



FCC TEST REPORT

REPORT NO.: RF90032602

MODEL NO.: RO07K

RECEIVED: March 16, 2001

TESTED: March 19, 2001

APPLICANT: PRIMAX ELECTRONICS LTD.

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Accredited Laboratory

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1 CERTIFICATION

PRODUCT : Wireless Mouse
BRAND NAME : MICRO Innovations
MODEL NO : RO07K
APPLICANT : PRIMAX ELECTRONICS LTD.
STANDARDS : 47 CFR Part 15, Subpart C (Section 15.227) ,
ANSI C63.4-1992
SITE REGISTRATION 90422 (FCC)
NO : IC 3789-5 (Canada IC)

We, **Advance Data Technology Corporation**, hereby certify that one sample (RO07K) of the designation has been tested in our facility on March 19, 2001.

The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions herein specified.

Tested by : Steven Lu , Date: Mar. 22, 2001
Steven Lu

Prepared by : Demi Chen , Date: Mar. 22, 2001
Demi Chen

Approved by : Alan Lane , Date: Mar. 22, 2001
Dr. Alan Lane, Manager

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
STANDARD PARAGRAPH	TEST REQUIREMENTS	RESULT	REMARK
15.107	AC Power Conducted Emissions Spec.: 48 dBuV	N/A	N/A
15.227	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Minimum passing margin is -6.5dBuV At 33.5 MHz

NOTE:

The receiver portion of the EUT has been tested in ADT. The test result has been verified to comply with FCC Part 15, Subpart B, Class B – Computing Devices (FCC DoC). The engineering test report can be provided upon FCC requests.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Wireless Mouse
MODEL NO.	RO07K
POWER SUPPLY	3VDC (1.5V x 2 batteries)
DATA CABLE	NA
I/O PORTS	NA
MODULATION TYPE	FSK
FREQUENCY RANGE	27MHz
CARRIER FREQUENCY OF EACH CHANNEL	27.195MHz, 27.255MHz
BANDWIDTH OF EACH CHANNEL	40kHz
NUMBER OF CHANNEL	2
ANTENNA TYPE	Loop Antenna
ASSOCIATED DEVICES	NA
DESCRIPTION OF MODELS	

3.2 DESCRIPTION OF TEST MODES

Two channels are provided in this EUT.

Channel	Frequency	Channel	Frequency
1	27.195 MHz	7	
2	27.255 MHz	8	
3		9	
4		10	
5		11	
6			



3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Wireless Mouse, according to the specifications of the manufacturers, it must comply with the requirements of the following standards:

FCC CFR 47 Part 15, Subpart C. (15.227)

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

3.4 DESCRIPTION OF SUPPORT UNITS

NA

4 TEST PROCEDURES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

- NOTES: (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESHS30	828109/007	July 6, 2001
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	839135/006	July 9, 2001
ROHDE & SCHWARZ 4-wire ISN	ENY41	837032/016	Nov. 28, 2001
ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/016	Dec. 3, 2001
EMCO-L.I.S.N. (for peripheral)	3825/2	9204-1964	July 9, 2001
Software	Cond-V2e	NA	NA
RF cable (JYEBAO)	RG-58A/U	Cable-C02.01	July 9, 2001
HP Terminator (For EMCO LISN)	11593A	E1-01-298	Feb. 20, 2002
HP Terminator (For EMCO LISN)	11593A	E1-01-299	Feb. 20, 2002
Shielded Room	Site 2	ADT-C02	NA
VCCI Site Registration No.	Site 2	C-240	NA

