## FCC CERTIFICATION On Behalf of Eastern Times Technology Co., Ltd.

2.4G Wireless Optical Mouse Model No.: DS-2331

FCC ID: TUVDS2331

Prepared for Address	:	Eastern Times Technology Co., Ltd. Building 5, Penghua Industry Park, Heping Rd.(W), Longhua, Shenzhen, Guangdong, China
Prepared by Address	:	ACCURATE TECHNOLOGY CO. LTD F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, Shenzhen, Guangdong P.R. China
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Report Number	:	ATE20100088
Date of Test	:	February 2, 2010
Date of Report	:	March 1, 2010

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### APPENDIX I (TEST CURVES) (22 pages)

#### **Test Report Certification**

Applicant	:	Eastern Times Technology Co., Ltd.
Manufacturer	:	Eastern Times Technology Co., Ltd.
EUT Description	:	2.4G Wireless Optical Mouse
		(A) MODEL NO.: DS-2331
		(B) SERIAL NO.: N/A
		(C) POWER SUPPLY: 3V DC ("AAA" batteries $2 \times$ )

Measurement Procedure Used:

#### FCC Rules and Regulations Part 15 Subpart C Section 15.249 ANSI C63.4: 2003

The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section15.249 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test :

February 2, 2010

Prepared by :

(Engineer)

Approved & Authorized Signer :

(Manager)

## **1. GENERAL INFORMATION**

## 1.1.Description of Device (EUT)

EUT	:	2.4G Wireless Optical Mouse
Model Number	:	DS-2331
Power Supply	:	3V DC ("AAA" batteries $2 \times$ )
Operate Frequency	:	2402-2478MHz
Channel Number	:	64
Applicant Address	:	Eastern Times Technology Co., Ltd. Building 5, Penghua Industry Park, Heping Rd.(W), Longhua, Shenzhen, Guangdong, China
Manufacturer Address	:	Eastern Times Technology Co., Ltd. Building 5, Penghua Industry Park, Heping Rd.(W), Longhua, Shenzhen, Guangdong, China
Date of sample received	:	February 1, 2010
Date of Test	:	February 2, 2010

## 1.2.Description of Test Facility

EMC Lab	:	Accredited by TUV Rheinland Shenzhen
		Listed by FCC The Registration Number is 752051
		The Registration Number is 752051
		Listed by Industry Canada
		The Registration Number is 5077A-2
		Accredited by China National Accreditation Committee
		for Laboratories
		The Certificate Registration Number is L3193
Name of Firm	:	ACCURATE TECHNOLOGY CO. LTD
Site Location	:	F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.
		Science & Industry Park, Nanshan, Shenzhen, Guangdong
		P.R. China

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, k=2

## 2. MEASURING DEVICE AND TEST EQUIPMENT

Kind of equipment	Manufacturer	Туре	S/N	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 9, 2011
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 9, 2011
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 9, 2011
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 9, 2011
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 9, 2011
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 9, 2011
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 9, 2011
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 9, 2011
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 9, 2011
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 9, 2011

#### Table 1: List of Test and Measurement Equipment

## 3. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission	N/A
Section 15.249(a)	Fundamental and Harmonics Radiated Emission	Compliant
Section 15.249(d)	Spurious Radiated Emission	Compliant
Section 15.249(d)	Band Edge	Compliant
Section 15.203	Antenna Requirement	Compliant

Remark: "N/A" means "Not applicable".

## 4. FUNDAMENTAL AND HARMONICS RADIATED EMISSION FOR SECTION 15.249(A)

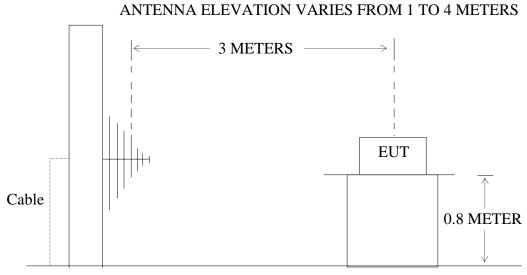
4.1.Block Diagram of Test Setup

4.1.1.Block diagram of connection between the EUT and simulators



(EUT: 2.4G Wireless Optical Mouse)

4.1.2.Semi-Anechoic Chamber Test Setup Diagram



GROUND PLANE

(EUT: 2.4G Wireless Optical Mouse)

#### 4.2. The Emission Limit

4.2.1.For intentional radiators, According to section 15.249(a), Operation within the frequency band of 2.4 to 2.4835GHz, The fundamental field strength shall not exceed 94 dB $\mu$ V/m and the harmonics shall not exceed 54 dB $\mu$ V/m.

Fundamental	Field Strength of Fundamental	Field Strength of harmonics
Frequency	(millivolts/meter)	(microvolts/meter)
902-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

4.2.2.According to section 15.249(e), as shown in section 15.35(b), the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

#### 4.3.Configuration of EUT on Measurement

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

4.3.1. 2.4G Wireless Optical Mouse (EUT)

Model Number	:	DS-2331
Serial Number	:	N/A
Manufacturer	:	Eastern Times Technology Co., Ltd.

