

FCC TEST REPORT

REPORT NO.: RF960703L13

MODEL NO.: MA5 (Refer to item 3.1 for the more details)

RECEIVED: Jul. 04, 2007

TESTED: Jul. 06, 2007

ISSUED: Jul. 12, 2007

APPLICANT: Acrox Technologies Co., Ltd

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ISSUED BY: Advance Data Technology Corporation

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R.O.C.

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1 CERTIFICATION

PRODUCT: RF TiltWheel Optical Mouse

MODEL: MA5 (Refer to item 3.1 for the more details)

BRAND: ACROX (Refer to item 3.1 for the more details)

APPLICANT: Acrox Technologies Co., Ltd

TESTED: Jul. 06, 2007

TEST SAMPLE: ENGINEERING SAMPLE

STANDARDS: **FCC Part 15, Subpart C (Section 15.227),**
ANSI C63.4-2003

The above equipment (model: MA5) 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 : Peggy Chen , **DATE:** Jul. 12, 2007
Peggy Chen / Specialist

TECHNICAL ACCEPTANCE : Long Chen , **DATE:** Jul. 12, 2007
Responsible for RF Long Chen / Senior Engineer

APPROVED BY : Gary Chang , **DATE:** Jul. 12, 2007
Gary Chang / Assistant Manager

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	AC Power Conducted Emission	NA	Power supply is 2.4Vdc from batteries
15.227 15.209	Radiated Emission Test	PASS	Meet the requirement of limit. Minimum passing margin is -10.96dB at 955.38MHz.

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Uncertainty
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.34 dB
	200MHz ~1000MHz	3.35 dB

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

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	RF TiltWheel Optical Mouse
MODEL NO.	MA5 (Refer to Note for the more details)
FCC ID	PRDTWRFSMMICE
POWER SUPPLY	2.4Vdc from battery (For transmitter) 5.0Vdc from host equipment (For receiver)
MODULATION TYPE	FSK
CARRIER FREQUENCY OF EACH CHANNEL	27.045MHz (For transmitter) 26.590MHz (For receiver)
NUMBER OF CHANNEL	1
ANTENNA TYPE	Loop antenna
DATA CABLE	NA
I/O PORTS	USB for receiver
ACCESSORY DEVICE	NA

NOTE:

1. The following models are provided to this EUT.

BRAND	Model Name	Remark
ACROX	MA5	Transmitter
ACROX	MRQ	Receiver
TARGUS	AMW25	For marketing difference only - Transmitter & Receiver

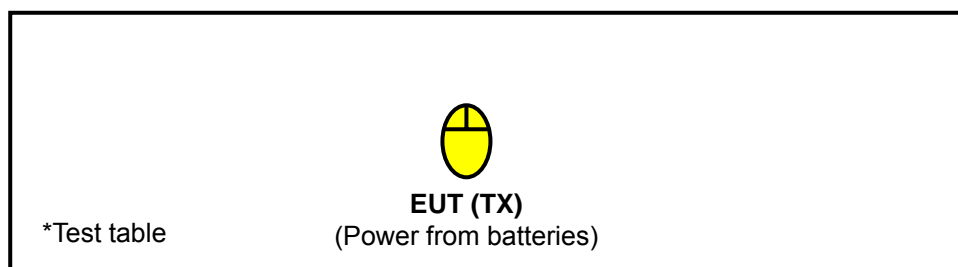
2. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.1 DESCRIPTION OF TEST MODES

The EUT only has one channel.

TRANSMITTER	
CHANNEL	FREQUENCY (MHz)
1	27.045

3.1.1 CONFIGURATION OF SYSTEM UNDER TEST



3.1.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT configure mode	Applicable to		Description
	PLC	RE<1G	
-	NOTE	√	-

Where **PLC**: Power Line Conducted Emission **RE<1G**: 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):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types.
- Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	FSK

3.2 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.

3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.

4 TEST PROCEDURE AND RESULT

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 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.

4.1.2 TEST INSTRUMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Aug. 04, 2007
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100025	Oct. 05, 2007
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	May 31, 2008
HORN Antenna SCHWARZBECK	9120D	9120D-209	Jun. 28, 2008
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170243	Dec. 28, 2007
Preamplifier Agilent	8447D	2944A10633	Oct. 26, 2007
Preamplifier Agilent	8449B	3008A01964	Oct. 26, 2007
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	238137/4	Dec. 11, 2007
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	233233/4	Nov. 14, 2007
Loop Antenna	HFH2-Z2	100070	Nov. 28, 2007
Software ADT.	ADT_Radiated_V7.6	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA
Turn Table ADT.	TT100.	TT93021703	NA
Turn Table Controller ADT.	SC100.	SC93021703	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 3.
 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The VCCI Site Registration No. is R-237.
 5. The IC Site Registration No. is IC3789B-3.

