

FCC TEST REPORT

REPORT NO.: RF950418A06A

MODEL NO.: SM-2056

RECEIVED: Apr. 18, 2006

TESTED: May 8, 2006

ISSUED: May 11, 2006

APPLICANT: Lite-On Technology Corporation

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ISSUED BY: Advance Data Technology Corporation

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1 CERTIFICATION

PRODUCT: Wireless Mouse
BRAND NAME: LITEON
MODEL NO.: SM-2056
APPLICANT: Lite-On Technology Corporation
TEST SAMPLE: ENGINEERING SAMPLE
TESTED: May 8, 2006
STANDARDS: FCC Part 15, Subpart C (Section 15.227),
ANSI C63.4 -2003

The above equipment has been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Jessica Cheng , **DATE:** May 11, 2006
(Jessica Cheng)

TECHNICAL
ACCEPTANCE : Ken Liu , **DATE:** May 11, 2006
Responsible for RF (Ken Liu)

APPROVED BY : Gary Chang , **DATE:** May 11, 2006
(Gary Chang / Supervisor)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
STANDARD PARAGRAPH	TEST TYPE	RESULT	REMARK
15.207	Conducted Emission Test	N/A	Power supply is 3Vdc from battery
15.227 15.209	Radiated Emission Test	PASS	Minimum passing margin is -7.72dB at 433.09MHz

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Frequency	Uncertainty
Radiated emissions	30MHz ~ 200MHz	3.59 dB
	200MHz ~1000MHz	3.61 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless Mouse
MODEL NO.	SM-2056
FCC ID	H4IMS27RF002
POWER SUPPLY	3Vdc from battery
MODULATION TYPE	FSK
CARRIER FREQUENCY OF EACH CHANNEL	26.995, 27.020, 27.045, 27.070, 27.095, 27.120, 27.145, 27.170, 27.195, 27.225, 27.255MHz
NUMBER OF CHANNEL	11
ANTENNA TYPE	Loop antenna
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

1. The EUT is a Wireless Mouse, which is a transmitter.
2. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

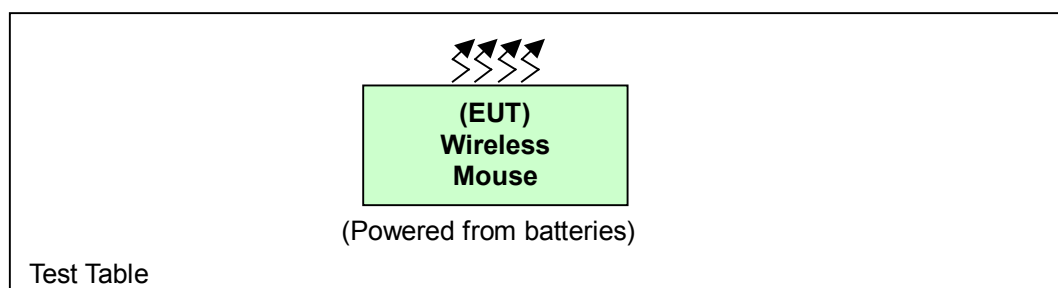
3.1 DESCRIPTION OF TEST MODES

Eleven channels were provided to this EUT.

Channel	Frequency (MHz)
1	26.995 MHz
2	27.020 MHz
3	27.045 MHz
4	27.070 MHz
5	27.095 MHz
6	27.120 MHz
7	27.145 MHz
8	27.170 MHz
9	27.195 MHz
10	27.225 MHz
11	27.255 MHz

Note: The channel 6 (27.120MHz) was chosen for final test.

3.2 CONFIGURATION OF SYSTEM UNDER TEST



3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT configure mode	Applicable to		Description
	PLC	RE<1G	
-	Note	√	N/A

Where PLC: Power Line Conducted Emission RE<1G RE: Radiated Emission below 1GHz

Note: No need to concern of Conducted Emission due to the EUT is powered by battery.

RADIATED EMISSION TEST (BELOW 1 GHZ):

☒ Following channel(s) was (were) selected for the final test as listed below.

OPERATING STATE	Available Channel	Tested Channel	Modulation Type
Operating	1 to 11	6	FSK

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C. (15.227)
ANSI C63.4 -2003

All test items have been performed and recorded as per the above standards.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit

4 TEST PROCEDURE AND RESULT

4.1 CONDUCTED EMISSION MEASUREMENT

NA

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

According to 15.227 the field strength of Emissions from intentional radiators operated under these frequencies bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m)	
	Peak	Average
26.96-27.28	100	80

Field strength limits are at the distance of 3 meters, Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (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
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.2.2 TEST INSTRUMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESMI	839013/007 839379/002	Jan. 24, 2007
Spectrum Analyzer ROHDE & SCHWARZ	FSEK30	100049	Aug. 14, 2006
BILOG Antenna SCHWARZBECK	VULB9163	121	Jun. 01, 2006
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-407	Jan. 22, 2007
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 19, 2007
Loop Antenna	HFH2-Z2	100070	Nov. 28, 2007
Preamplifier Agilent	8449B	3008A01911	Sep. 22, 2006
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	218188/218189	Dec. 13, 2006
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Mar. 08, 2007
Software ADT.	ADT_Radiated_ V7.6.01	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA
Antenna Tower Controller EMCO	2090	NA	NA
Turn Table EMCO	2087-2.03	NA	NA
Turn Table Controller EMCO	2090	NA	NA

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Chamber 4.
 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The IC Site Registration No. is IC4924-4.

