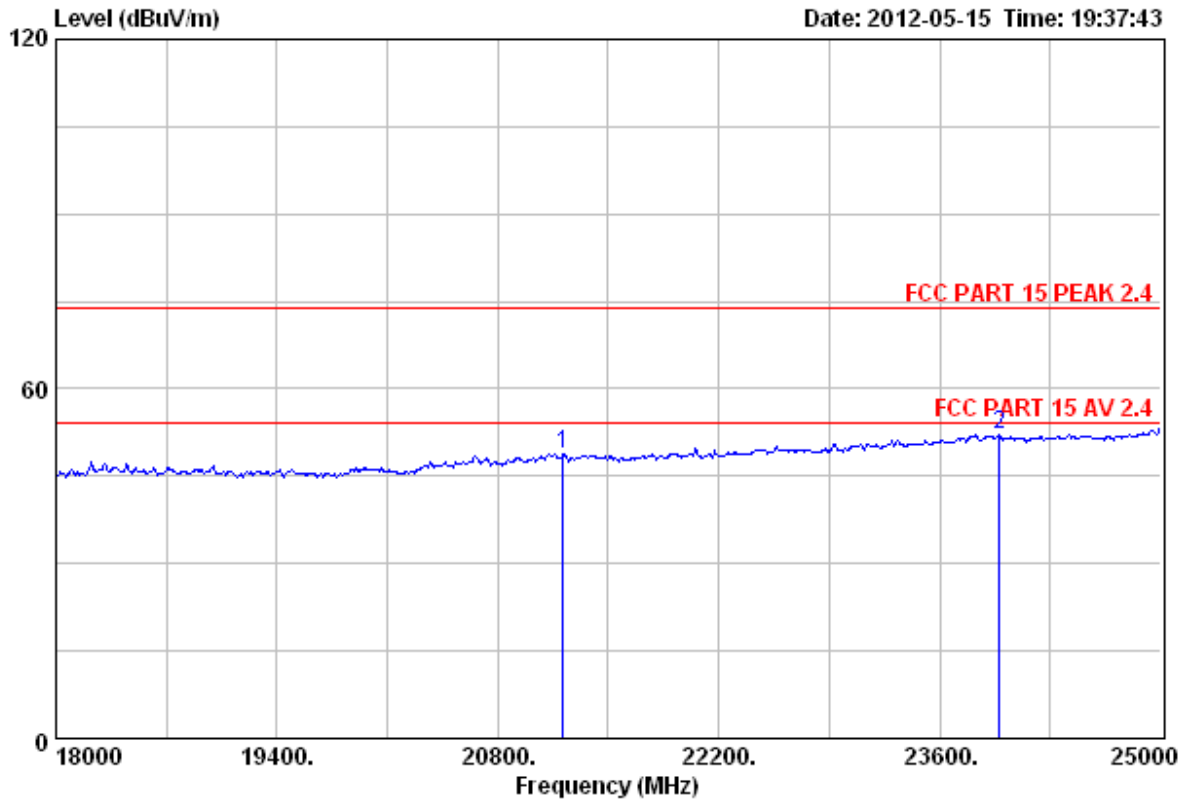
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
 2. The emission levels that are 20dB below the official limit are not reported.

# EST Technology

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Data: 175 File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 19:37:43



Site no. : 3m Chamber Data no. : 175  
 Dis. / Ant. : 3m ANT ABOVE 18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : Temp:25.6'; Humi:56%; Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2403MHz

	Ant.	Cable	Amp	Emission					
Freq. (MHz)	Factor (dB/m)	Loss (dB)	Factor (dB)	Reading (dBuV)	Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark	
1	21213.00	46.17	20.22	35.60	18.11	48.90	74.00	25.10	Peak
2	23978.00	45.60	22.03	32.83	17.31	52.11	74.00	21.89	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.

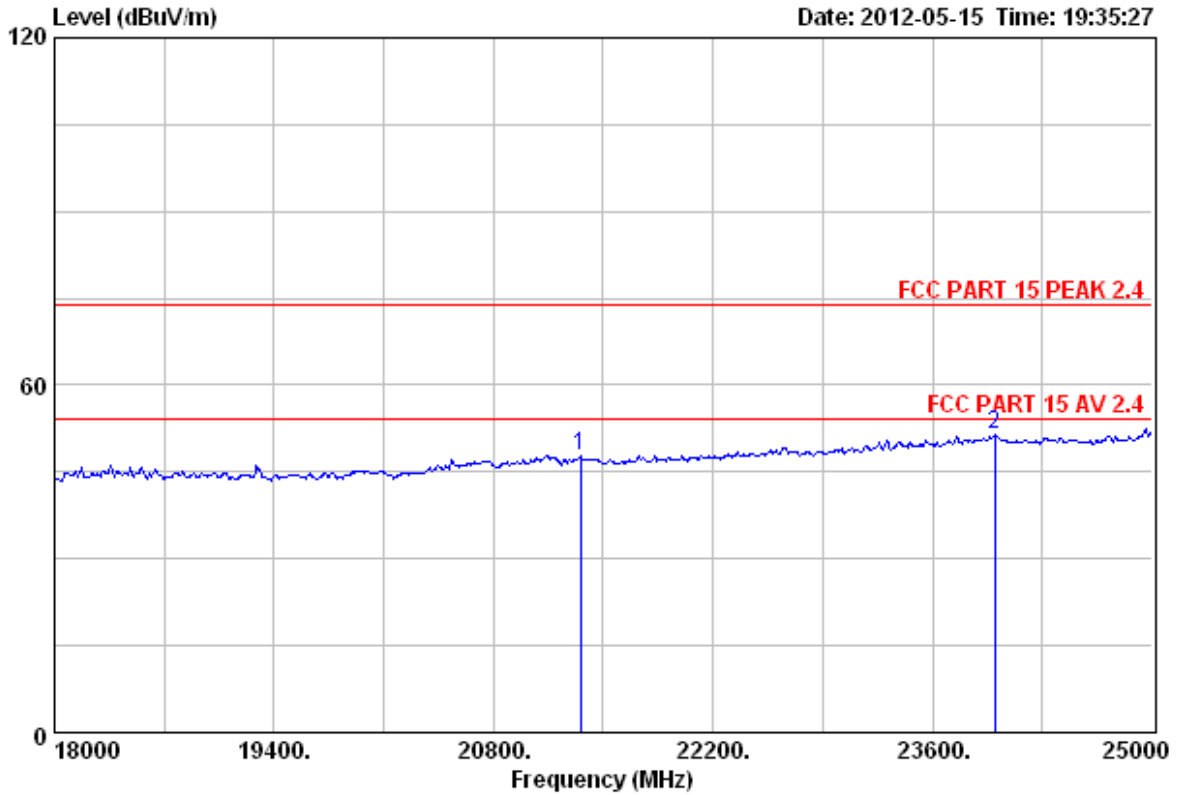
# EST Technology

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Data: 173

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 19:35:27



Site no. : 3m Chamber Data no. : 173  
 Dis. / Ant. : 3m ANT ABOVE 18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : Temp:25.6'; Humi:56%; Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2440MHz

Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Emission		Limits (dBuV/m)	Margin (dB)	Remark	
				Reading (dBuV)	Level (dBuV/m)				
1	21353.00	46.09	20.28	35.49	16.96	47.84	74.00	26.16	Peak
2	23999.00	45.60	22.05	32.80	16.54	51.39	74.00	22.61	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.

