

Test Report

1/16

Report No.	C3115735
FCC ID	IOWRMO220UP
Specifications	FCC Part 15, Class B
Test Method	ANSI C63.4 1992
Applicant	Chic Technology Corp.
Applicant address	16F, No. 150, Chien-I Road, 235 Chung Ho City, Taipei Hsien, Taiwan, R.O.C.
Product name	Navigator Wireless Optical Mouse
Items tested	Wireless Optical Mouse
Model No.	RMO 220 (Sample # C31734)
Frequency Range	26.96MHz to 27.28MHz
Results	Compliance (As detailed within this report)
Date	07/01/2003 (month / day / year)(Sample received) 07/16/2003 (month / day / year)(Tested)
Prepared by	 Project Engineer
Authorized by	 V. General Manager (Jacob Lin)
Issue date	July 28, 2003 (month / day / year)
Modifications	None
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Conditions of issue :

- *This test report shall not be reproduced except in full, without written approval of TRC. And the test result contained within this report only relate to the sample submitted for testing.*
- *The test data in this test report are following the procedures in accordance with the terms of accreditation.*
- *This test report and measurements made by TRC are traceable to the NIST only Conducted and Radiated Method (TRC is accredited by NVLAP, code No.: 200174-0).*
- *The device has been tested is fully complied with the requirements the Directive FCC Part 15.*

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Chapter 1 Introduction

Description of EUT:

EUT : Wireless Optical Mouse
Model No. : RMO 220
Product name : Navigator Wireless Optical Mouse
Frequency Range : 26.96 – 27.28 MHz
Power Type : Transmitter: Powered by two 1.5VDC AA batteries

*This EUT has two channels (each with 256 IDs):

1. 27.0950 MHz
2. 27.0450 MHz

Test method:

Pretest was found that the emission of operating mode is worse than standby mode. So, The final test is made at the operating mode.

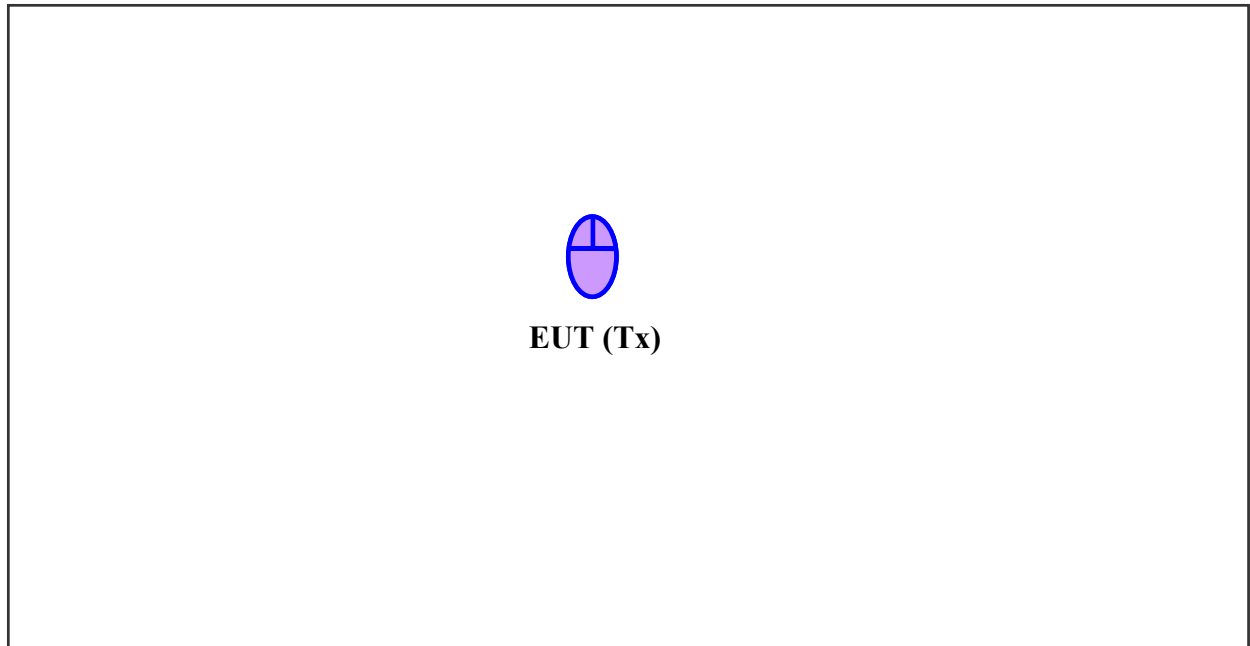
During the measurement, there were six modes tested: “Radiate used Channel 1 “, “Radiate used Channel 2 “and “Charge 110Vac/60Hz”. The radiation pretest was found out the test mode: “Radiate used Channel 1 “ was the worst case and we only recorded this data in this report.