#### 4.4.Operating Condition of EUT

4.4.1.Setup the EUT and simulator as shown as Section 4.1.

4.4.2.Turn on the power of all equipment.

4.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2478MHz. We are select 2402MHz, 2440MHz, 2478MHz TX frequency to transmit.

#### **4.5.Test Procedure**

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 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 polarizations of the antenna are set on measurement. 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 measurement. The EUT was tested in 3 orthogonal planes.

The bandwidth of test receiver is set at 1MHz.

# 4.6.The Field Strength of Radiation Emission Measurement Results **PASS.**

Date of Test:	February 2, 2010	Temperature:	25°C
EUT:	2.4G Wireless Optical Mouse	Humidity:	50%
Model No.:	DS-2331	Power Supply:	3V DC ("AAA" batteries $2 \times$ )
Test Mode:	TX 2402MHz	Test Engineer:	Joe

#### **Fundamental Radiated Emissions**

Frequency	Reading(c	lBμV/m)	Factor(dB)	Result(c	lBµV/m)	Limit(dF	BμV/m)	Marg	in(dB)	Polarization
(MHz)	AV	PEAK	Corr.	AV	PEAK	AV	PEAK	AV	PEAK	
2402.250	91.60	97.61	-7.45	84.15	90.16	94	114	-9.85	-23.84	Vertical
2402.250	95.91	101.88	-7.45	88.46	94.43	94	114	-5.54	-19.57	Horizontal

#### **Harmonics Radiated Emissions**

Frequency	Reading(c	lBμV/m)	Factor(dB)	Result(c	lBµV/m)	Limit(dl	BμV/m)	Margi	n(dB)	Polarization
(MHz)	AV	PEAK	Corr.	AV	PEAK	AV	PEAK	AV	PEAK	
4804.501	45.88	51.86	-0.30	45.58	51.56	54	74	-8.42	-20.44	Vertical
4804.501	49.43	55.40	-0.30	49.43	55.40	54	74	-4.57	-18.60	Horizontal

Note:

- 1. Emissions attenuated more than 20 dB below the permissible value are not reported.
- 2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Amplifier Gain

Date of Test:	February 2, 2010	Temperature:	25°C
EUT:	2.4G Wireless Optical Mouse	Humidity:	50%
Model No.:	DS-2331	Power Supply:	3V DC ("AAA" batteries $2 \times$ )
Test Mode:	TX 2440MHz	Test Engineer:	Joe

#### **Fundamental Radiated Emissions**

Frequency	Reading(c	dBμV/m)	Factor(dB)	Result(c	lBµV/m)	Limit(dF	BμV/m)	Margi	n(dB)	Polarization
(MHz)	AV	PEAK	Corr.	AV	PEAK	AV	PEAK	AV	PEAK	
2440.350	91.59	97.60	-7.36	84.23	90.24	94	114	-9.77	-23.76	Vertical
2440.350	87.80	93.74	-7.36	87.80	93.74	94	114	-6.20	-20.26	Horizontal

#### **Harmonics Radiated Emissions**

Frequency	Reading(c	lBμV/m)	Factor(dB)	Result(c	lBµV/m)	Limit(dl	BμV/m)	Margi	n(dB)	Polarization
(MHz)	AV	PEAK	Corr.	AV	PEAK	AV	PEAK	AV	PEAK	
4880.698	45.01	50.97	0.13	45.14	51.10	54	74	-8.86	-20.90	Vertical
4880.698	49.20	55.17	0.13	49.33	55.30	54	74	-4.67	-18.70	Horizontal

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.

2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Amplifier Gain

Date of Test:	February 2, 2010	Temperature:	25°C
EUT:	2.4G Wireless Optical Mouse	Humidity:	50%
Model No.:	DS-2331	Power Supply:	3V DC ("AAA" batteries $2 \times$ )
Test Mode:	TX 2478MHz	Test Engineer:	Joe

#### **Fundamental Radiated Emissions**

Frequency	Reading(c	dBμV/m)	Factor(dB)	Result(c	lBµV/m)	Limit(dF	BμV/m)	Margi	n(dB)	Polarization
(MHz)	AV	PEAK	Corr.	AV	PEAK	AV	PEAK	AV	PEAK	
2478.235	91.59	97.56	-7.37	84.22	90.19	94	114	-9.78	-23.81	Vertical
2478.235	95.73	101.71	-7.37	88.36	94.34	94	114	-5.64	-19.66	Horizontal

#### **Harmonics Radiated Emissions**

Frequency	Reading(c	lBμV/m)	Factor(dB)	Result(c	lBµV/m)	Limit(dl	BμV/m)	Margi	n(dB)	Polarization
(MHz)	AV	PEAK	Corr.	AV	PEAK	AV	PEAK	AV	PEAK	
4956.470	49.54	55.55	0.51	50.05	56.06	54	74	-3.95	-17.94	Vertical
4956.470	47.71	53.67	0.51	48.22	54.18	54	74	-5.78	-19.82	Horizontal

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.

