

Certification Test Report

For a Wireless Mouse

Manufacturer:

Mitsumi Electric Co., Ltd
8-8-2 Kokuryo-cho, Chofu-shi
Tokyo 182, Japan

Testing Facility:

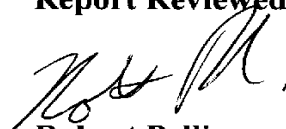
F-Squared Laboratories
10880 Moxley Road
Damascus, MD 20872

The Wireless Mouse, FCCID: CMYECM-W5504 (model ECM-W5504), has been tested and found to comply with the requirements of the Federal Communications Commission outlined in the Federal Register CFR 47, Part 15 subpart C for Class B Equipment. The product was received on September 25, 2000 and the testing was completed on September 28, 2000.

Evaluation Conducted By:


Shi-Lun Chau
Senior EMC Engineer

Report Reviewed By:


Robert Pellizze
General Manager



F-Squared Laboratories
9890 Main Street
Damascus, MD 20872
(301) 253-4500
Fax (301) 253-5179

This report shall not be duplicated except in full without the written approval of F-Squared Laboratories.

Client: Mitsumi Electric Co., Ltd
FCC ID: CMYECM-W5504
Model: ECM-W5504

Report #: 2269-01c
Issue Date: 09/29/2000

MITSUMI

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Mitsumi Electric Co., Ltd.
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Tel: +81-3-3489-5333 Fax: +81-3-3430-9096

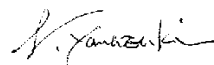
Federal Communications Commission
Authorization and Evaluation Division
7435 Oakland Mills Road
Columbia, MD 21046

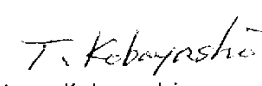
Dear Commission

This is serve as proper written authorization that F²Engineering Testing Laboratory, 10880 Moxley Rd, Damascus, MD 20872, will act as our representative in all matters relating to FCC applications for equipment approval. This includes the signing of all related documents, the transmitting of required fees, and receiving correspondence and notifications from the FCC. All acts performed by F²Engineering Testing Laboratory, especially modifications to our equipment under testing, will be carried out on our behalf

Meantime, By checking yes for FCC Form 731, the applicant certifies that, in case of an individual applicant, he or she is not subject to a denial of federal benefits, that includes FCC benefits, pursuant to Section 5301 of the Anti-Drug Abuse act of 1988, 21 U.S.C. 862, or in the case of a non-individual applicant (e.g., corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits, that includes FCC benefits, pursuant to that section. For a definition of a "party" for these purposes see 47 C.F.R. 1.2002(b).

If you have any questions regarding our applications for equipment approval, Please contact F²Engineering Testing Laboratory, by calling +1-301-253-4500.

Written by : 
Naoki Yamazaki
Issued : September 21, 2000

Approved: 
Manager, Tatsuo Kobayashi

Mitsumi Electric Co., Ltd
Form:

Client: Mitsumi Electric Co., Ltd
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Exhibit I

Engineering Statement

This report has been prepared on behalf of Mitsumi Electric Co., Ltd to provide documentation for the testing described herein. This equipment has been tested and found to comply with Part 15 subpart C of the FCC Rules and under the regulation section 15.227 and section 15.209 procedure, using ANSI C63.4 1992 standards. The test results found in this report relate only to the items tested.

EQUIPMENT UNDER TEST:	Wireless Mouse Trade Name: Mitsumi Electric Co., Ltd Model #: ECM-W5504 Power Supply: 3VDC (Battery AAA Cell x2)
FCC ID:	CMYECM-W5504
APPLICABLE RULES:	CFR 47 Part 15
EQUIPMENT CATEGORY:	Wireless Mouse
MEASUREMENT LOCATION:	F-Squared Laboratories in Damascus, MD. Site description and attenuation data are on file with the FCC's Sampling and Measurement Branch at the FCC Laboratory in Columbia, MD.
MEASUREMENT PROCEDURE:	All measurements were performed according to the 1992 version of ANSI C63.4. A list of the measurement equipment can be found in Exhibit II.
A2LA STATEMENT:	This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with the laboratory's terms of accreditation unless stated otherwise in the report.
A2LA CERTIFICATE NUMBER:	793.01