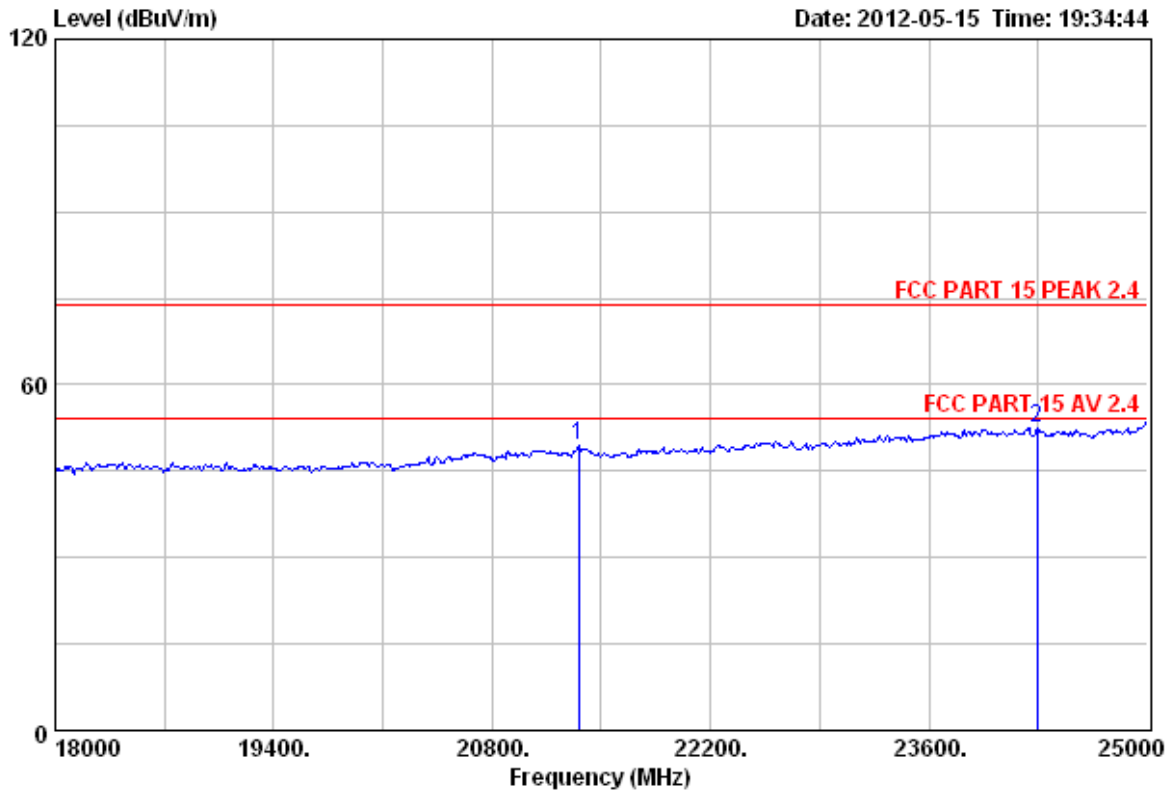
# EST Technology

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Data: 172

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 19:34:44



```

Site no.      : 3m Chamber                Data no. : 172
Dis. / Ant.  : 3m ANT ABOVE 18G          Ant. pol. : VERTICAL
Limit        : FCC PART 15 PEAK 2.4
Env. / Ins.  : Temp:25.6';Humi:56%;Press:101.52kPa
Engineer     : Tony
EUT          : 2.4GHz Laser Mouse
Power        : DC 3V
M/N          : MSS
Test Mode    : TX 2440MHz
    
```

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	21353.00	46.09	20.28	35.49	18.46	49.34	74.00	24.66	Peak
2	24293.00	45.66	22.21	33.26	17.93	52.54	74.00	21.46	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.

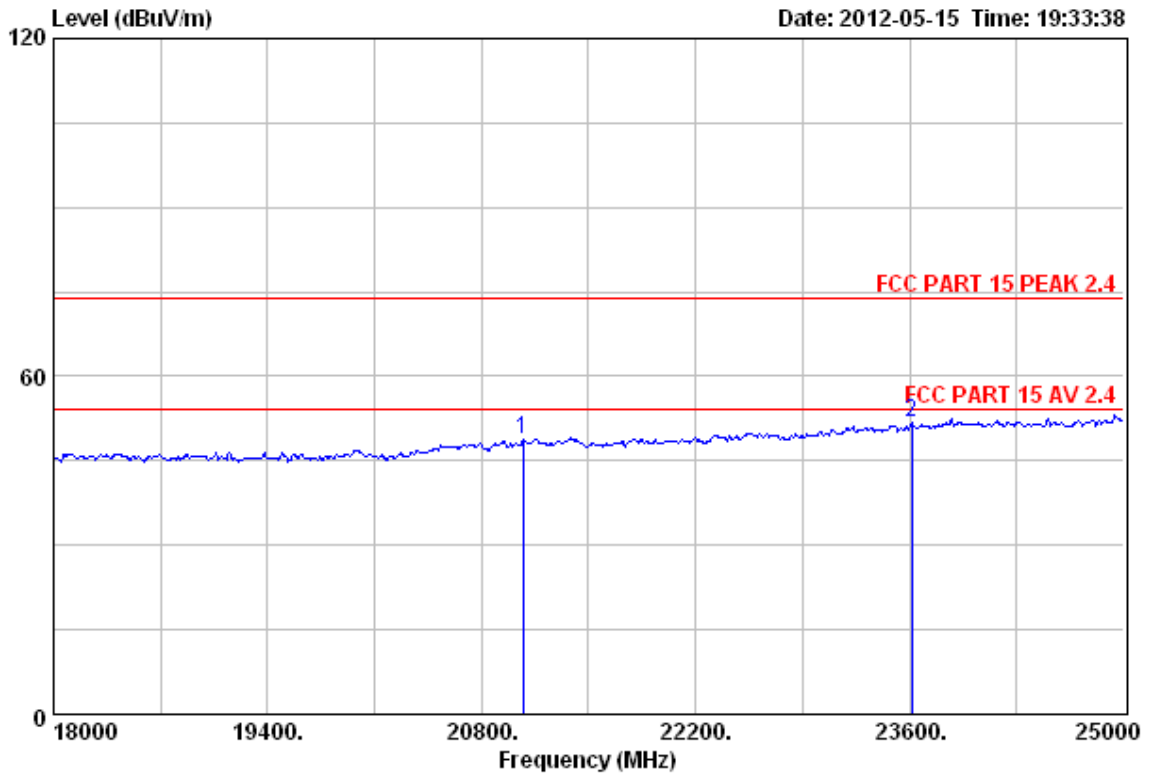
# EST Technology

San Tun Management Zone, Houjie Town,  
Dongguan City, Guangdong, China  
Tel: +86-769-83081888  
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Data: 171

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 19:33:38



Site no. : 3m Chamber Data no. : 171  
 Dis. / Ant. : 3m ANT ABOVE 18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : Temp:25.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2480MHz

	Freq.	Ant.	Cable	Amp	Emission				
	(MHz)	Factor	Loss	Factor	Reading	Level	Limits	Margin	Remark
		(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)	
1	21073.00	46.25	20.16	35.73	18.12	48.80	74.00	25.20	Peak
2	23614.00	45.68	21.70	33.19	17.78	51.97	74.00	22.03	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.