2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Amplifier Gain

## 5. SPURIOUS RADIATED EMISSION FOR SECTION 15.249(D)

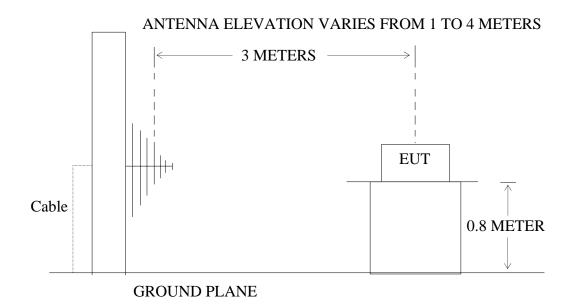
#### 5.1.Block Diagram of Test Setup

5.1.1.Block diagram of connection between the EUT and simulators



(EUT: 2.4G Wireless Optical Mouse)

5.1.2.Semi-Anechoic Chamber Test Setup Diagram



(EUT: 2.4G Wireless Optical Mouse)

#### 5.2. The Emission Limit For Section 15.249(d)

5.2.1.Emission radiated outside of the specified frequency bands, except for harmonics, shall be comply with the general radiated emission limits in Section 15.209.

		6		
		Limit		
Frequency (MHz)	Field Strength of Quasi-peak Value (microvolts/m)	Field Strength of Quasi-peak Value (dBµV/m)	The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is	
30 - 88	100	40	performed with Average detector.	
88 - 216	150	43.5	Except those frequency bands mention above, the	
216 - 960	200	46	final measurement for frequencies below	
Above 960	500	54	1000MHz is performed with Quasi Peak detector.	

Radiation Emission Measurement Limits According to Section 15.209

#### 5.3.EUT Configuration on Measurement

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

5.3.1. 2.4G Wireless Optical Mouse (EUT)

Model Number	:	DS-2331
Serial Number	:	N/A
Manufacturer	:	Eastern Times Technology Co., Ltd.

#### 5.4. Operating Condition of EUT

- 5.4.1.Setup the EUT and simulator as shown as Section 5.1.
- 5.4.2.Turn on the power of all equipment.
- 5.4.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2478MHz. We are select 2402MHz, 2440MHz, 2478MHz TX frequency to transmit.

#### 5.5.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 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 polarizations of the antenna are set on measurement. 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 measurement. The EUT was tested in 3 orthogonal planes.

The bandwidth of test receiver is set at 120kHz in 30-1000MHz. and set at 1MHz in above 1000MHz.

The frequency range from 30MHz to 25000MHz is checked.

The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

#### 5.6. The Emission Measurement Result

#### PASS.

Date of Test:	February 2, 2010	Temperature:	25°C
EUT:	2.4G Wireless Optical Mouse	Humidity:	50%
Model No.:	DS-2331	Power Supply:	3V DC ("AAA" batteries $2 \times$ )
Test Mode:	TX 2402MHz	Test Engineer:	Joe

Frequency	Reading	Factor(dB)	Result	Limit	Margin	Polarization
(MHz)	(dBµV/m)	Corr.	(dBµV/m)	(dBµV/m)	(dB)	
	QP		QP	QP	QP	
-	-	-	-	-	-	Vertical
-	-	-	-	-	-	Horizontal

Note:

- 1. Emissions attenuated more than 20 dB below the permissible value are not reported.
- 2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Amplifier Gain

Date of Test:	February 2, 2010	Temperature:	25°C
EUT:	2.4G Wireless Optical Mouse	Humidity:	50%
Model No.:	DS-2331	Power Supply:	3V DC ("AAA" batteries $2 \times$ )
Test Mode:	TX 2440MHz	Test Engineer:	Joe

Frequency	Reading	Factor(dB)	Result	Limit	Margin	Polarization
(MHz)	(dBµV/m)	Corr.	(dBµV/m)	(dBµV/m)	(dB)	
	QP		QP	QP	QP	
-	-	-	-	-	-	Vertical
-	-	_	-	_	_	Horizontal

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.

2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Amplifier Gain

Date of Test:	February 2, 2010	Temperature:	25°C
EUT:	2.4G Wireless Optical Mouse	Humidity:	50%
Model No.:	DS-2331	Power Supply:	3V DC ("AAA" batteries $2 \times$ )
Test Mode:	TX 2478MHz	Test Engineer:	Joe

Frequency	Reading	Factor(dB)	Result	Limit	Margin	Polarization
(MHz)	(dBµV/m)	Corr.	(dBµV/m)	(dBµV/m)	(dB)	
	QP		QP	QP	QP	
-	-	-	-	-	-	Vertical
-	-	-	-	-	-	Horizontal

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.

2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Amplifier Gain

## 6. BAND EDGES

#### 6.1.The Requirement

6.1.1.Band Edge from 2400MHz to 2483.5MHz. Emission 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 Section 15.209, whichever is the lesser attenuation.

#### 6.2.EUT Configuration on Measurement

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

6.2.1. 2.4G Wireless Optical Mouse (EUT)

Model Number	:	DS-2331
Serial Number	:	N/A
Manufacturer	:	Eastern Times Technology Co., Ltd.

#### 6.3. Operating Condition of EUT

6.3.1.Setup the EUT and simulator as shown as Section 4.1.

- 6.3.2.Turn on the power of all equipment.
- 6.3.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2478MHz. We are select 2402MHz, 2478MHz TX frequency to transmit.