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UNCERTAINTY BUDGET:

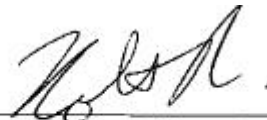
- Radiated Emission
Combined Uncertainty (+ or -) 2.24 dB
Expanded Uncertainty (+ or -) 4.48 dB
- Conducted Emission
Combined Uncertainty (+ or -) 1.13 dB
Expanded Uncertainty (+ or -) 2.26 dB

ENGINEERING STATEMENT:

I hereby state that: The measurements shown in this application were made in accordance with the procedures indicated and the energy emitted by this equipment was found to be within the limits. I assume full responsibility for the accuracy and completeness of these measurements.

I further state that: On the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 15 of the FCC Rules under normal use and maintenance.

Certified by: _____



Robert Pellizze, General Manager

Client: Mitsumi Electric Co., Ltd
FCC ID: CMYECM-W5504
Model: ECM-W5504

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Exhibit II

List of Measurement Instrumentation

Equipment Type	Manufacturer	Model #	Serial #	Calibration Due Date
Receiver System	Rohde & Schwarz	ESMI	DE23119	Feb. 2001
LISN #1	Solar	8012-50-R-24-BNC	910488	Feb. 2001
LISN #2	Solar	8012-50-R-24-BNC	933201	Feb. 2001
Biconical Antenna	Compliance Design, Inc.	B100	643	Mar. 2001
Biconical Antenna	Compliance Design, Inc.	B200	292	Jan. 2001
Biconical Antenna	Compliance Design, Inc.	B300	318	Jan. 2001
Horn Antenna	Antenna Research Associates	DRG-118/A	1105	Jan. 2001
Antenna Mast	Compliance Design, Inc.	M100	NA	NA
Amplifier	HP	8447F	3113A04704	Aug. 2001
Turntable	F-Squared Laboratories	Site 1	NA	NA
Spectrum Analyzer	HP	8391A	3149A07546	Feb. 2001

Exhibit III

Equipment Under Test Information and Data

TEST ITEM CONDITION: The equipment to be tested was received in good condition.

TESTING ALGORITHM: The wireless mouse was set to the “active mode” by the manufacturer. Once the right button of the mouse was pressed, the mouse continuously transmitted signals during the test. The fundamental emission, 10th harmonic emissions and the other highest emissions are recorded in the data tables.

RADIATED EMISSION TESTING: The EUT was tested at a distance of 3 meters. The emissions were maximized by rotating the table and raising/lowering the antenna mounted on a 4 meter mast. Both horizontal and vertical field components were measured. The output of the antenna was connected through a pre-amplifier, to the input of the receiver and emissions were measured of the fundamental frequency range 26.96MHz to 27.28MHz with a resolution bandwidth of 9KHz are quasi-peak reading and the range are in 30MHz to 1GHz values up to 1GHz with a resolution bandwidth of 120KHz are quasi-peak reading made at 3 meters. All data for radiated emissions is found in Exhibit VI.

CALCULATION OF DATA: **RADIATED EMISSIONS** – The antenna factors (included cable losses) of the biconical antennas used, and the pre-amplifier gain, are input into the memory of the receiver. The receiver then corrects the reading for amplitude automatically. The field strength reading can then be taken directly from the receiver and compared to the FCC limits in dBuV/m. The following equation is used to convert to uV/m:

$$^E_{\text{uV/m}} = \text{antilog}(^E_{\text{dBuV/m}}/20)$$

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SAMPLE OF FIELD STRENGTH CALCULATION:

$$E_a = V_a + AF + A_e + (-AG)$$

Where E_a = Field Strength(dBuV/m)
 $V_a = 20 \times \log_{10}$ (measure RF voltage, uV)
 A_e = Cable Loss Factor, dB
 AG = Amplifier Gain, dB
 AF = Antenna Factor dB(m-1)

i.e. if the reading is 57.0 dBuV, the antenna factor 8.0 dB, cable loss factor 1.0 dB and Amplifier gain is 25.0 dB, so the field strength will be:

$$\begin{aligned} E_a(\text{dBuV/m}) &= 57 + 8 + 1 + (-25) \\ &= 41 \text{ dBuV/m} \end{aligned}$$