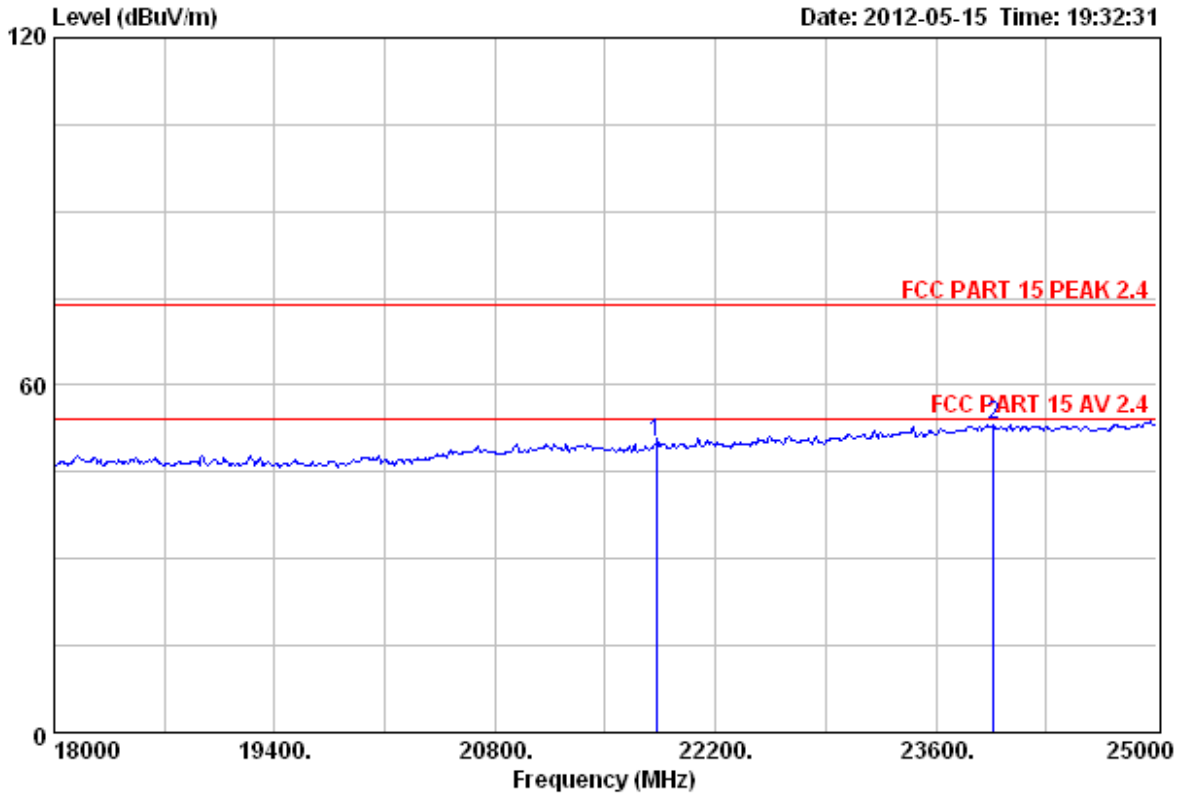
# EST Technology

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Tel: +86-769-83081888  
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Data: 170

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 19:32:31



Site no. : 3m Chamber Data no. : 170  
 Dis. / Ant. : 3m ANT ABOVE 18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : Temp:25.6'; Humi:56%; Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2480MHz

Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Reading (dBUV)	Emission			Remark	
					Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)		
1	21822.00	45.80	20.49	35.06	18.98	50.21	74.00	23.79	Peak
2	23964.00	45.61	22.02	32.83	18.42	53.22	74.00	20.78	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.

## 5. 20 DB BANDWIDTH TEST

### 5.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	Agilent	E4408B	MY44211139	May.02, 12	1 Year

### 5.2. Limit

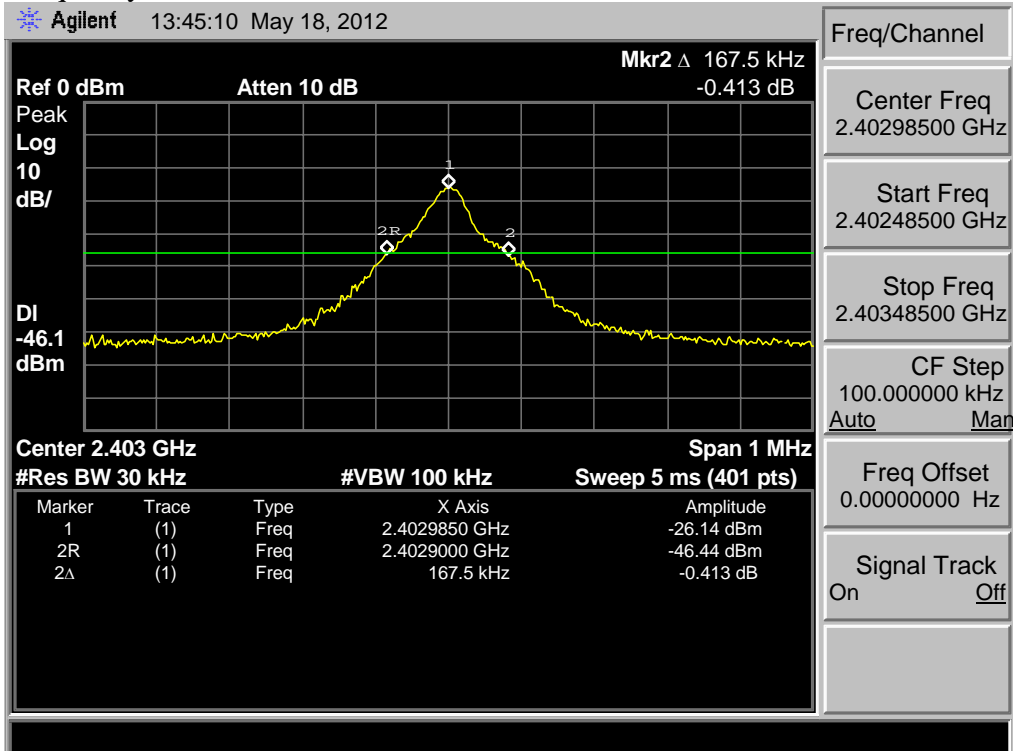
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific 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

