

FCC TEST REPORT  
for  
Shenzhen Eastech Co., Ltd.

2.4G Wireless Optical Mouse  
Model No.: S-100, EM-515B, EM-515W, EM-517, EM-518,  
EM-3056W, EM-3069W, EM-3062W, EM-3038W

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Report Number : 201106726F  
Date of Test : Jun. 16~22, 2011  
Date of Report : Jun. 24, 2011

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APPENDIX I (Photos of EUT) (4 Pages)

## TEST REPORT

Applicant : Shenzhen Eastech Co., Ltd.  
Manufacturer : Shenzhen Eastech Co., Ltd.  
EUT : 2.4G Wireless Optical Mouse  
Model No. : S-100, EM-515B, EM-515W, EM-517, EM-518, EM-3056W,  
EM-3069W, EM-3062W, EM-3038W  
Serial No. : N/A  
Rating : DC 3V  
Trade Mark : N.A.

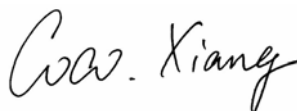
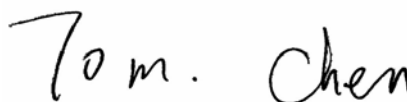
## Measurement Procedure Used:

FCC Part15 Subpart C, Paragraph 15.249 &amp; 15.209

The device described above is tested by Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Anbotek Compliance Laboratory Limited

Date of Test : Jun. 16~22, 2011

Prepared by :  
(Engineer / Rock Zeng)Reviewer :  
(Project Manager / Coco Xiang)Approved & Authorized Signer :  
(Manager / Tom Chen)

## 1. GENERAL INFORMATION

### 1.1. Description of Device (EUT)

EUT	: 2.4G Wireless Optical Mouse
Model Number	: S-100, EM-515B, EM-515W, EM-517, EM-518, EM-3056W, EM-3069W, EM-3062W, EM-3038W (Note: The above samples are same except the model number or Shape of appliances, so we prepare “EM-515B(S-100)” for EMC test only.)
Test Power Supply	: DC 3V via 2 Pcs new (full) AA Alkaline Battery
Frequency	: 2408~2474MHz
Channel	: 67 Channels, 1MHz Spacing
Antenna Gain	: 1dBi (The device uses an integral PCB antenna which is not intended and easy to modify.)
Applicant	: Shenzhen Eastech Co., Ltd.
Address	: Block A, Baizhushan Industrial Park, Shajing Street, Bao'an District, Shenzhen City, Guangdong Province, China
Manufacturer	: Shenzhen Eastech Co., Ltd.
Address	: Block A, Baizhushan Industrial Park, Shajing Street, Bao'an District, Shenzhen City, Guangdong Province, China
Date of receiver	: Jun. 16, 2011
Date of Test	: Jun. 16~22, 2011

## 1.2. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

### **CNAS - LAB Code: L3503**

Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

### **FCC-Registration No.: 752021**

Anbotek Compliance Laboratory Limited, 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. Registration 752021, August 20, 2010.

### **IC-Registration No.: 8058A-1**

Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A-1, August 30, 2010.

### **Test Location**

All Emissions tests were performed at  
Anbotek Compliance Laboratory Limited. at 1/F, 1 /Building, SEC Industrial Park,  
No. 4 Qianhai Road, Nanshan District, Shenzhen, 518054, China