#### 6.4. Test Procedure

- 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 upper band-edges of the emission: RBW=1MHz, VBW=1MHz

#### 6.5. The Measurement Result

#### Pass.

Date of Test:	February 2, 2010	Temperature:	25°C
EUT:	2.4G Wireless Optical Mouse	Humidity:	50%
Model No.:	DS-2331	Power Supply:	3V DC ("AAA" batteries $2 \times$ )
Test Mode:	TX 2402MHz	Test Engineer:	Joe

Frequency	Reading(c	dBμV/m)	Factor(dB)	Result(c	lBµV/m)	Limit(dl	BμV/m)	Margi	n(dB)	Polarization
(MHz)	AV	PEAK	Corr.	AV	PEAK	AV	PEAK	AV	PEAK	
2400.000	44.93	50.90	-7.46	37.47	43.44	54	74	-16.53	-30.56	Vertical
2400.000	49.62	55.61	-7.46	42.16	48.15	54	74	-11.84	-25.85	Horizontal

Note:

- 1. Emissions attenuated more than 20 dB below the permissible value are not reported.
- 2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Amplifier Gain

Date of Test:	February 2, 2010	Temperature:	25°C
EUT:	2.4G Wireless Optical Mouse	Humidity:	50%
Model No.:	DS-2331	Power Supply:	3V DC ("AAA" batteries $2 \times$ )
Test Mode:	TX 2478MHz	Test Engineer:	Joe

Frequency	Reading(c	lBμV/m)	Factor(dB)	Result(c	lBµV/m)	Limit(dI	BμV/m)	Margi	in(dB)	Polarization
(MHz)	AV	PEAK	Corr.	AV	PEAK	AV	PEAK	AV	PEAK	
2483.500	37.65	43.59	-7.37	30.28	36.22	54	74	-23.72	-37.78	Vertical
2483.500	38.29	44.23	-7.37	30.92	36.86	54	74	-23.08	-37.14	Horizontal

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.

2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Amplifier Gain

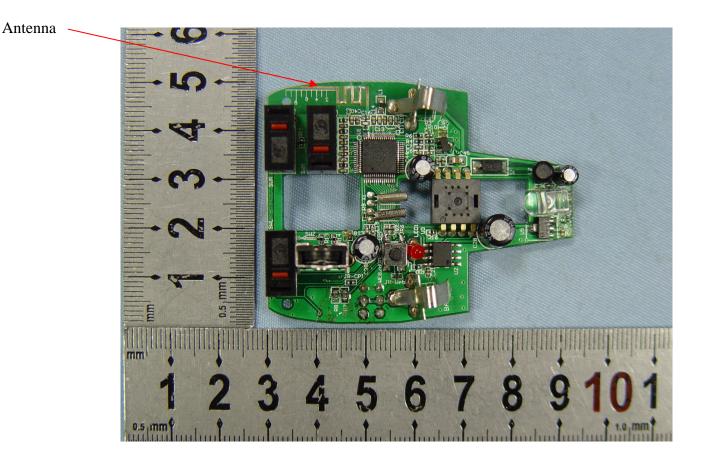
## 7. ANTENNA REQUIREMENT

#### 7.1.The Requirement

7.1.1.According to Section 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.

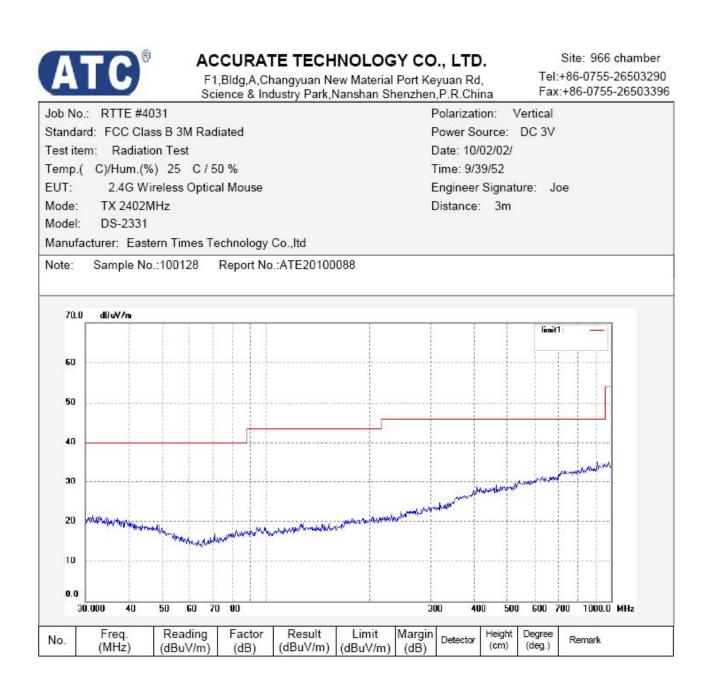
#### 7.2. Antenna Construction

The antenna is PCB Layout antenna, no consideration of replacement.