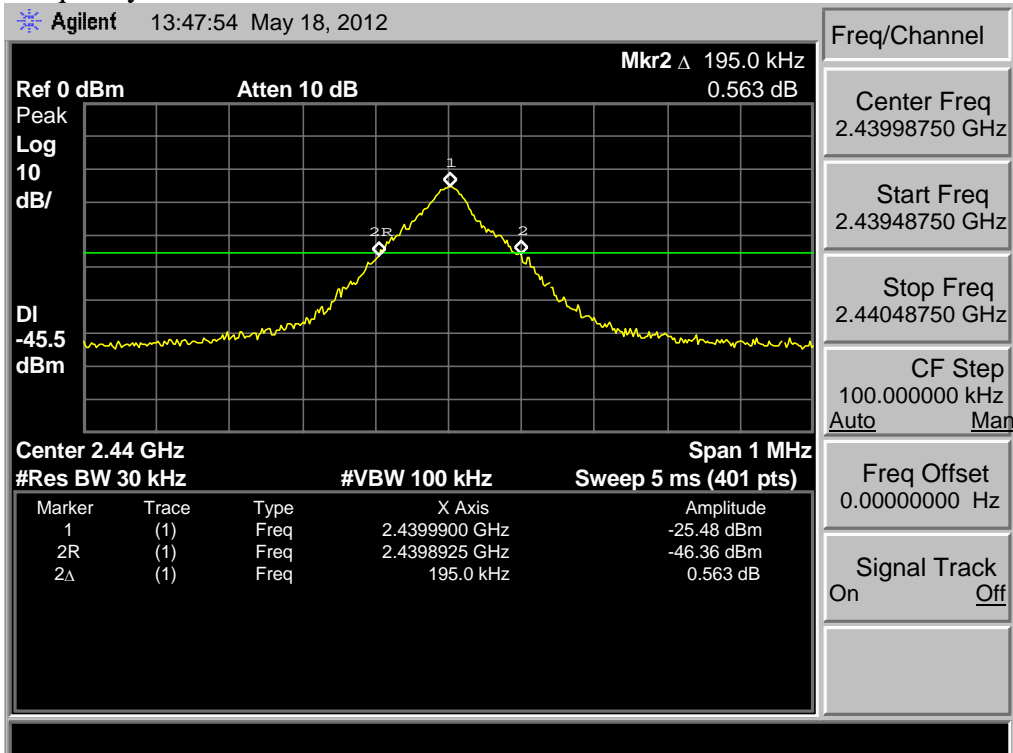
EUT: 2.4GHz Laser Mouse		
M/N: MSS		
Test date:2012-05-15	Pressure:101.8 kpa	Humidity:54 %
Tested by: Tony.Tang	Test site: RF site	Temperature : 24.1 °C

Frequency	20% bandwidth ( MHz )	Limit (KHz)
2403	0.1675	N/A
2440	0.1950	N/A
2480	0.2275	N/A
Conclusion : PASS		

Test Frequency: 2403Hz

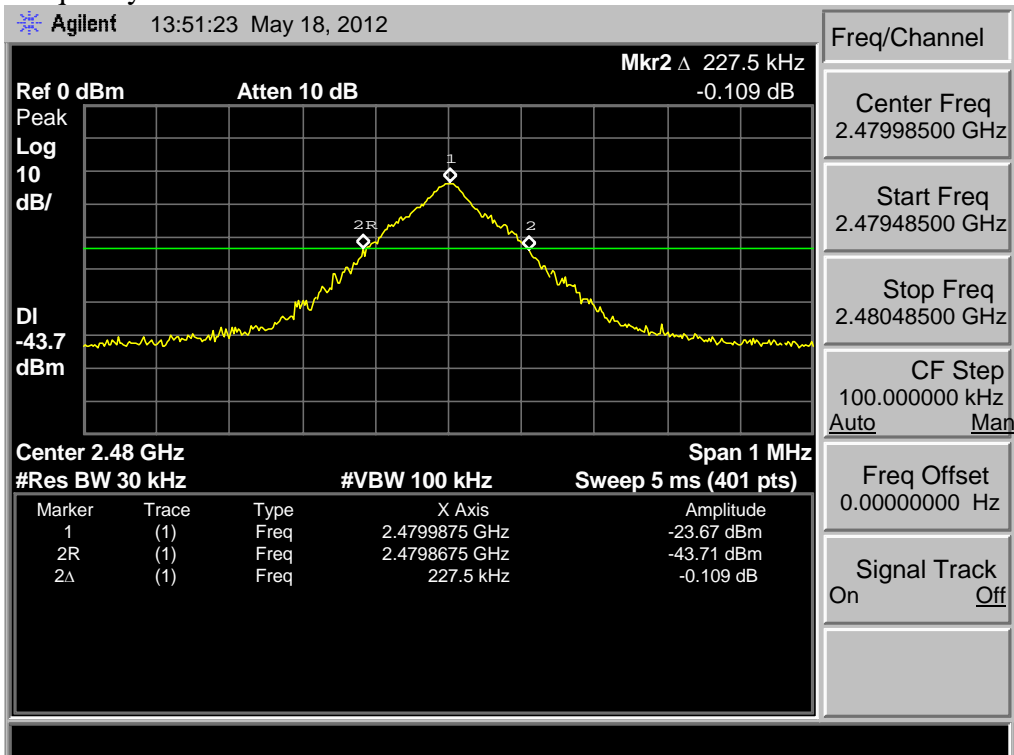


Test Frequency: 2444Hz





Test Frequency: 2479Hz



## 6. BAND EDGE COMPLIANCE TEST

### 6.1. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	Agilent	E4408B	MY44211139	May.02, 12	1 Year
2.	Horn Antenna	EMCO	3115	9607-4877	May.02, 12	1.5 Year
3.	Amplifier	Agilent	8449B	3008A02495	May.02, 12	1 Year
4.	RF Cable	Hubersuhner	SUCOFLEX102	28620/2	May.02, 12	1 Year
5.	RF Cable	Hubersuhner	SUCOFLEX102	28618/2	May.02, 12	1 Year
6.	RF Cable	Hubersuhner	SUCOFLEX102	28610/2	May.02, 12	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) Average: RBW=1MHz ;VBW=10Hz, PK detector, Sweep=AUTO

#### 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.

### 6.5. Test Data

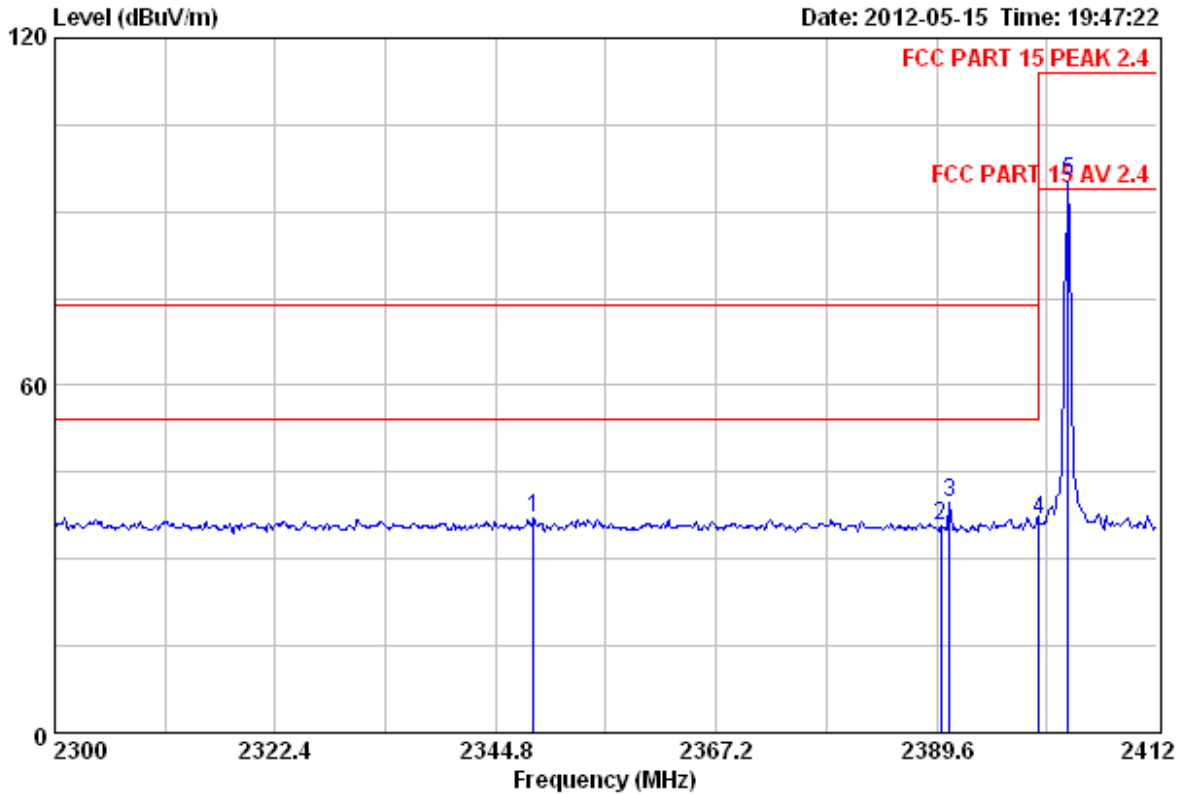
**EST Technology**

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Dongguan City, Guangdong, China  
Tel: +86-769-83081888  
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Data: 178

