



ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CLASS B CERTIFICATION

Test report file number : E028R-053

Applicant : KTEC CO., LTD.

Address : 186-3 Weonjong-Dong, Ojeong-Gu, Pucheon-City, Kyungki-Do, 421-200, Korea

Manufacturer : KTEC CO., LTD.

Address : 186-3 Weonjong-Dong, Ojeong-Gu, Pucheon-City, Kyungki-Do, 421-200, Korea

Type of Equipment : Corded Optical Wheel Mouse

FCC ID : PKVKTM-2112

Model name : KTM-2112

Serial number : N/A

Total page of Report : 13 pages (including this page)

Date of Incoming : August 22, 2002


Date of Issuing : August 27, 2002


SUMMARY

The equipment complies with the regulation; *FCC CFR 47 PART 15 SUBPART B, Class B.*

This test report contains only the results of a single test of the sample supplied for the examination.

It is not a general valid assessment of the features of the respective products of the mass-production.

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1. VERIFICATION OF COMPLIANCE

APPLICANT : KTEC CO., LTD.
 ADDRESS : 186-3 Weonjong-Dong, Ojeong-Gu, Pucheon-City, Kyungki-Do, 421-200, Korea
 CONTACT PERSON : Heon-Yeon, Kim / Manager
 TELEPHONE NO : +82-32-675-0861
 FCC ID : PKVKTM-2112
 MODEL NAME : KTM-2112
 SERIAL NUMBER : N/A
 DATE : August 27, 2002

DEVICE TYPE	Peripheral Device for Class B Computing Device - Unintentional Radiator
E.U.T. DESCRIPTION	Corded Optical Wheel Mouse
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4/2000
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15, SECTION 15.101 (Class B)
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.



2. GENERAL INFORMATION

2.1 Product Description

The KTEC CO., LTD., Model KTM-2112 (referred to as the EUT in this report) is a Corded Optical Wheel Mouse, which is PS/2 connector type. Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic – Non coated
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	24.00 MHz on the main board
POWER REQUIREMENT	DC5V supplied from a PC
NUMBER OF LAYERS	1 Layer
EXTERNAL CONNECTOR	PS/2 Port

Model Differences:

-. None

2.2 Related Submittal(s) / Grant(s)

-. Original submittal only



2.3 Test System Details

The model numbers for all the equipments that were used in the tested system is:

Model	Manufacturer	FCC ID	Description	Connected to
KTM-2112	KTEC CO., LTD.	PKVKTM-2112	Corded Optical Wheel Mouse (EUT)	NOTEBOOK PC
PP01L	DELL COMPUTER	DoC	NOTEBOOK PC	-
ADP-70EB	DELTA ELEC.	N/A	AC/DC ADAPTER	NOTEBOOK PC
2225C	HP	DSI6XU2225	PRINTER	NOTEBOOK PC
020-0470	CARDINAL	GDE0196	MODEM	NOTEBOOK PC

2.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4/2000. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.5 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Si, Kyunggi-Do, 464-080, Korea. Description details of test facilities were submitted to the Commission on January 18, 2002. (Registration Number: 92819)



3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
MAIN BOARD	KTEC CO., LTD.	KTM-2112	N/A

3.2 EUT exercise Software

The EUT was connected to PS/2 port on the Note Book Computer for normal operation.

During the test, the EUT was operated as follows;

The windows program was designed to exercise the various system components in a manner similar to a typical use. This program was included into HOST. Once loaded, this program sequentially exercises each system component in turn. The sequence used is:(1) series of “H” characters are printed on the monitor until the screen is completely full, (2) copy series of “H” characters to mass storage device (if one is used), (3) print series of “H” characters to printer. The complete cycle takes about 20 seconds and is repeated continuously.

3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
Corded Optical Wheel Mouse (EUT)	N/A	Y	1.8 (D)
NOTEBOOK PC	N	Y	1.5 (P), 1.8 (D)
AC/DC ADAPTOR	N	N/A	1.5 (P)
MODEM	N	Y	1.5 (P), 1.5 (D)
PRINTER	N	Y	1.5 (P), 1.5 (D)

* The marked “(P)” means the Power Cable and “(D)” means the Data Cable.



3.4 Noise Suppression Parts on Cable

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
Corded Optical Wheel Mouse (EUT)	N	N/A	Y	EUT END
NOTEBOOK PC	-	-	-	-
AC/DC ADAPTER	Y	ADAPTOR END	Y	ADAPTOR END
MODEM	N	N/A	Y	BOTH END
PRINTER	N	N/A	Y	BOTH END

3.5 Equipment Modifications

To achieve compliance to CLASS B levels, the following change(s) was made by ONETECH Corp. during compliance testing:

“There was no Modified items during EMI test”

3.6 Configuration of Test System

Line Conducted Test: The EUT was connected to PS/2 port on the NOTE PC and the power line of NOTE PC was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4/2000 7.2.3 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emission test was conducted using the procedure in ANSI C63.4/2000 8.3.1.1 to determine the worse operating conditions. Final radiated emission test was conducted at 3 meters open area test site.