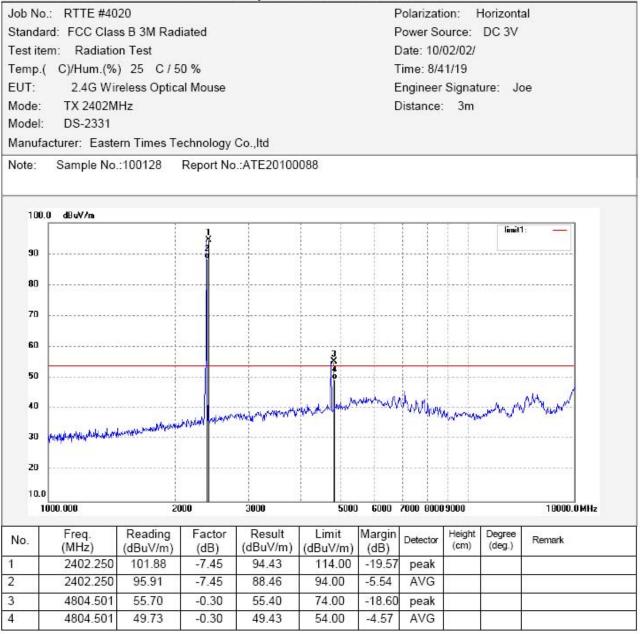
# APPENDIX I (Test Curves)





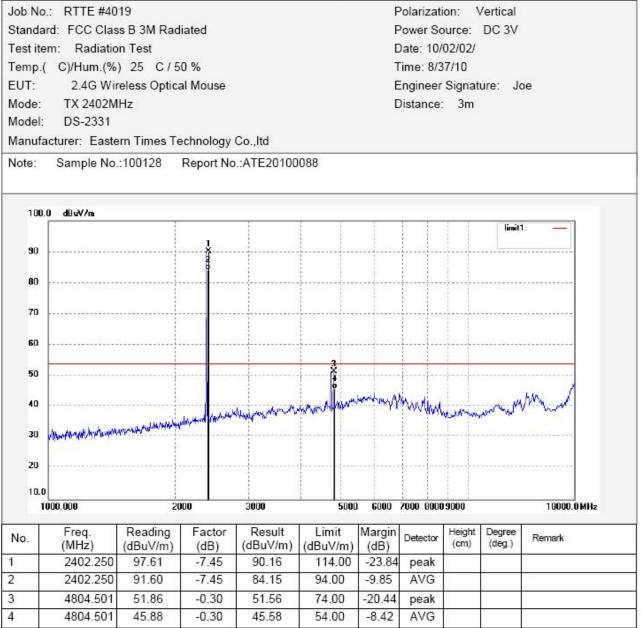


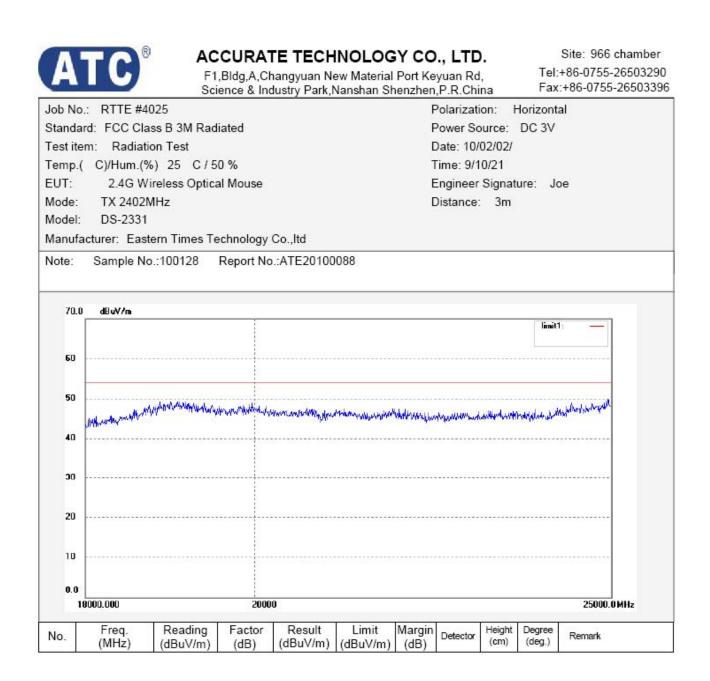
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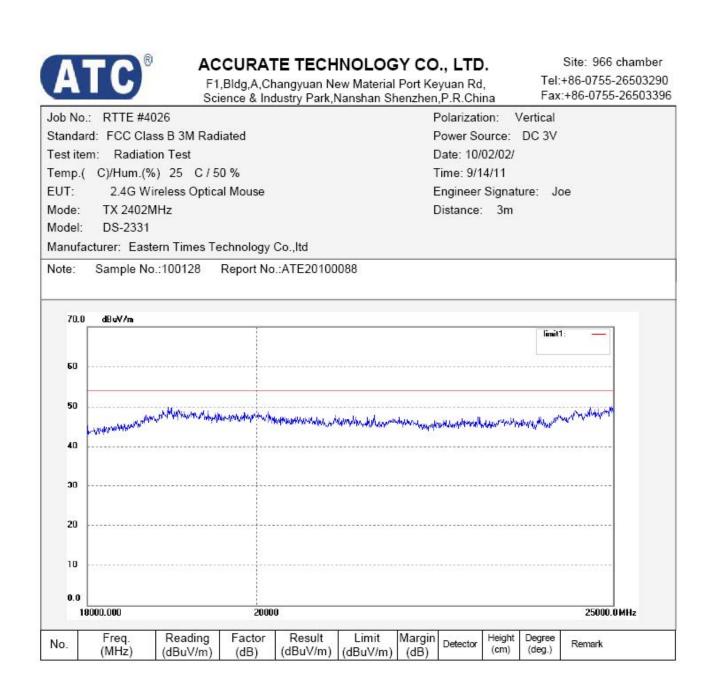