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 19:47:22



Site no. : 3m Chamber Data no. : 178  
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : HORIZONTAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : Temp:25.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2403MHz

	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Emission				Remark
					Reading (dBUV)	Level (dBUV/m)	Limits (dBUV/m)	Margin (dB)	
1	2348.61	27.70	6.56	34.22	37.03	37.07	74.00	36.93	Peak
2	2390.00	27.64	6.62	34.19	35.84	35.91	74.00	38.09	Peak
3	2390.94	27.64	6.62	34.19	39.68	39.75	74.00	34.25	Peak
4	2400.00	27.61	6.62	34.18	36.68	36.73	74.00	37.27	Peak
5	2402.93	27.61	6.64	34.18	95.07	95.14	114.00	18.86	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.

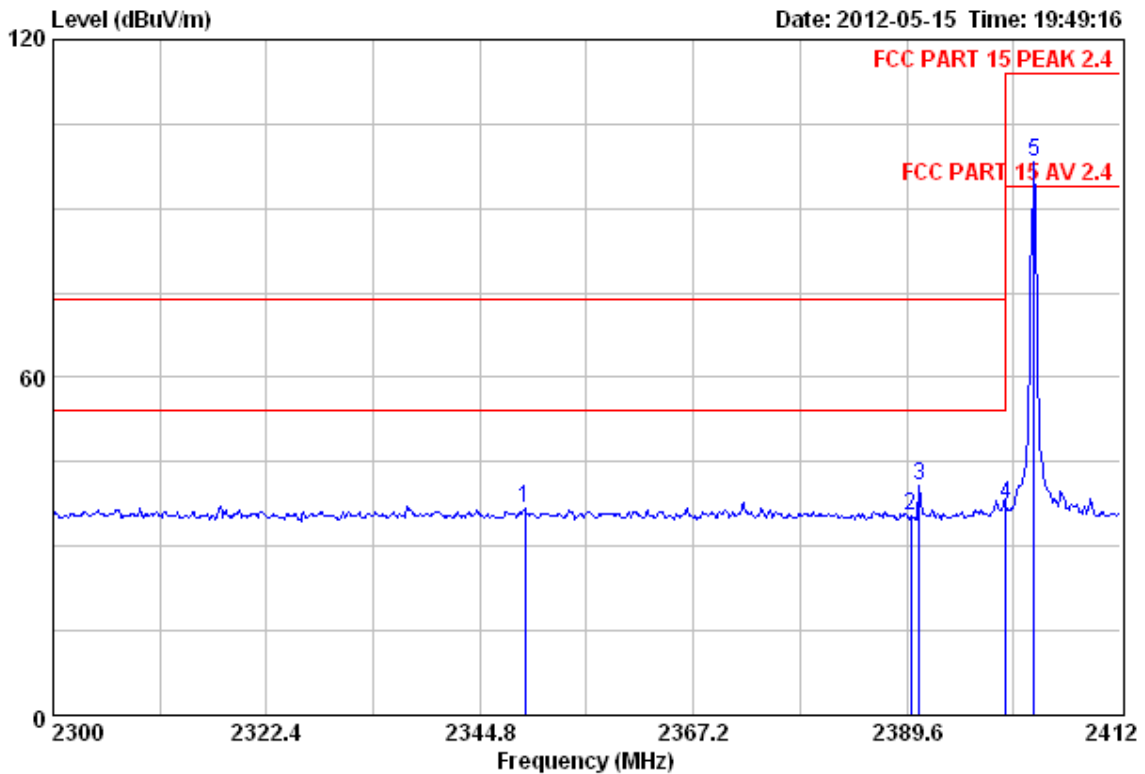
# EST Technology

San Tun Management Zone, Houjie Town,  
Dongguan City, Guangdong, China  
Tel: +86-769-83081888  
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Data: 179

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 19:49:16



Site no. : 3m Chamber Data no. : 179  
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : Temp:25.6'; Humi:56%; Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2403MHz

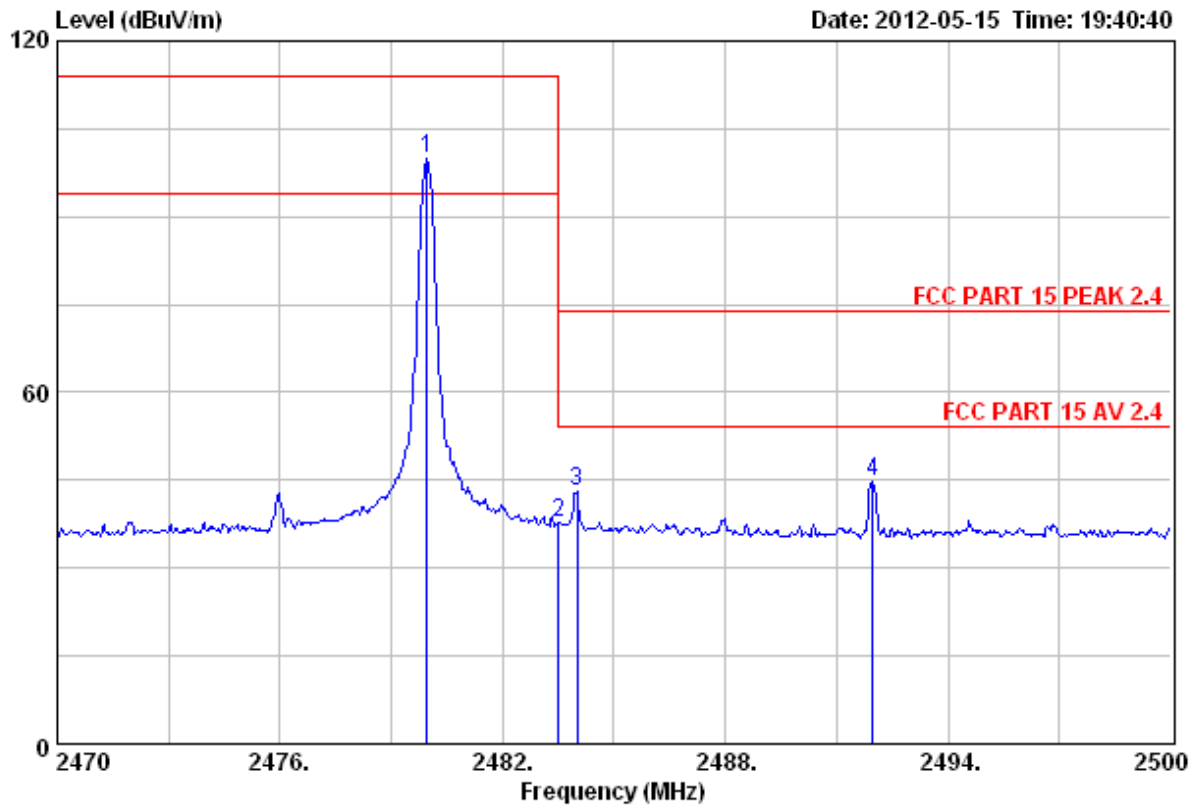
Peak	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Emission		Limits (dBuV/m)	Margin (dB)	Remark
					Reading (dBuV)	Level (dBuV/m)			
1	2349.50	27.70	6.56	34.22	36.89	36.93	74.00	37.07	Peak
2	2390.00	27.64	6.62	34.19	35.31	35.38	74.00	38.62	Peak
3	2390.94	27.64	6.62	34.19	40.83	40.90	74.00	33.10	Peak
4	2400.00	27.61	6.62	34.18	37.41	37.46	74.00	36.54	Peak
5	2402.93	27.61	6.64	34.18	98.28	98.35	114.00	15.65	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.