4. PRELIMINARY TEST

4.1 AC Power line Conducted Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Standby mode	
Continuously operation mode	X

4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Standby mode	
Continuously operation mode	X



5. FINAL RESULT OF MEASUREMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level

5.1 Conducted Emission Test

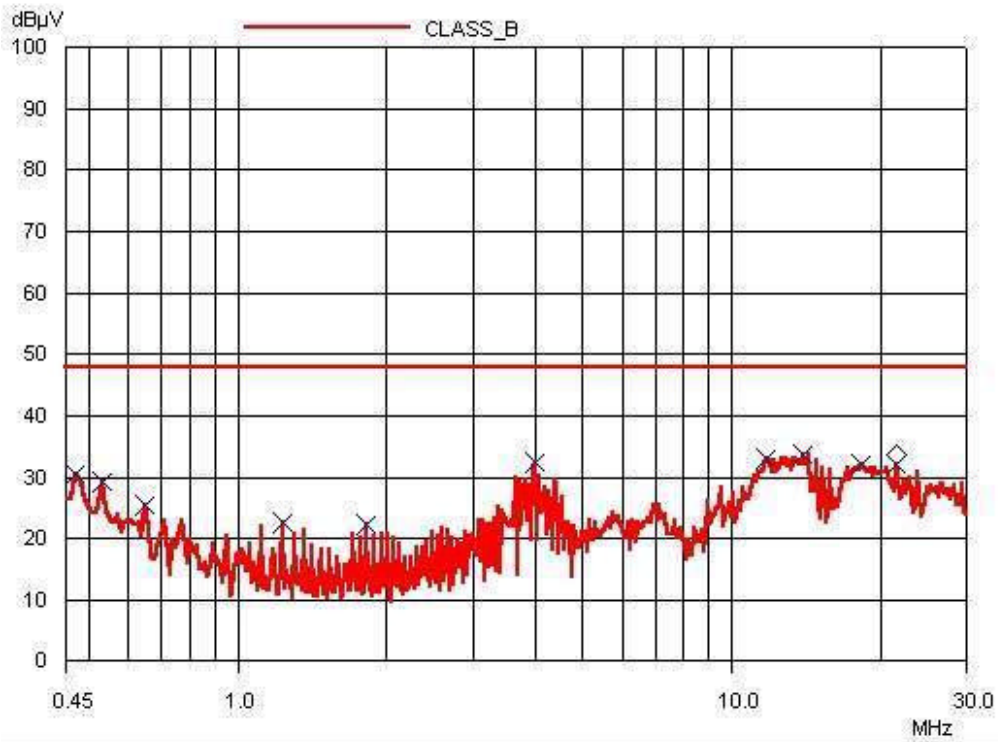
Humidity Level : 49 % Temperature : 24 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.107
 Type of Test : CLASS B
 Result : PASSED BY -12.88 dB at 4.15 MHz

EUT : Corded Optical Wheel Mouse Date: August 23, 2002
 Operating Condition : Continuously operation mode
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

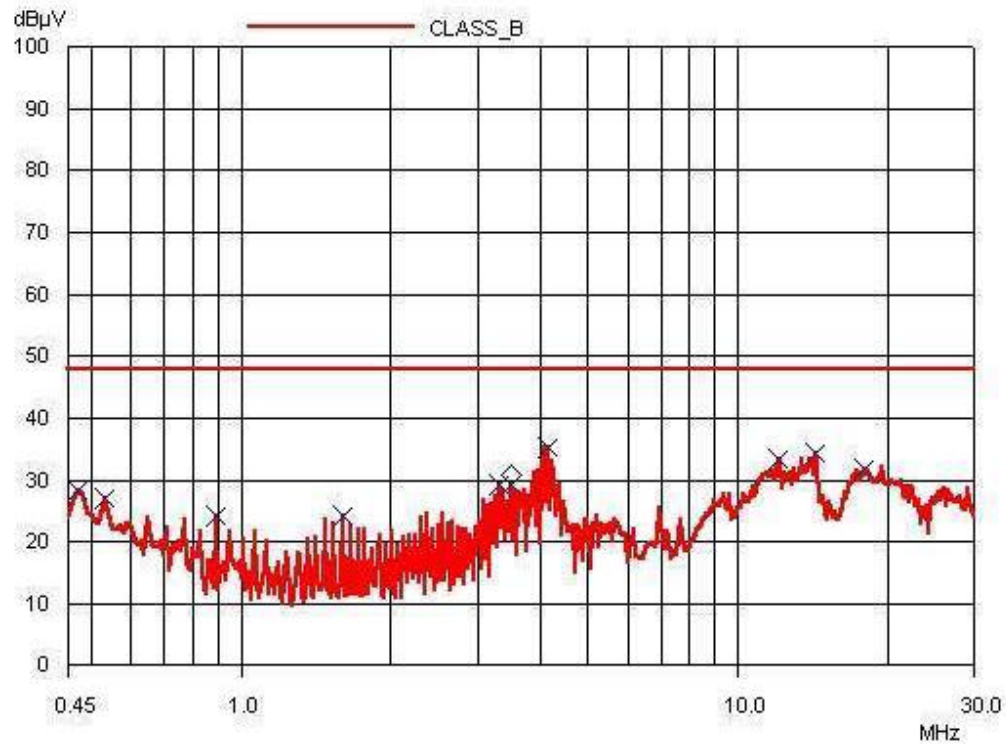
Power Line Conducted Emission			FCC CLASS B	
Frequency (MHz)	Amplitude (dBuV)	Conductor	Limit (dBuV)	Margin (dB)
0.47	30.41	HOT	48.00	-17.59
0.53	29.12	HOT	48.00	-18.88
0.65	25.39	HOT	48.00	-22.61
3.50	29.31	NEUTRAL	48.00	-18.69
4.15	35.12	NEUTRAL	48.00	-12.88
13.95	33.65	HOT	48.00	-14.35
14.41	34.33	NEUTRAL	48.00	-13.67
21.59	32.19	HOT	48.00	-15.81