OR

$$\begin{aligned} E_a(\text{uV/m}) &= 10^{(41/20)} \\ &= 112.20 \text{ uV/m} \end{aligned}$$

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Exhibit IV

EUT Configuration

EUT:

Device	Manufacturer	Model #	FCC ID
Wireless Mouse	Mitsumi Electric Co., Ltd	ECM-W5504	CMYECM-W5504

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Exhibit V

RADIATED DATA

Temperature: 24 °C
Humidity: 51 % RH
Pressure: 997 mb
Distance: 3 Meters

Frequency (MHz)	Antenna Polarization	Position		Cable Loss (dB)	Antenna Factor (dB)	Reading (dBuV)/m	Emission (dBuV)/m	FCC Limits (dBuV)/m	Margins (dBuV)/m
		Height	Azimuth						
27.04	H	3.00	180	0.35	11.80	32.79	44.94	80.00	-35.06
27.04	V	1.25	92	0.35	10.30	35.66	46.31	80.00	-33.69
54.06	H	*	*	*	*	*	*	40.00	*
54.06	V	*	*	*	*	*	*	40.00	*
81.11	H	*	*	*	*	*	*	40.00	*
81.11	V	*	*	*	*	*	*	40.00	*
108.16	H	*	*	*	*	*	*	43.50	*
108.16	V	*	*	*	*	*	*	43.50	*
135.19	H	*	*	*	*	*	*	43.50	*
135.19	V	*	*	*	*	*	*	43.50	*
162.22	H	*	*	*	*	*	*	43.50	*
162.22	V	*	*	*	*	*	*	43.50	*

Remark: * Measurement does not apply for this frequency.

Note: This device was tested to 10th harmonics of its fundamental operating frequency. The emissions of higher degree harmonics and the other emissions are too small to list at this testing report.

The Rohde & Schwarz Receiver System's noise floor, in the range of 30MHz to 1GHz, is 25.65dBuV to 27.00dBuV.



PASS



FAIL

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RADIATED DATA

Temperature: 24 °C
Humidity: 51 % RH
Pressure: 997 mb
Distance: 3 Meters

Frequency (MHz)	Antenna Polarization	Position		Cable Loss (dB)	Antenna Factor (dB)	Reading (dBuV/m)	Emission (dBuV/m)	FCC Limits (dBuV/m)	Margins (dBuV/m)
		Height	Azimuth						
189.27	H	*	*	*	*	*	*	43.50	*
189.27	V	*	*	*	*	*	*	43.50	*
216.31	H	1.50	90	1.12	16.60	1.50	19.22	46.00	-26.78
216.31	V	*	*	*	*	*	*	46.00	*
243.35	H	*	*	*	*	*	*	46.00	*
243.35	V	*	*	*	*	*	*	46.00	*
270.39	H	*	*	*	*	*	*	46.00	*
270.39	V	*	*	*	*	*	*	46.00	*
486.73	H	1.00	270	1.57	23.10	7.20	31.87	46.00	-14.13
486.73	V	*	*	*	*	*	*	46.00	*
513.76	H	1.00	250	1.56	23.50	9.93	34.99	46.00	-11.01
513.76	V	1.00	180	1.56	22.90	3.76	28.22	46.00	-17.78

Remark: * Measurement does not apply for this frequency.

Note: This device was tested to 10th harmonics of its fundamental operating frequency. The emissions of higher degree harmonics and the other emissions are too small to list at this testing report.

The Rohde & Schwarz Receiver System's noise floor, in the range of 30MHz to 1GHz, is 25.65dBuV to 27.00dBuV.



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Exhibit VI

Modifications

EUT COMPLIES

WITHOUT MODIFICATIONS

Exhibit VII

Compliance Information

The following statement, or equivalent, is required to be in the user's manual.

FCC COMPLIANCE STATEMENT

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, as well as the instructions of any peripheral and accessories to be attached to this device, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Notice:

- To meet FCC requirements, shielded AC power cord and shielded interface cables are required to connect the device to a personal computer peripheral, or other Class B device.
- Any peripheral and/or accessories that will be attached to this equipment must also be compliant to Part 15 of the FCC Rules.

Warning to the User:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.