# EST Technology

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Data: 176 File: D:\test data\2012\W\WangHong.EMI (189)



Site no. : 3m Chamber Data no. : 176  
 Dis. / Ant. : 3m ANT 1-18G Ant. pol. : VERTICAL  
 Limit : FCC PART 15 PEAK 2.4  
 Env. / Ins. : Temp:25.6';Humi:56%;Press:101.52kPa  
 Engineer : Tony  
 EUT : 2.4GHz Laser Mouse  
 Power : DC 3V  
 M/N : MSS  
 Test Mode : TX 2480MHz

No.	Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Emission		Limits (dBUV/m)	Margin (dB)	Remark
					Reading (dBUV)	Level (dBUV/m)			
1	2479.96	27.58	6.71	34.03	99.66	99.92	114.00	14.08	Peak
2	2483.50	27.58	6.71	34.03	37.56	37.82	74.00	36.18	Peak
3	2484.01	27.58	6.71	34.03	42.77	43.03	74.00	30.97	Peak
4	2491.96	27.58	6.73	34.03	44.54	44.82	74.00	29.18	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.

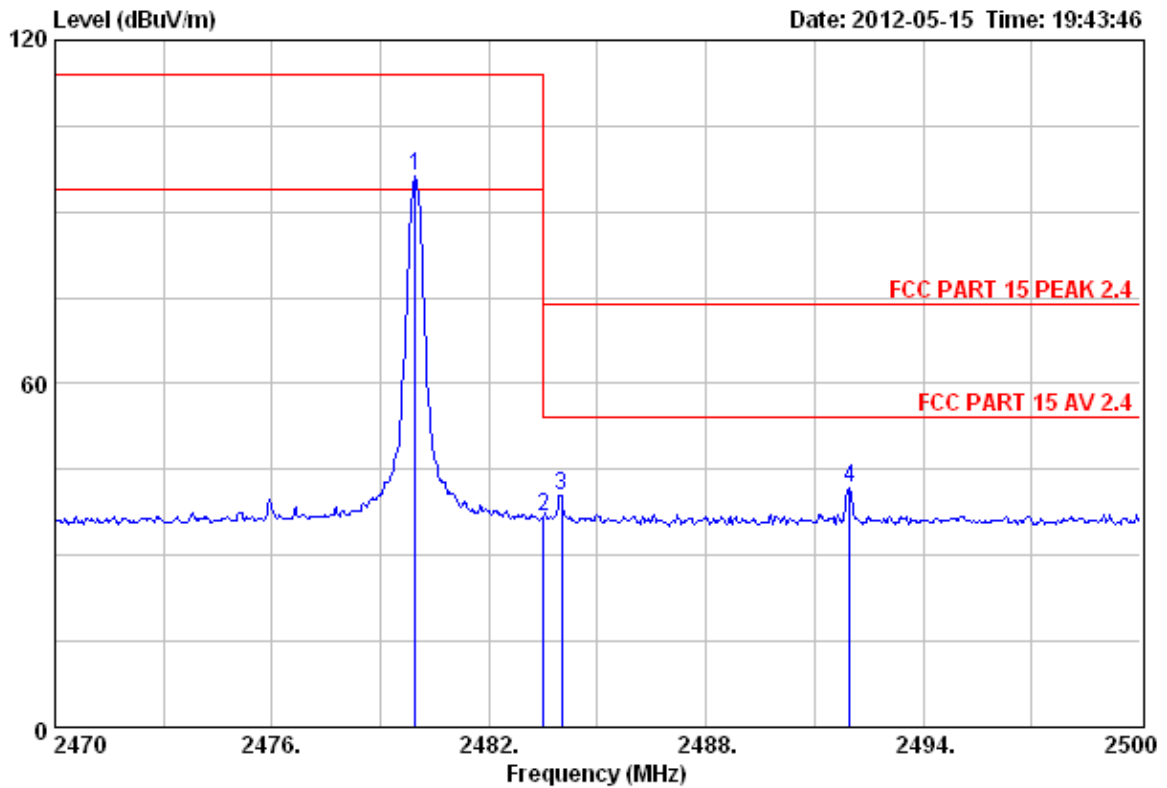
# EST Technology

San Tun Management Zone, Houjie Town,  
Dongguan City, Guangdong, China  
Tel: +86-769-83081888  
Fax: +86-769-83081878

Data: 177

File: D:\test data\2012\W\WangHong.EMI (189)

Date: 2012-05-15 Time: 19:43:46



```

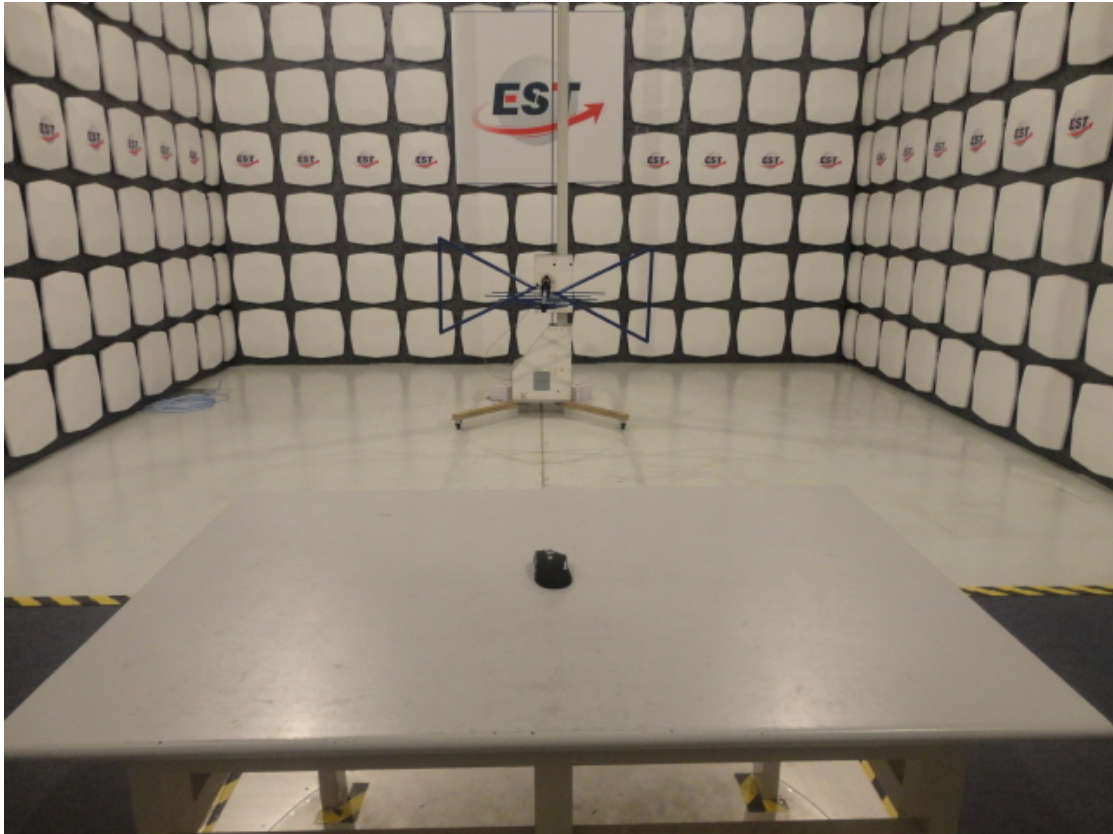
Site no.      : 3m Chamber                      Data no. : 177
Dis. / Ant.  : 3m ANT 1-18G                    Ant. pol. : HORIZONTAL
Limit        : FCC PART 15 PEAK 2.4
Env. / Ins.  : Temp:25.6';Humi:56%;Press:101.52kPa
Engineer     : Tony
EUT          : 2.4GHz Laser Mouse
Power        : DC 3V
M/N          : MSS
Test Mode    : TX 2480MHz
    
```