## 1.3. Measurement Uncertainty

Radiation Uncertainty : Ur = 4.3dB

Conduction Uncertainty : Uc = 3.4dB

## 2. MEASURING DEVICE AND TEST EQUIPMENT

Equipment	Manufacturer	Model #	Serial #	Data of Cal.	Due Data
EMI Test Receiver	Rohde & Schwarz	ESCI	100119	Mar.03, 2011	Mar.02, 2012
EMI Test Receiver	Rohde & Schwarz	ESPI	1101604	Jun.21, 2010	Jun.20, 2011
EMI Test Receiver	Rohde & Schwarz	ESIB26	100249	Sep.22, 2010	Sep.21, 2011
EMI Test Software	SHURPLE	ESK1	N/A	N/A	N/A
Spectrum Analyzer	Agilent	E7405A	MY45114970	Jun.21, 2010	Jun.20, 2011
Signal Generator	Rohde & Schwarz	SMR27	100124	Jul.06, 2010	Jul.05, 2012
Signal Generator	Rohde & Schwarz	SML03	102319	Aug.01, 2010	Aug.01, 2012
AC Power Source	Secpial power system	YF650	N/A	N/A	N/A
Absorbing Clamp	Rohde & Schwarz	MDS21	100218	Apr.30, 2010	Apr.29, 2012
Power Meter	Rohde & Schwarz	NRVD	101287	Jul.19, 2009	Jul.18, 2011
Coaxial Cable	N/A	N/A	N/A	May.31, 2011	May.30, 2012
Coaxial Cable	N/A	N/A	N/A	May.31, 2011	May.30, 2012
Coaxial Cable	N/A	N/A	N/A	May.31, 2011	May.30, 2012
Universal radio Communication tester	Rohde & Schwarz	CMU200	101724	Sep.08, 2009	Sep.07, 2011
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	N/A	N/A	N/A
Loop Antenna	ETS-LINGREN	6502	00071730	Mar.03, 2011	Mar.02, 2012
BiConilog Antenna	ETS-LINDGREN	3142C	00042670	Mar.03, 2011	Mar.02, 2012
BiConilog Antenna	ETS-LINDGREN	3142C	00042673	Mar.03, 2011	Mar.02, 2012
Double-ridged Waveguide horn	ETS-LINDGREN	3117	00035926	Dec.30, 2009	Dec.29, 2011
Double-ridged Waveguide horn	ETS-LINDGREN	3117	00041545	Dec.30, 2009	Dec.29, 2011
Pre-amplifier	CD	PAM0203	804203	Jun.21, 2010	Jun.20, 2011
RF Switch	CD	RSU-M3	706543	Jun.21, 2010	Jun.20, 2011
Thermo-/Hygrometer	N/A	TH01	N/A	May.03, 2011	May.02, 2012
Shielding Room	Zhong Yu Electronic	N/A	N/A	N/A	N/A
3m Semi-Anechoic Chamber	Zhong Yu Electronic	N/A	N/A	Apr.28, 2010	Apr.27, 2012

### 3. Test Procedure

**GENERAL:** This report shall NOT be reproduced except in full without the written approval of Anbotek Compliance Laboratory Limited. The EUT was transmitting a test signal during the testing.

**RADIATION INTERFERENCE:** The test procedure used was ANSI STANDARD C63.4-2003 using a spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the EUT was 74.3oF with a humidity of 69%.

**FORMULA OF CONVERSION FACTORS:** The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

**Example:**

Freq (MHz) METER READING + ACF = FS

33 20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

**ANSI STANDARD C63.4-2003 10.1.7 MEASUREMENT PROCEDURES:** The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

## 4. Radiation Interference

### 4.1. Requirements (15.249, 15.209):

#### 4.1.1. Test Limits (< 30 MHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30

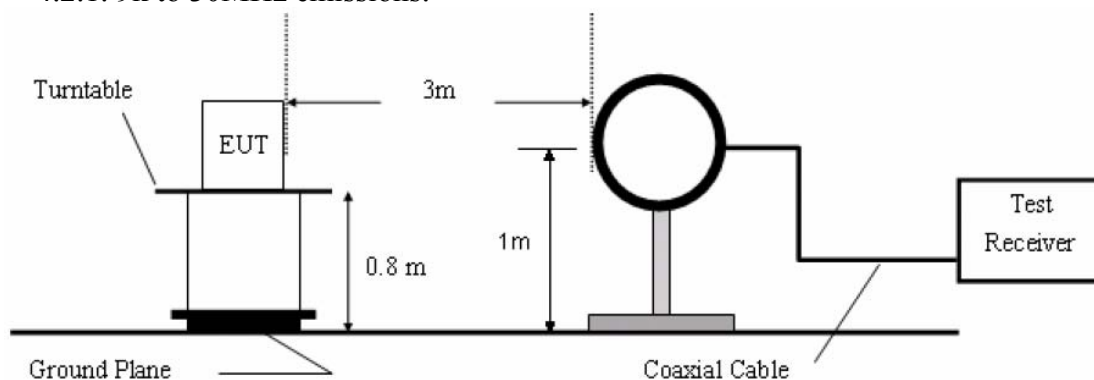
#### 4.1.2. Test Limits ( $\geq$ 30 MHz)

FIELD STRENGTH of Fundamental:	FIELD STRENGTH of Harmonics	S15.209	
902-928 MHz		30 - 88 MHz	40 dBuV/m @3M
2.4-2.4835 GHz		88 - 216 MHz	43.5
94 dBuV/m @3m	54 dBuV/m @3m	216 - 960 MHz	46
		ABOVE 960 MHz	54dBuV/m

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.