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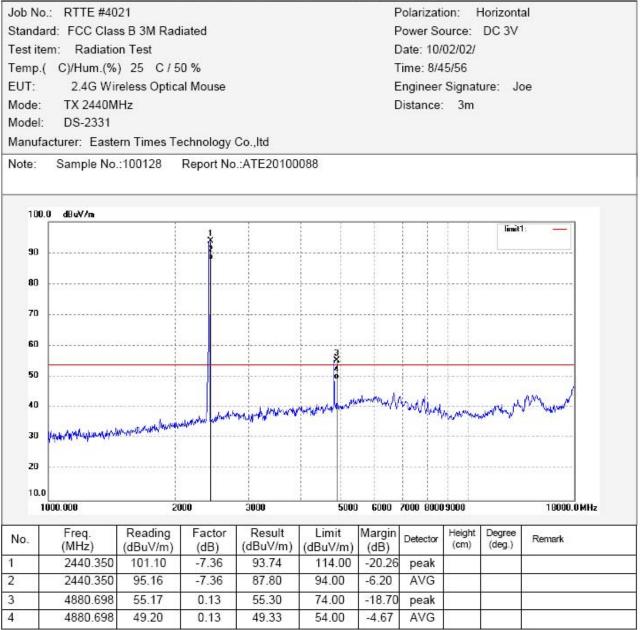






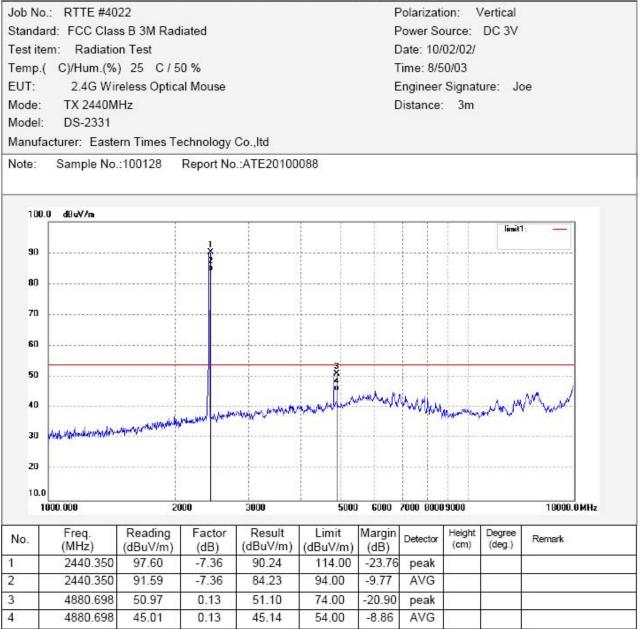


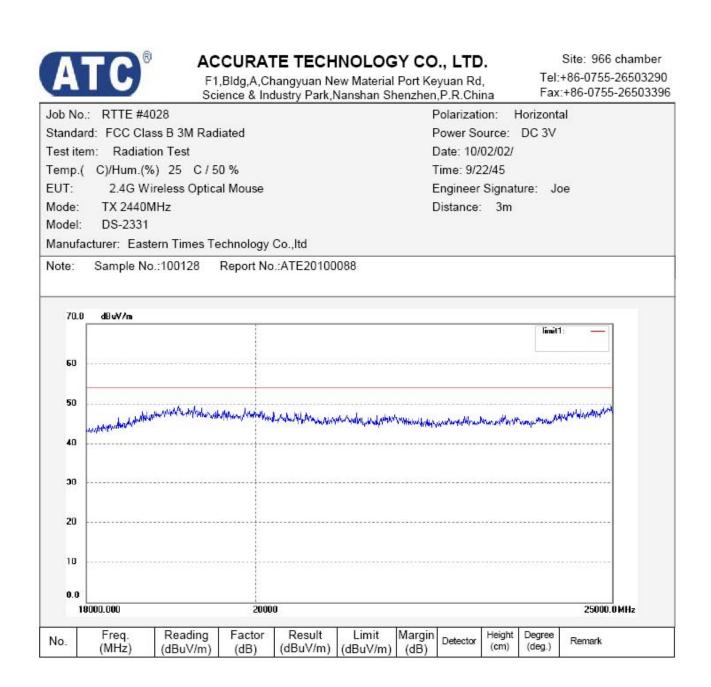
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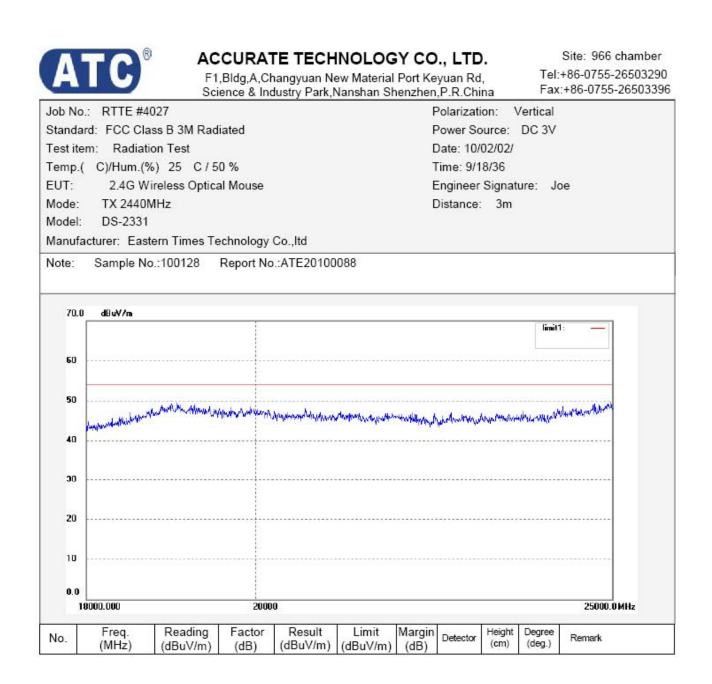