Freq. (MHz)	Ant. Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)	Emission		Limits (dBuV/m)	Margin (dB)	Remark
				Reading (dBuV)	Level (dBuV/m)			
1	27.58	6.71	34.03	95.86	96.12	114.00	17.88	Peak
2	27.58	6.71	34.03	36.52	36.78	74.00	37.22	Peak
3	27.58	6.71	34.03	40.10	40.36	74.00	33.64	Peak
4	27.58	6.73	34.03	41.55	41.83	74.00	32.17	Peak

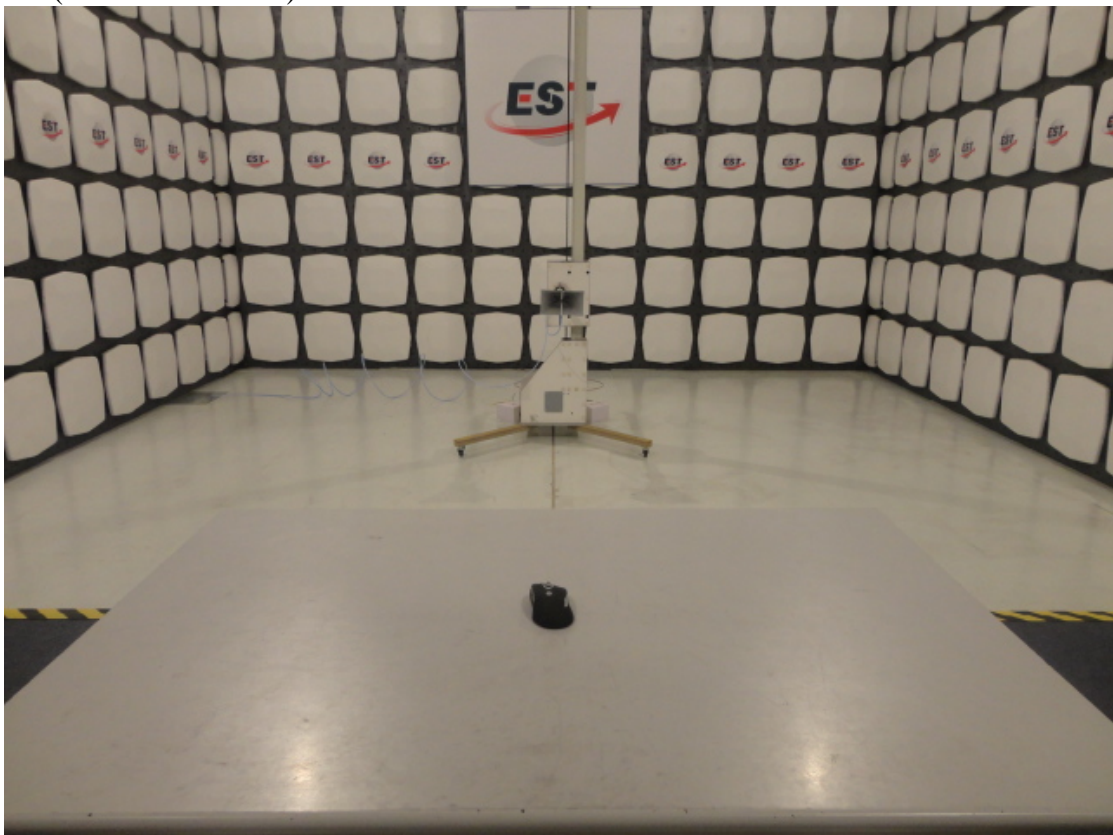
Remarks: 1. Emission Level= Antenna Factor + Cable Loss - Amp Factor + Reading.  
2. The emission levels that are 20dB below the official limit are not reported.

## 7. PHOTOGRAPH OF TEST

### 7.1.Photos of Radiated Emission Test (30-1000MHz)



(Above 1000MHz)