### 4.2. Test Configuration:

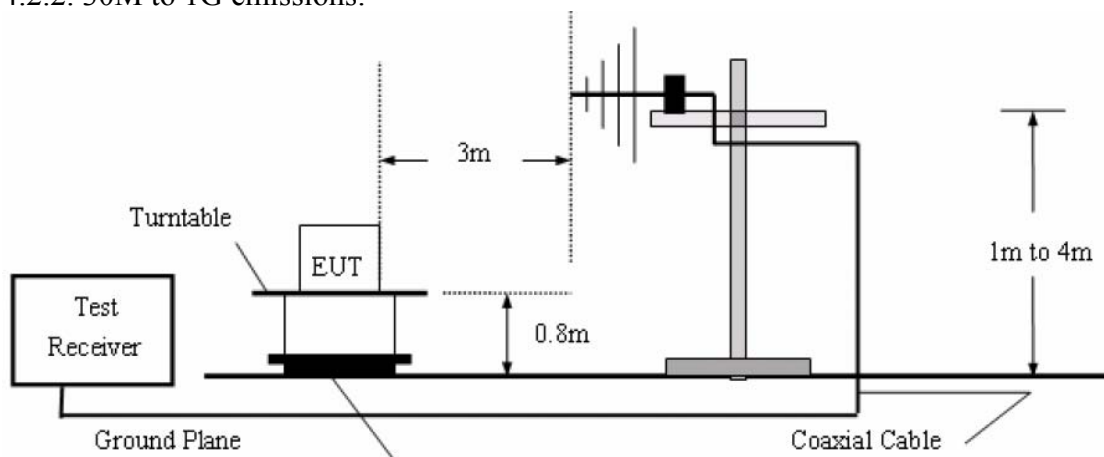
#### 4.2.1. 9k to 30MHz emissions:



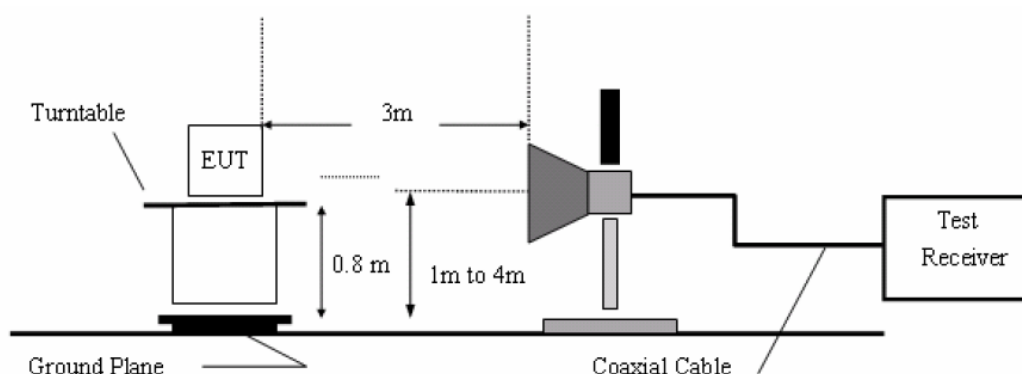


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## 4.2.2. 30M to 1G emissions:



## 4.2.3. 1G to 40G emissions:



## 4.3 Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the 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 from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

All readings from 30MHz to 1GHz are quasi-peak values with a resolution bandwidth of 120kHz. All reading are above 1GHz, peak & average values with a resolution bandwidth of 1MHz. The EUT is tested in 9\*6\*6 Chamber.

The test results are listed in Section 4.4.

## 4.4 Test Results

PASS.

Please refer the following pages.

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**Data:**

Horizontal CH Low(2408MHz)								
Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dBμV	Level dBμV/m	Limit dBμV/m	Over Limit dB	Remark
312.28	1.6	13.30	41.40	57.02	30.52	46.00	-15.48	QP
2408.00	3.11	31.24	35.30	82.31	81.36	94.0	-12.64	Peak
4816.00	3.11	31.62	34.71	32.48	32.50	54.0	-21.50	Peak
7224.00	3.12	32.15	35.15	31.07	31.19	54.0	-22.81	Peak
9632.00	---	---	---	---	---	---	---	---
12040.00	---	---	---	---	---	---	---	---
14448.00	---	---	---	---	---	---	---	---
16856.00	---	---	---	---	---	---	---	---
19264.00	---	---	---	---	---	---	---	---
21672.00	---	---	---	---	---	---	---	---
24080.00	---	---	---	---	---	---	---	---

**Remark:** There is no emissions were detected below 30MHz

CH Middle(2440MHz)								
Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dBμV	Level dBμV/m	Limit dBμV/m	Over Limit dB	Remark
324.90	1.65	13.41	41.45	57.15	30.76	46.00	-15.24	QP
2440.00	3.11	31.25	35.90	83.62	82.08	94.0	-11.92	Peak
4880.00	3.11	31.61	34.73	33.40	33.39	54.0	-20.61	Peak
7320.00	3.12	32.16	35.17	32.10	32.21	54.0	-21.79	Peak
9760.00	---	---	---	---	---	---	---	---
12200.00	---	---	---	---	---	---	---	---
14640.00	---	---	---	---	---	---	---	---
17080.00	---	---	---	---	---	---	---	---
19520.00	---	---	---	---	---	---	---	---
21960.00	---	---	---	---	---	---	---	---
24410.00	---	---	---	---	---	---	---	---