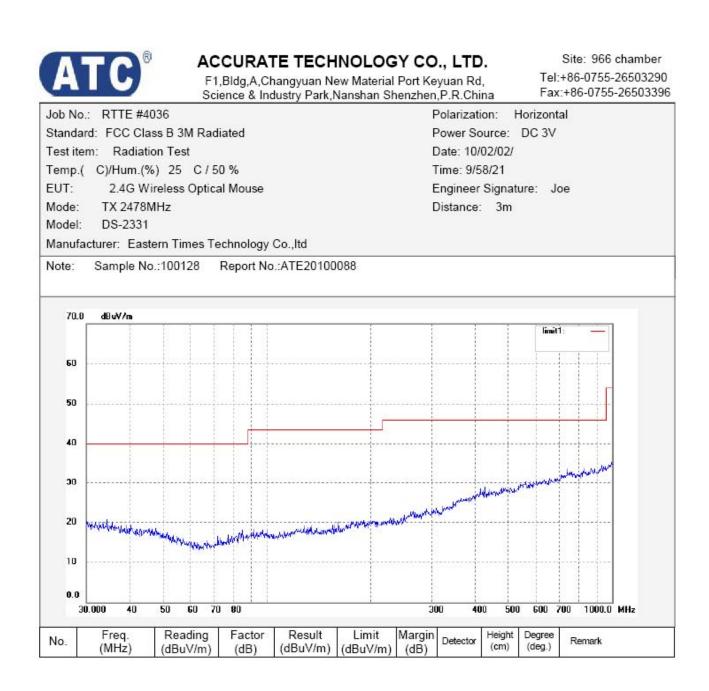


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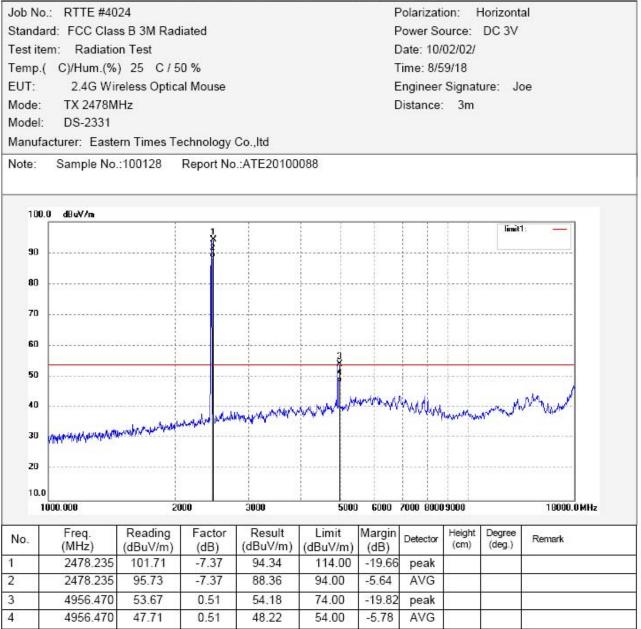