## 8. PHOTOGRAPH OF EUT

**Figure 1**  
General Appearance of the EUT

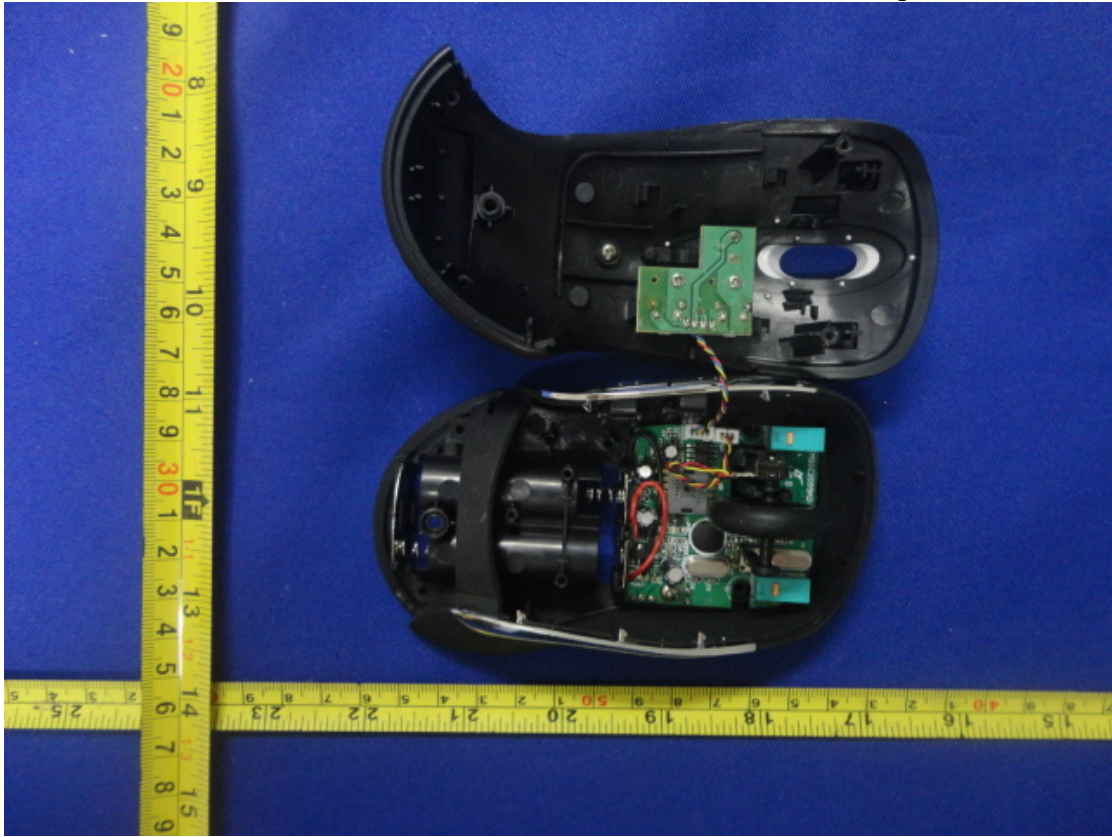


**Figure 2**  
General Appearance of the EUT

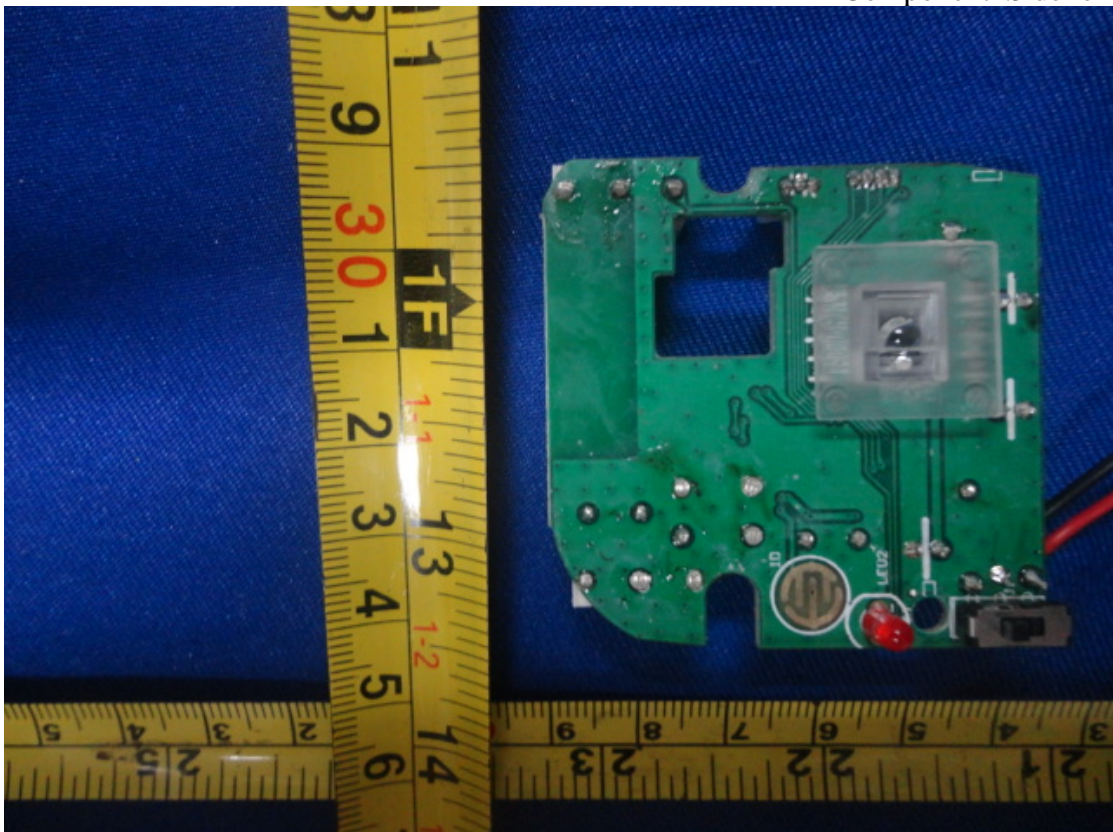




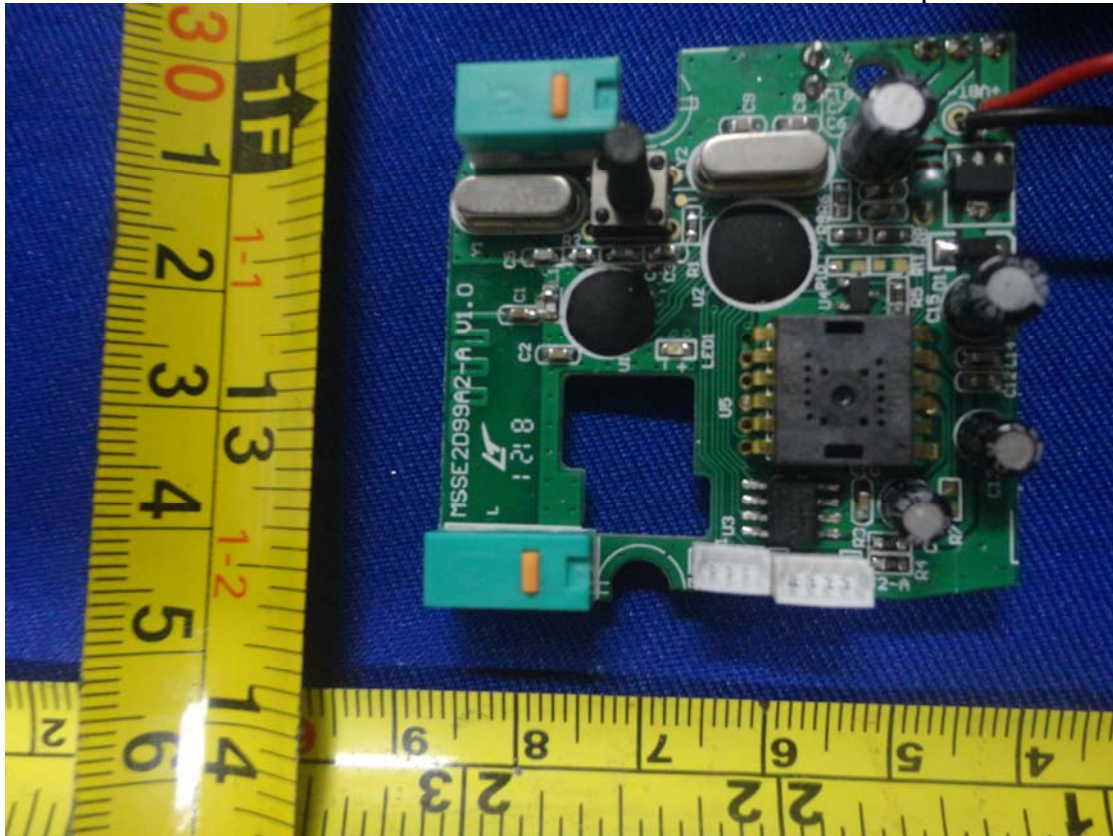
**Figure 3**  
Component Side of the PCB



**Figure 4**  
Component Side of the PCB



**Figure 5**  
Component Side of the PCB



**<End of Report>**