While testing, the EUT was made to transmit continuously and adjusted at a position, which transmitted the maximum emission.

The test placement as the photographs showed is the worst case emission placed. (If the emission is close to the ambient, the resolution BW and view resolution will be reduced and the data will be recorded by detection of maximum hold peak mode.)

The testing configuration of test setup is showing in the next page.

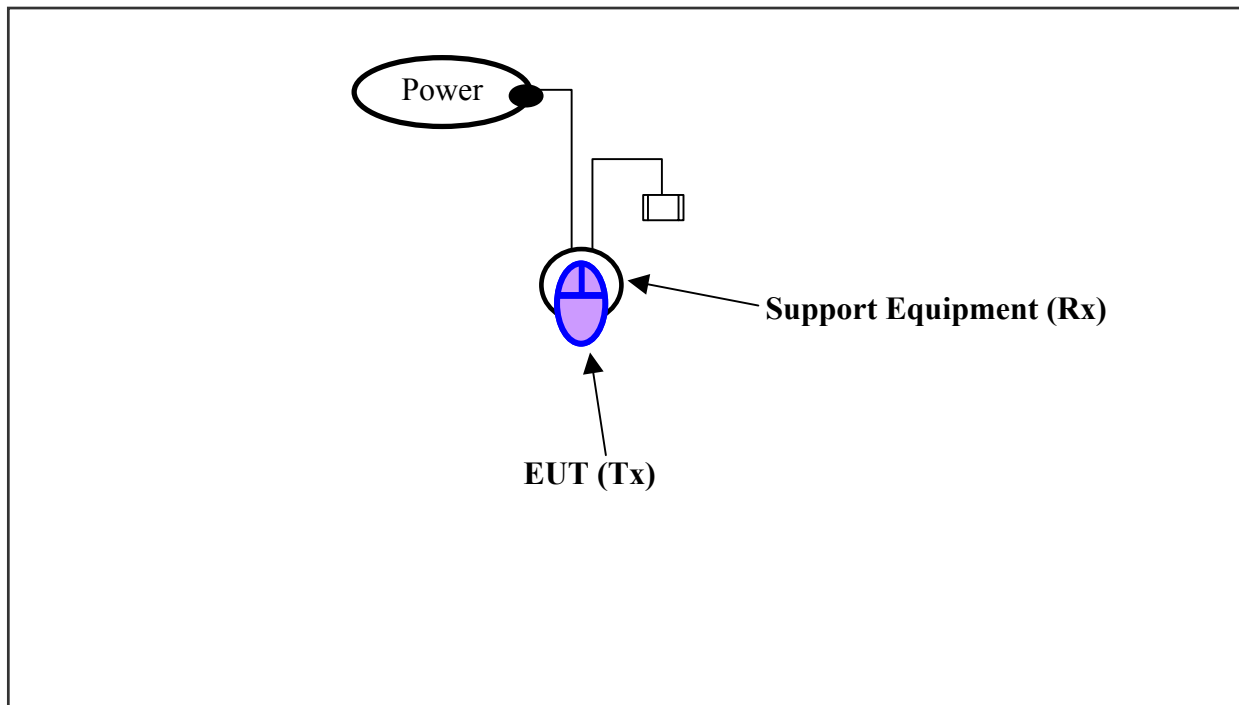
Configuration of Test Setup



EUT:

*Put two AA size, 1.5V battery into the battery cell of EUT, powers the subject device.
The EUT does not be connected with any product.