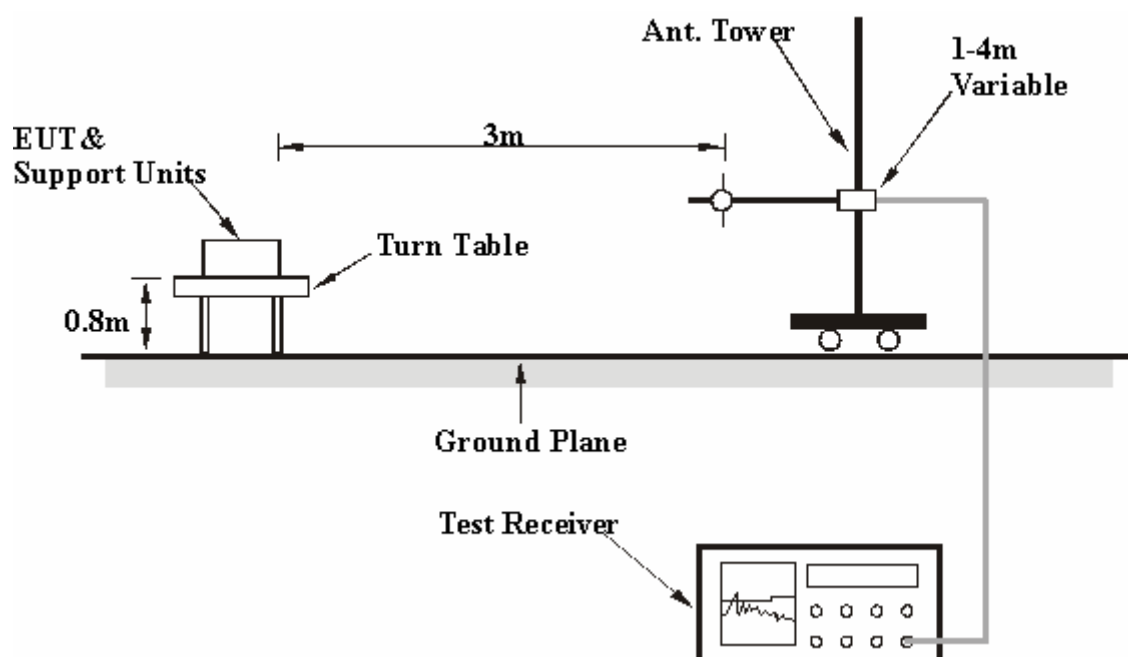
4.1.3 TEST PROCEDURE

- 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 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

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

4.1.4 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.5 EUT OPERATING CONDITION

- a. Placed the EUT on the testing table.
- b. Set the EUT under transmitting condition.

4.1.6 TEST RESULTS

RADIATED WORST-CASE DATA

INPUT POWER (SYSTEM)	120Vac, 60 Hz	FREQUENCY RANGE	Below 1000 MHz
ENVIRONMENTAL CONDITIONS	25 deg. C, 68% RH, 991 hPa	DETECTOR FUNCTION	Peak / Average
TESTED BY	Dean Wang		

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	*27.05	53.89 PK	100.00	-46.11	1.00	259	40.56	13.33
2	*27.05	53.48 AV	80.00	-26.52	1.00	259	40.15	13.33

- 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 frequency below 30MHz.

INPUT POWER (SYSTEM)	120Vac, 60 Hz	FREQUENCY RANGE	Below 1000 MHz
ENVIRONMENTAL CONDITIONS	26 deg. C, 71% RH, 991 hPa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	Lori Chiu		

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	59.06	12.46 QP	40.00	-27.54	2.00 H	121	-0.84	13.30
2	92.12	9.38 QP	43.50	-34.12	2.50 H	4	0.33	9.05
3	105.73	10.49 QP	43.50	-33.01	2.00 H	238	0.65	9.84
4	150.45	13.05 QP	43.50	-30.45	1.00 H	10	-0.61	13.66
5	189.33	12.49 QP	43.50	-31.01	2.00 H	10	1.26	11.23
6	216.55	20.95 QP	46.00	-25.05	1.00 H	277	9.89	11.06
7	243.77	27.93 QP	46.00	-18.07	1.00 H	265	15.65	12.27
8	269.05	16.64 QP	46.00	-29.36	1.00 H	94	3.78	12.85
9	296.27	17.99 QP	46.00	-28.01	1.00 H	82	4.70	13.29
10	323.49	19.98 QP	46.00	-26.02	1.00 H	271	6.06	13.92
11	350.71	17.47 QP	46.00	-28.53	1.00 H	82	2.89	14.58
12	377.93	15.63 QP	46.00	-30.37	1.00 H	274	0.42	15.20
13	543.19	25.43 QP	46.00	-20.57	1.00 H	79	5.66	19.77
14	951.49	30.62 QP	46.00	-15.38	2.00 H	10	4.89	25.73

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	53.23	15.92 QP	40.00	-24.08	1.00 V	88	2.37	13.55
2	80.45	10.20 QP	40.00	-29.80	1.00 V	280	2.25	7.95
3	109.62	17.74 QP	43.50	-25.76	1.50 V	97	7.43	10.31
4	121.28	13.98 QP	43.50	-29.52	2.00 V	238	2.36	11.61
5	162.11	13.88 QP	43.50	-29.62	1.00 V	10	0.57	13.31
6	187.39	14.47 QP	43.50	-29.03	1.00 V	67	3.07	11.40
7	216.55	21.26 QP	46.00	-24.74	1.50 V	340	10.20	11.06
8	243.77	26.15 QP	46.00	-19.85	2.50 V	19	13.88	12.27
9	269.05	16.94 QP	46.00	-29.06	2.50 V	16	4.08	12.85
10	296.27	18.56 QP	46.00	-27.44	1.50 V	322	5.27	13.29
11	955.38	35.04 QP	46.00	-10.96	1.00 V	43	9.29	25.75

- 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

Please refer to the attached file (Test Setup Photo).

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.	TAF, BSMI, NCC
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.

7 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.