Line Conducted Emission Tabulated Data

Tested by: Seung Hyun, Nam / Test Engineer



HOT LINE



NEUTRAL LINE



5.2 Radiated Emission Test

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 49 % Temperature : 24 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.109
 Type of Test : CLASS B
 Result : PASSED BY -11.48 dB at 32.60 MHz

EUT : Corded Optical Wheel Mouse Date: August 23, 2002
 Operating Condition : Continuously operation mode
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)
 Distance : 3 Meter

Radiated Emission		Ant	Correction Factors		Total	FCC CLASS B	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
32.60	15.50	V	12.22	0.80	28.52	40.00	-11.48
34.60	10.00	V	11.46	0.80	22.26	40.00	-17.74
36.60	10.30	V	11.14	0.81	22.25	40.00	-17.75
42.90	10.50	V	10.80	0.85	22.15	40.00	-17.85
45.10	12.10	V	10.81	0.88	23.79	40.00	-16.21
46.30	15.10	V	10.80	0.89	26.79	40.00	-13.21
49.40	10.90	V	10.79	0.92	22.61	40.00	-17.39
55.80	9.20	V	9.99	0.98	20.17	40.00	-19.83
97.25	8.90	V	11.23	1.14	21.27	43.50	-22.23
110.36	9.20	V	12.89	1.20	23.29	43.50	-20.21
86.35	13.00	H	7.77	1.10	21.87	40.00	-18.13

Radiated Emissions Tabulated Data

Tested by : Seung Hyun, Nam / Test Engineer



6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+ Meter reading (dBuV)

+ Cable Loss (dB)

+ Antenna Factor (Loss) (dB/meter)

= Corrected Reading (dBuV/meter)

- Specification Limit (dBuV/meter)

= dB Relative to Spec (+/- dB)



7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS 10	827864/005	OCT/01	12MONTH	■
2.	Test receiver	R/S	ESHS10	834467/007	APR/02	12MONTH	■
3.	Spectrum analyzer	HP	8568B	3026A0226	APR/02	12MONTH	■
4.	RF preselector	HP	85685A	3107A01264	APR/02	12MONTH	■
5.	Quasi-Peak Adapter	HP	85650A	3107A01542	APR/02	12MONTH	■
6.	Dipole Antenna	EMCO	3121C	9107-745	JUN/02	12MONTH	
7.	Biconical antenna	EMCO	3104C	9109-4441 9109-4443 9109-4444	APR/02	12MONTH	■
8.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	APR/02	12MONTH	■
10.	Horn Antenna	EMCO	3115	9509-4563	MAR/02	12MONTH	
11.	LISN	EMCO	3825/2	9109-1867 9109-1869	JUL/02	12MONTH	■
12.	RF Amplifier	HP	8447F	3113A04554	JUN/02	N/A	
13.	Spectrum Analyzer	HP	8561E	3350A00546	SEP/01	12MONTH	■
14.	Spectrum Analyzer	HP	8591A	3131A02312	APR/02	12MONTH	
15.	Computer System	HP	98581C	98543A	N/A	N/A	■
	Hard disk drive		9153C	CMC762Z9153	N/A	N/A	■
16.	Plotter	HP	7475A	30052 22986	N/A	N/A	■
17.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	■
18.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	■
19.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	■

* Remark ■ means used equipment.