Configuration of Test Setup (Test mode: “Charge”)



Connections:

EUT(Tx):

- *Put two AA size, 1.5V battery into the battery cell of EUT, powers the subject device.
- Put the EUT(Tx) on the EUT(Rx) to charge.

Support Equipment (Rx):

- *USB Jack --- with a 142cm long shielded USB cable that terminated.
- *Power Jack --- via a 1.86m long power cable with a power adapter to the power source.

List of Support Equipment

Conducted (Radiated) test:

Receiver : **Chic Technology Corp.**
Model No. : RMO 220
Serial No. : N/A
FCC ID : Doc Approval
Power type : By PC
Data cable : Shielded, 1.43m long, with ferrite core

Chapter 2 Conducted Emission Test

Test Condition and Setup:

All the equipment is placed and setup according to the ANSI C63.4 – 1992. The EUT is assembled on a wooden table that is 80 cm high, is placed 40 cm from the back-wall that is a vertical conducting plane. One LISN is for EUT, the other LISN is for support equipment. They are all placed on the conductive ground. The EUT's LISN connect a line switch box for selecting L1 or L2, then connect to a preamplifier and Spectrum.

The spectrum measured from 150KHz to 30MHz. Conducted emission levels are detected at max. peak mode. But if the max. peak mode failed or over average limit, it will be measured by QP and average detection mode using the Receiver.

While testing, there is the worst-emission plot printed at peak detection mode, and there are more than 6 highest emissions relative to limit recorded. The plot is kept as the original data, not included in test report.

List of test Instrument :

<u>Instrument Name</u>	<u>Model No.</u>	<u>Brand</u>	<u>Serial No.</u>	<u>Calibration Date</u>	
				<u>Last time</u>	<u>Next time</u>
Receiver	SCR3102	SCHAFFNER	012	03/29/03	03/28/04
LISN (EUT)	3825/2	EMCO	9411-2284	06/10/03	06/09/04
LISN (Support E.)	3825/2	EMCO	9210-2007	06/14/03	06/13/04
Preamplifier	EQ3-006	TRC	-----	05/14/03	05/13/04
Line switch box	EQ3-007	TRC	-----	05/14/03	05/13/04

The level of confidence of 95% , the uncertainty of measurement of conducted emission is ± 2.02 dB .

Test Result: Pass (Appendix A)

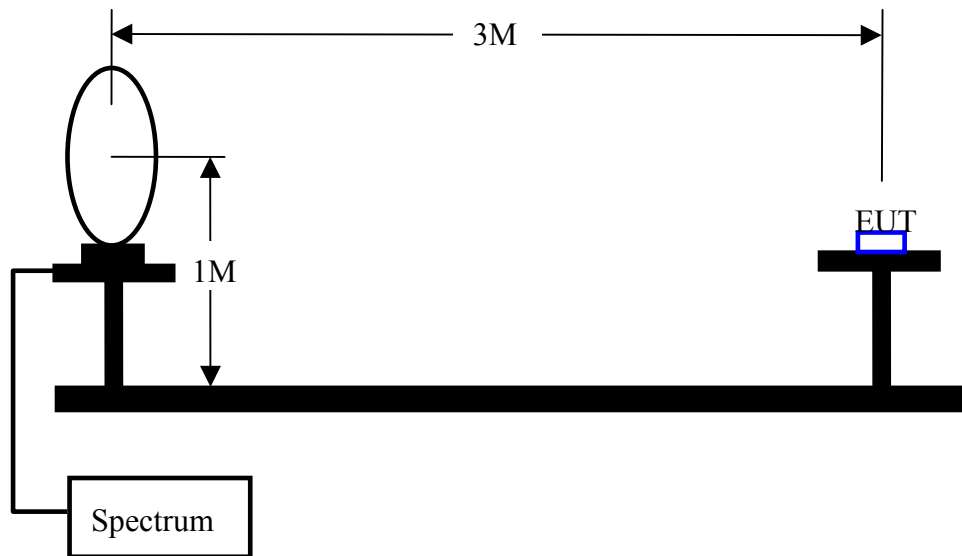
Conducted Test Placement: (Photographs) (Test mode: Charge)