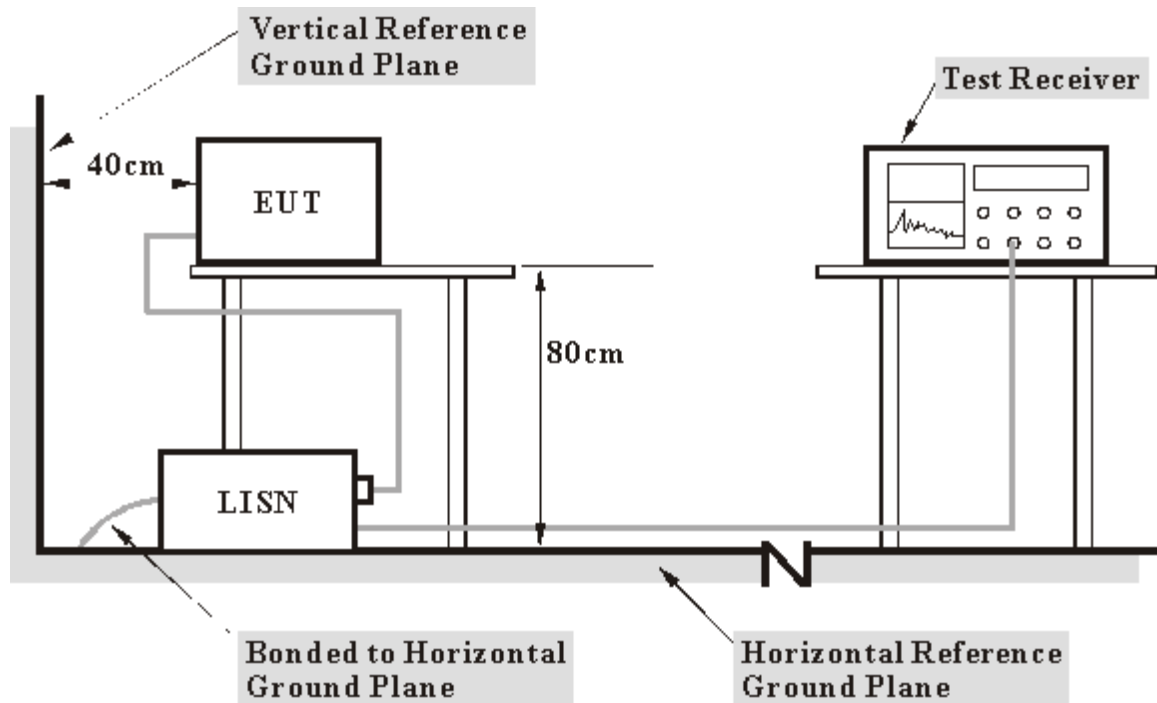
- NOTE: 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months.
And the calibrations are traceable to NML/ROC and NIST/USA.



4.1.3 TEST PROCEDURES

- a. Place the EUT at 0.4 meter away from the conduction wall of the shielded room.
- b. Connect the EUT to the power mains through a Line Impedance Stabilization Network (LISN).
- c. Connect the other support units to the other LISN too.
- d. Make sure the 50Ω / $50\mu\text{H}$ coupling impedance is provided to the measurement instrument by the LISNs.
- e. Measure the maximum conducted interference on both lines of the power mains connects to the EUT, within frequency range 450KHz ~ 30MHz.
- f. The emission level under limit by 10dB is not needed to be reported.

4.1.4 TEST SETUP



- Note:** 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

For the actual test configuration, please refer to the related Item in this test report (**Photographs of the Test Configuration**).

4.1.5 TEST RESULTS

This EUT is excused from investigation of conducted emission, for it is powered by battery only. According to paragraph 15.207(a), measurements to demonstrate compliance with the conducted limited are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

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 (dB μ V/meter)	
	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:

Other Frequencies (MHz)	Field Strength of Fundamental	
	μ V/meter	dB μ V/meter
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HP Spectrum Analyzer	8590L	3544A01176	April 18, 2001
HP Preamplifier	8447D	2944A08485	April 26, 2001
* HP Preamplifier	8449B	3008A01201	Dec. 13, 2001
* ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Jan. 25, 2002
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 23, 2001
* CHASE BILOG Antenna	CBL6112A	2221	Aug. 4, 2001
* EMCO Turn Table	1060	1115	NA
* SHOSHIN Tower	AP-4701	A6Y005	NA
* Software	AS61D	NA	NA
* ANRITSU RF Switches	MP59B	M35046	Aug. 4, 2001
* TIMES RF cable	LMR-600	CABLE-ST5-01	Aug. 4, 2001
Open Field Test Site	Site 5	ADT-R05	July 28, 2001
VCCI Site Registration No.	Site 5	R-1039	NA

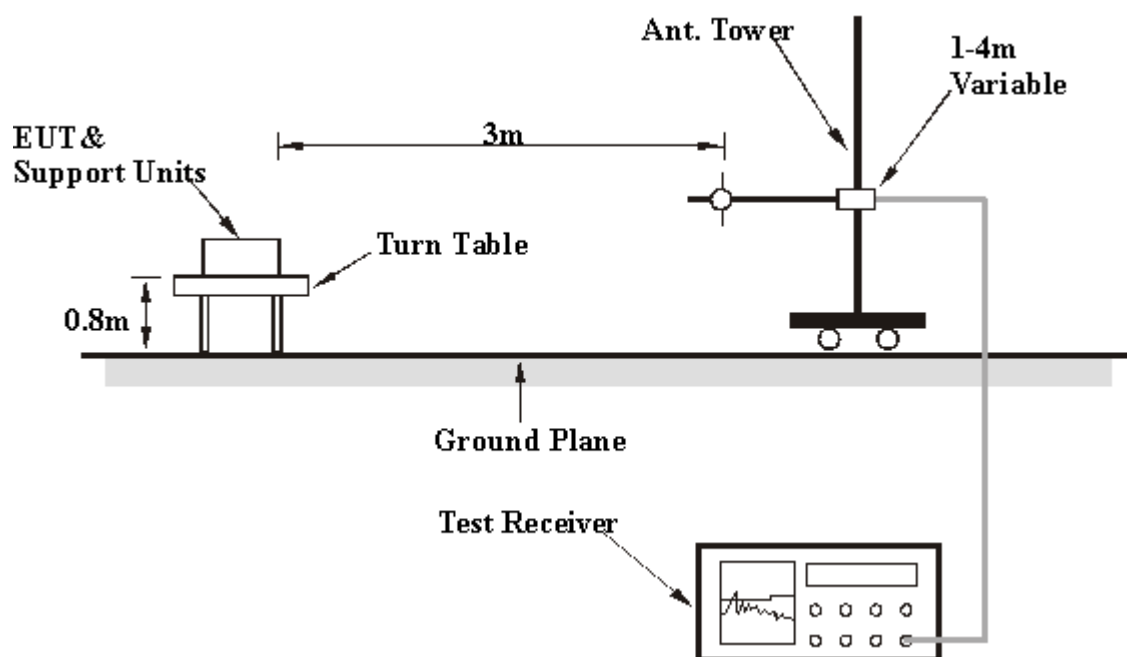
- NOTE:**1. The measurement uncertainty is less than +/- 3.0dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.
3. “*” = These equipments are used for the final measurement.