**Remark:** There is no emissions were detected below 30MHz

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CH High(2474MHz)								
Frequency	Cable	Ant	Preamp	Read	Level	Limit	Over	Remark
MHz	Loss	Factor	Factor	Level	dBμV/m	dBμV/m	Limit	
	dB	dB/m	dB	dBμV			dB	
312.28	1.6	13.30	41.40	58.11	31.61	46.00	-14.39	QP
2474.00	3.11	31.32	36.00	83.50	81.93	94.0	-12.07	Peak
4948.00	3.11	31.63	34.80	33.36	33.30	54.0	-20.70	Peak
7422.00	3.12	32.16	35.20	32.73	32.81	54.0	-21.19	Peak
9896.00	---	---	---	---	---	---	---	---
12370.00	---	---	---	---	---	---	---	---
14844.00	---	---	---	---	---	---	---	---
17318.00	---	---	---	---	---	---	---	---
19792.00	---	---	---	---	---	---	---	---
22266.00	---	---	---	---	---	---	---	---
24740.00	---	---	---	---	---	---	---	---

**Remark:** There is no emissions were detected below 30MHz

Vertical CH Low(2408MHz)								
Frequency	Cable	Ant	Preamp	Read	Level	Limit	Over	Remark
MHz	Loss	Factor	Factor	Level	dBμV/m	dBμV/m	Limit	
	dB	dB/m	dB	dBμV			dB	
375.94	1.75	14.82	41.80	52.11	26.88	46.00	-19.12	QP
2408.00	3.11	31.24	36.00	84.12	82.47	94.0	-11.53	Peak
4816.00	3.11	31.60	34.70	33.90	33.91	54.0	-20.09	Peak
7224.00	3.12	32.16	35.17	32.71	32.82	54.0	-21.18	Peak
9632.00	---	---	---	---	---	---	---	---
12040.00	---	---	---	---	---	---	---	---
14448.00	---	---	---	---	---	---	---	---
16856.00	---	---	---	---	---	---	---	---
19264.00	---	---	---	---	---	---	---	---
21672.00	---	---	---	---	---	---	---	---
24080.00	---	---	---	---	---	---	---	---

**Remark:** There is no emissions were detected below 30MHz

FCC ID: ZPF515T

CH Middle(2440MHz)								
Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dBμV	Level dBμV/m	Limit dBμV/m	Over Limit dB	Remark
420.58	1.84	15.47	41.70	53.40	29.01	46.00	-16.99	QP
2440.00	3.11	31.25	35.90	81.76	80.22	94.0	-13.78	Peak
4880.00	3.11	31.61	34.72	34.92	34.92	54.0	-19.08	Peak
7320.00	3.12	32.16	35.17	31.84	31.95	54.0	-22.05	Peak
9760.00	---	---	---	---	---	---	---	---
12200.00	---	---	---	---	---	---	---	---
14640.00	---	---	---	---	---	---	---	---
17080.00	---	---	---	---	---	---	---	---
19520.00	---	---	---	---	---	---	---	---
21960.00	---	---	---	---	---	---	---	---
24410.00	---	---	---	---	---	---	---	---
<b>Remark: There is no emissions were detected below 30MHz</b>								

CH High(2474MHz)								
Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dBμV	Level dBμV/m	Limit dBμV/m	Over Limit dB	Remark
938.83	3.0	21.21	38.44	44.84	30.61	46.00	-15.39	QP
2474.00	3.11	31.32	36.00	83.81	82.24	94.0	-11.76	Peak
4948.00	3.11	31.63	34.80	34.01	33.95	54.0	-20.05	Peak
7422.00	3.12	32.16	35.20	32.90	32.98	54.0	-21.02	Peak
9896.00	---	---	---	---	---	---	---	---
12370.00	---	---	---	---	---	---	---	---
14844.00	---	---	---	---	---	---	---	---
17318.00	---	---	---	---	---	---	---	---
19792.00	---	---	---	---	---	---	---	---
22266.00	---	---	---	---	---	---	---	---
24740.00	---	---	---	---	---	---	---	---
<b>Remark: There is no emissions were detected below 30MHz</b>								

**NOTE: “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.**

## **5. Occupied Bandwidth**

### **5.1. Requirements (15.249):**

The field strength of any emissions appearing outside the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 50 dB below the level of the carrier or to the general limits of 15.249.

### **5.2 Test Results**

Pass.

Please refer the following plot.

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