Chapter 2 Peak Power Measurement (Frequency Band: 26.96 ~ 27.28)

Test Setup:

1. Test Setup:



2. Test Procedure:

- The EUT was setup in the anechoic chamber as shown above.
- The loop antenna was located upon its plane vertical, 3-meter distance from the EUT. The center of the loop is 1-meter above the ground plane.
- In order to find the maximum radiation, the EUT was rotated 360°. The measuring antenna was rotated about its axis at each azimuth about the EUT.

List of test Instrument :

Instrument Name	Model No.	Brand	Serial No.	Calibration Date	
				Last time	Next time
Receiver	SCR3102	SCHAFFNER	012	03/29/03	03/28/04
Control Box	TRC-CB-2	TRC	CB-002	N/A	N/A
Antenna	6502	EMCO	9206-2777	06/10/03	06/09/04
Open test side (Antenna, Amplify, cable calibrated together)				05/16/03	05/15/04

The level of confidence of 95% , the uncertainty of measurement of radiated emission is ± 3.44 dB .

Test Result : Appendix A

Chapter 4 Radiated Emission Test

Test Condition and Setup:

Pretest : Prior to the final test ,the EUT is placed in an anechoic chamber, and scan from 30MHz to 1GHz. The devices rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit. This is done to ensure the radiation exactly emits form the EUT.

Final test: Final radiation measurements is made on a **3 – meter** open-field test site. The EUT's maximum emission of radiation is placed on a nonconductive table, which is 0.8m height, the top surface is 1.0 x 1.5 meter. All placement is according to ANSI C63.4 - 1992.

The emissions was examined from 30 MHz to 1000 MHz measured by receiver.

The whole range Antenna is used to measure frequency from 30 MHz to 1 GHz. The final test is used the receiver.

Measure more than six top marked frequencies generated form pretest by computer step by step at each frequency. The EUT is rotated 360 degrees, and antenna is raised and lowered from 1 to 4 meters to find the maximum emission levels. The antenna is used with both horizontal and vertical polarization.

Appropriated preamplifier, which is made by TRC is used for improving sensitivity and precautions is taken to avoid overloading. The spectrum analyzer's 6dB bandwidth is set to 120 KHz, and the EUT is measured at quasi-peak mode.

If the emission is close to the frequency band of ambient, the tester will recheck the data and the corrected data will be written in the test data sheet. If the emission is just within the ambient, the data from shield room will be taken as the final data.

List of test Instrument :

Instrument Name	Model No.	Brand	Serial No.	<u>Calibration Date</u>	
				Last time	Next time
RECEIVER	SCR3102	SCHAFFNER	012	03/29/03	03/28/04
Control Box	TRC-CB-2	TRC	CB-002	N/A	N/A
Antenna	VULB 9160	SCHAFFNER	4188	11/29/02	11/29/03
Open test side (Antenna, Amplify, cable calibrated together)				05/16/03	05/15/04

The level of confidence of 95% , the uncertainty of measurement of radiated emission is ± 3.44 dB .