4.2.3 TEST PROCEDURES

- a. The EUT was placed on the turn table 0.8 meter above ground in 3 meter open area test site.
- b. Set the resolution bandwidth to 120KHz in the test receiver and select Peak function to scan the frequency below 1 GHz.
- c. Shift the interference-receiving antenna located in antenna tower upwards and downwards between 1 and 4 meters above ground and find out the local peak emission on frequency domain.
- d. Locate the interference-receiving antenna at the position where the local peak reach the maximum emission.
- e. Rotate the turn table and stop at the angle where the measurement device has maximum reading
- f. Shift the interference-receiving antenna again to detect the maximum emission of the local peak
- g. If the reading of the local peak under Peak function is lower than limit by 6dB, then Quasi Peak detection is not needed and this reading should be recorded. And if it is higher than Peak limit, then the test is fail. Others, switch the receiver to Quasi Peak function, set the resolution bandwidth to 100kHz and repeat the procedures C ~ F. If the reading is lower than limit, this reading should be recorded, otherwise, the test is fail.
- h. Set the resolution and video bandwidth of the spectrum analyzer to 1MHz and repeat procedures C ~ F for frequency band from 1 GHz to 10 times carrier frequency.
- i. If the reading for the local peak is lower than the Average limit, no further testing is needed in this local peak and this reading should be recorded. If it is higher than Average limit but lower than Peak limit, then set the resolution bandwidth to 1MHz and video bandwidth to 300Hz. Repeat procedures C ~ F. If the maximum reading is lower than Average limit, then this reading should be recorded. If it is higher, then the test is fail.

- Note:1. The frequency range of verification is either from 30 MHz to 1GHz or from 30 MHz up to 10 times carrier frequency of EUT (whichever is the highest frequency range).
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for frequency below 1GHz.
 3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 300 Hz for 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 TEST RESULTS

EUT	Wireless Mouse	Model	RO07K
Mode	Channel 1	Detector Function	PK,AV
Frequency Range	30-1000 MHz	Test Distance	3M
Environmental Conditions	24°C, 70%RH	Tested By	Steven Lu

ANTENNA POLARITY: Vertical		Detector Function :				6dB Bandwidth : 120 kHz.				Frequency Range:30 – 1000 MHz	
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Antenna Height (cm)	Table Angle (Degree)
		P.K.	A.V.	P.K.	A.V.	P.K.	A.V.	P.K.	A.V.		
*27.25	7.89	65.21	61.71	73.10	69.60	100	80	-26.9	-10.4	120	216

ANTENNA POLARITY: Horizontal		Detector Function :				6dB Bandwidth : 120 kHz.				Frequency Range:30 – 1000 MHz	
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)		Antenna Height (cm)	Table Angle (Degree)
		P.K.	A.V.	P.K.	A.V.	P.K.	A.V.	P.K.	A.V.		
*27.25	7.89	61.71	56.01	69.6	63.9	100	80	-30.4	-36.1	139	-2

- NOTES:**
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (dBuV).
 2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. The limit value is defined as per 15.227
 6. “ * “ : Fundamental frequency

EUT	Wireless Mouse	Model	RO07K
Mode	Channel 1	Detector Function	Quasi-Peak
Frequency Range	30-1000 MHz	Test Distance	3M
Environmental Conditions	24°C, 70%RH	Tested By	Steven Lu

ANTENNA POLARITY: HORIZONTAL							
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
54.60	18.89	14.61	33.5	40.0	-6.5	125	36
82.35	17.95	8.45	26.4	40.0	-13.6	105	150
108.78	13.88	13.42	27.3	43.5	-16.2	103	244
135.74	13.61	14.39	28.0	43.5	-15.5	128	175
189.50	15.76	9.14	24.9	43.5	-18.6	110	279

ANTENNA POLARITY: VERTICAL							
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
54.36	18.89	14.31	33.2	40.0	-6.8	100	148
82.39	17.95	7.35	25.3	40.0	-14.7	100	142
108.79	13.88	11.92	25.8	43.5	-17.7	129	205
135.76	13.61	11.39	25.0	43.5	-18.5	111	242
189.45	15.76	10.64	26.4	46.0	-17.1	125	95

NOTES:(1) Emission level (dBuV/m) = Correction Factor (dB) + Reading value (dBuV).
(2) Correction Factor (dB) = Ant. Factor (dB)+Cable loss (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 and Safety consultation. Our laboratories are accredited by the following approval agencies according to ISO/IEC Guide 25 or EN 45001:

USA	FCC, NVLAP
Germany	TUV Rheinland
Japan	VCCI
New Zealand	RFS
Norway	NEMKO, DNV
U.K.	INCHCAPE
R.O.C.	BSMI

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.

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