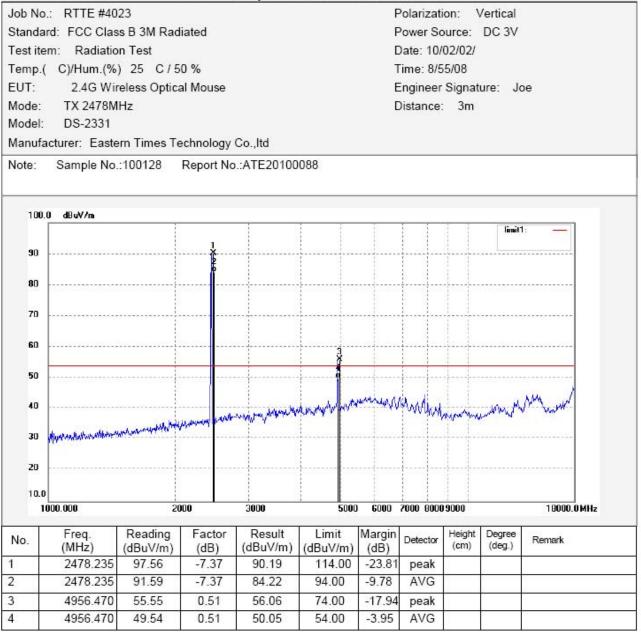


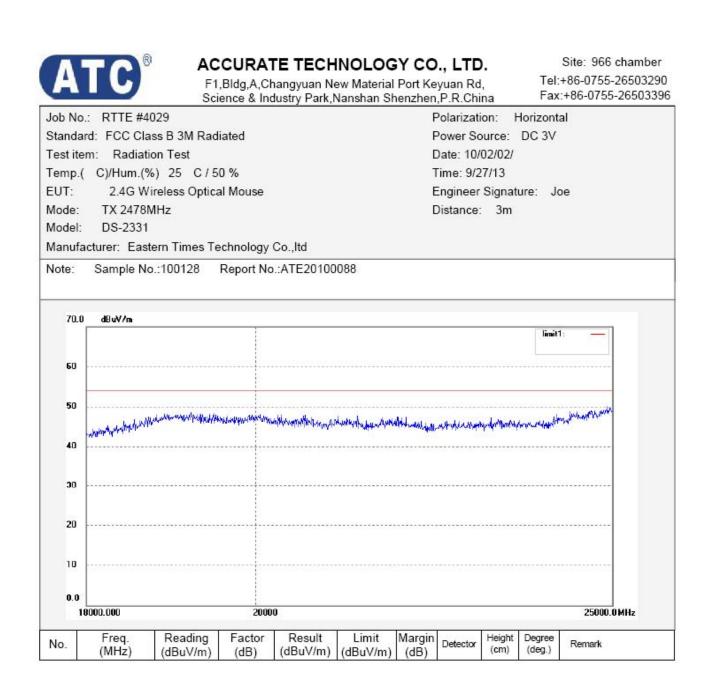
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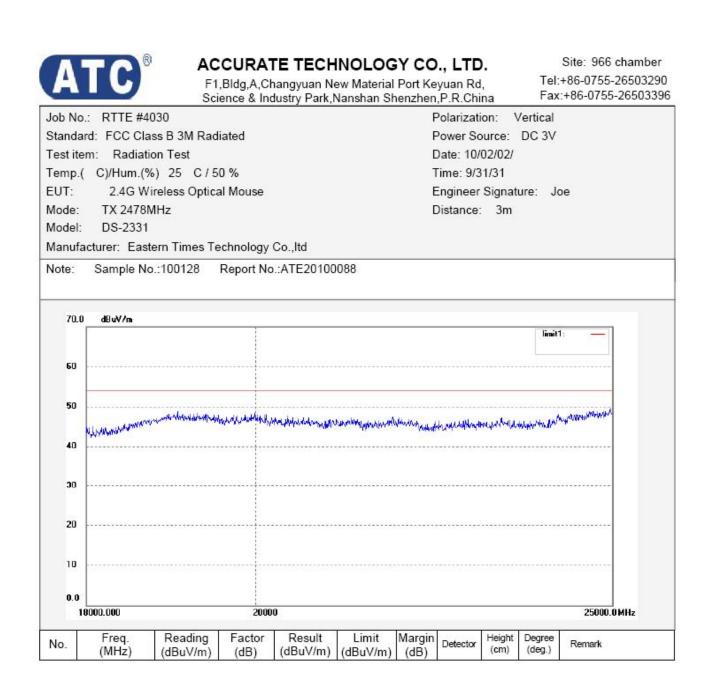




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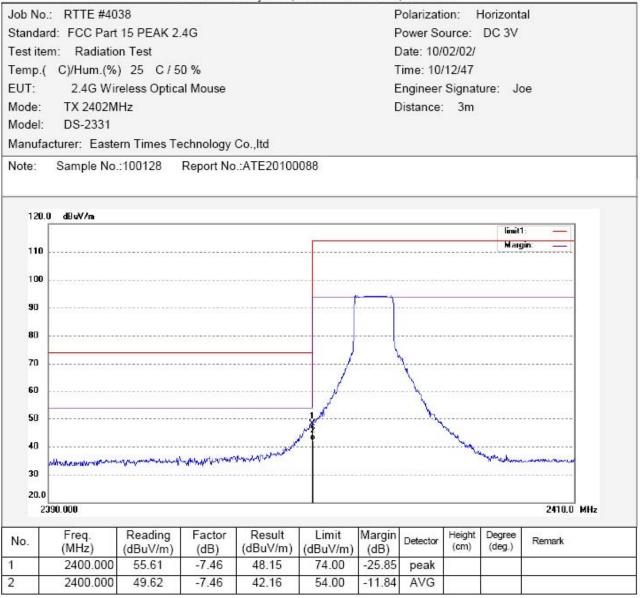








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