Test Result : Pass (Appendix A)

Radiated Test Placement: (Photographs)



Appendix A

Conducted Emission Test Result: (Test mode: Charge)

Testing room : Temperature : 24° C Humidity : 71 % RH

Line 1

Frequency (KHz)	READING AMPLITUDE			LIMIT		Margin (dB)
	Peak (dBμV)	Quasi-Peak (dBμV)	Average (dBμV)	Quasi-Peak (dBμV)	Average (dBμV)	
154.00	34.07	***.***	***.***	65.89	55.89	-21.82
157.00	33.92	***.***	***.***	65.80	55.80	-21.88
170.00	33.31	***.***	***.***	65.43	55.43	-22.11
190.00	32.12	***.***	***.***	64.86	54.86	-22.74
197.00	31.66	***.***	***.***	64.66	54.66	-23.00
212.00	31.27	***.***	***.***	64.23	54.23	-22.96
234.00	31.21	***.***	***.***	63.60	53.60	-22.39
571.00	23.84	***.***	***.***	56.00	46.00	-22.16
1142.00	23.76	***.***	***.***	56.00	46.00	-22.24
23050.00	29.53	***.***	***.***	60.00	50.00	-20.47

Line 2

Frequency (KHz)	READING AMPLITUDE			LIMIT		Margin (dB)
	Peak (dBμV)	Quasi-Peak (dBμV)	Average (dBμV)	Quasi-Peak (dBμV)	Average (dBμV)	
518.00	30.19	***.***	***.***	56.00	46.00	-15.81
571.00	28.83	***.***	***.***	56.00	46.00	-17.17
604.00	29.41	***.***	***.***	56.00	46.00	-16.59
675.00	30.85	***.***	***.***	56.00	46.00	-15.15
729.00	30.02	***.***	***.***	56.00	46.00	-15.98
764.00	29.61	***.***	***.***	56.00	46.00	-16.39
803.00	30.09	***.***	***.***	56.00	46.00	-15.91
1113.00	29.00	***.***	***.***	56.00	46.00	-17.00
1224.00	29.11	***.***	***.***	56.00	46.00	-16.89
1257.00	29.72	***.***	***.***	56.00	46.00	-16.28

*The reading amplitudes are all under limit.

Appendix B

Peak Power Test Result: (Horizontal)

Frequency	Reading Amplitude	Correction Factors	Corrected Amplitude	Limit	Margin
MHz	dB μ V	dB/m	dB μ V/m	dB μ V/m	dB
27.0438	57.18	-8.30	48.88	80.00	-31.12

Radiated Emission Test Result: (Horizontal)

Test Conditions:

Testing site : Temperature : 30 ° C Humidity : 70 % RH

Frequency	Reading Amplitude	Ant. Height	Table	Correction Factors	Corrected Amplitude	Class B Limit	Margin
MHz	dB μ V	m	degree	dB/m	dB μ V/m	dB μ V/m	dB
243.8288	32.32	1.00	168	-2.23	30.09	46.02	-15.93
270.9213	38.00	1.00	231	-1.11	36.89	46.02	-9.13
298.0125	33.91	1.00	223	-1.40	32.51	46.02	-13.51
486.9265	15.38	3.97	8	6.49	21.87	46.02	-24.15

Note:

1. Margin = Amplitude – limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude – Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude gain)
(For example : 30MHz correction factor = 15.5 + (-15.26) = 0.24 dB/m)

Peak Power Test Result: (Vertical)

Frequency	Reading Amplitude	Correction Factors	Corrected Amplitude	Limit	Margin
MHz	dBμV	dB/m	dBμV/m	dBμV/m	dB
27.0438	45.32	-8.30	37.02	80.00	-42.98

Radiated Emission Test Result: (Vertical)

Test Conditions:

Testing site : Temperature : 30 ° C Humidity : 70 % RH

Frequency	Reading Amplitude	Ant. Height	Table	Correction Factors	Corrected Amplitude	Class B Limit	Margin
MHz	dBμV	m	degree	dB/m	dBμV/m	dBμV/m	dB
243.8250	31.40	2.51	1	-2.23	29.17	46.02	-16.85
270.9200	35.64	2.51	350	-1.11	34.53	46.02	-11.49
514.6750	11.52	1.00	220	7.18	18.70	46.02	-27.32

Note:

1. Margin = Amplitude – limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude – Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude gain)
(For example : 30MHz correction factor = 15.5 + (–15.26) = 0.24 dB/m)