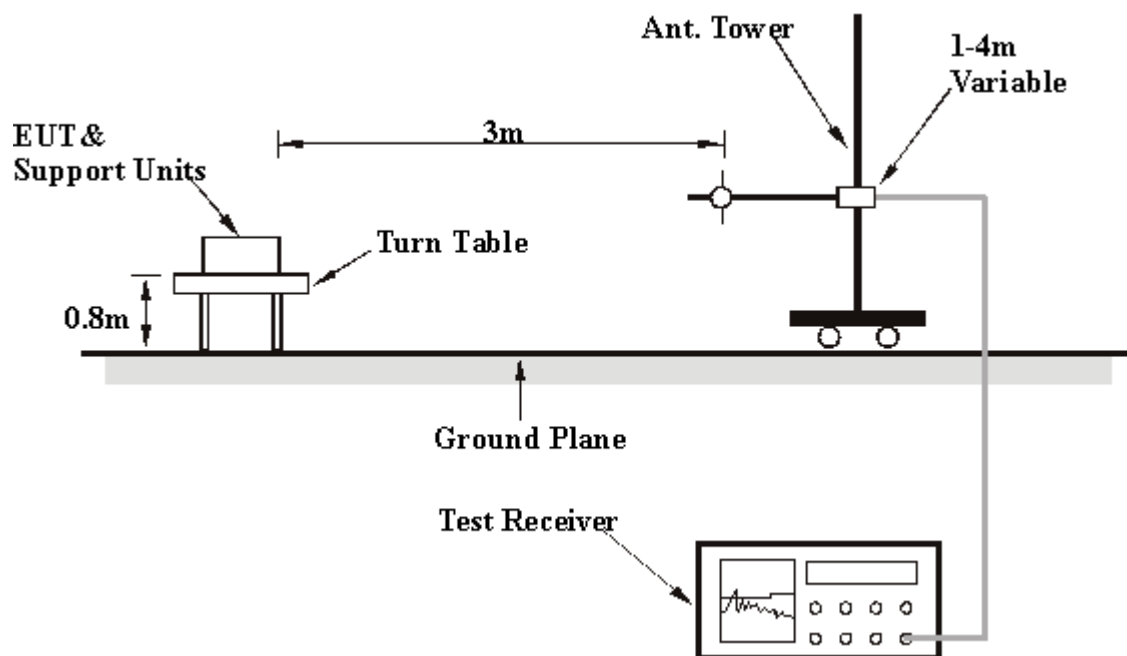
4.2.3 TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak method or average method as specified and then reported in data sheet.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection (PK) at frequency above 1GHz.

4.2.4 TEST SETUP



For the actual test configuration, please refer to the related item in this test report - Photographs of the Test Configuration.

4.2.5 EUT OPERATING CONDITION

Set the EUT under transmission condition continuously at specific channel frequency.

4.2.6 TEST RESULT

MODULATION TYPE	FSK	CHANNEL	6
INPUT POWER	3Vdc	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	24deg. C, 74% RH, 1002hPa	DETECTOR FUNCTION	Peak / Average
TESTED BY	Jamison Chan	OPERATING STATE	Operating

TEST DISTANCE: 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*27.12	48.82PK	100.00	-51.18	1.69	20	41.53	7.29
2	*27.12	46.76AV	80.00	-33.24	1.69	20	39.47	7.29

REMARKS:

- 1 Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
- 2 Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
- 3 The other emission levels were very low against the limit.
- 4 Margin value = Emission level – Limit value.
- 5 "*"= Fundamental frequency.
- 6 Loop antenna was used for all radiated emission below 30MHz.

MODULATION TYPE	FSK	CHANNEL	6
INPUT POWER	3Vdc	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	24deg. C, 74% RH, 1002hPa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Jamison Chan	OPERATING STATE	Operating

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	384.59	32.85 QP	46.00	-13.15	2.22 H	256	16.45	16.40
2	433.09	35.62 QP	46.00	-10.38	1.87 H	292	18.70	16.92
3	505.30	37.74 QP	46.00	-8.26	1.51 H	274	19.27	18.47
4	729.48	34.22 QP	46.00	-11.78	2.03 H	280	11.69	22.53
5	838.33	38.13 QP	46.00	-7.87	1.78 H	244	13.82	24.31
6	919.17	36.77 QP	46.00	-9.23	1.59 H	76	11.77	25.00

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	384.59	34.98 QP	46.00	-11.02	1.00 V	154	18.58	16.40
2	433.09	38.28 QP	46.00	-7.72	1.19 V	130	21.37	16.92
3	505.30	32.51 QP	46.00	-13.49	1.37 V	28	14.04	18.47
4	756.42	30.36 QP	46.00	-15.64	1.31 V	166	7.08	23.28
5	837.26	32.20 QP	46.00	-13.80	1.24 V	346	7.92	24.28
6	919.17	30.09 QP	46.00	-15.91	1.03 V	154	5.09	25.00

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
 2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level – Limit value.

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

RADIATED EMISSION TEST



6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025

USA	FCC, UL , A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	CNLA, BSMI, DGT
Netherlands	Telefication
Singapore	PSB , GOST-ASIA(MOU)
Russia	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml.

If you have any comments, please feel free to contact us at the following:

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Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.

APPENDIX-A

MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.