ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Wireless Multimedia Pro Keyboard

Model No.: MCK-8800

Brand Name: ORtek

FCC ID: GM8WKAMPROMCK8800

Report No: B30527005-RP

Issue Date: July 7, 2003

Prepared for

ORtek Technology, Inc.
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Prepared by

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VERIFICATION OF COMPLIANCE

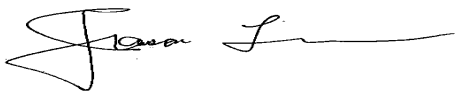
Applicant:	ORtek Technology, Inc. 13F, No. 150, Jian Yi Rd. Chung Ho City, Taipei Hsien, Taiwan, R.O.C.
Product Description:	Wireless Multimedia Pro Keyboard
Brand Name:	ORtek
Model Number:	MCK-8800
Serial Number:	N/A
File Number:	B30527005-RP
Date of Test:	May 28 ~ July 1, 2003

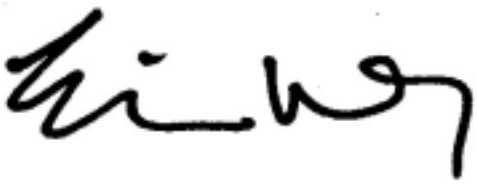
We hereby certify that:

The above equipment was tested by C&C Laboratory Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (1992) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.227.

The test results of this report relate only to the tested sample identified in this report.

Approved By ***Reviewed By***





Jonson Lee / Director ***Eric Wong / Section Manager***
C&C Laboratory Co., Ltd. ***C&C Laboratory Co., Ltd.***

Table of Contents

1. GENERAL INFORMATION

1.1 Product Description

The EUT is in short range, lower power, wireless multimedia pro keyboard and optical mouse designed as in "Input Device". It is designed by way of utilizing the FSK modulation achieves the system operating.

A major technical descriptions of EUT is described as following:

A). Operation Frequency: 27.092MHz, one channel.
B). Modulation: Frequency Shifting Key (FSK) Modulation
C). Antenna Designation: Non-User Replaceable (Fixed)
D). Power Supply: 3 Vdc by AA *2 battery.

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: GM8WKAMPROMCK8800 filing to comply with Section 15.227 of the FCC Part 15, Subpart C Rules. The composite system (receiver) is compliance with Subpart B is authorized under a DoC procedure.

1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (1992). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of C&C Laboratory, Co., Ltd. No. 81-1, 210 Lane, Pa-de 2nd Road, Lu-Chu Hsiang, Taoyuan, Taiwan, R.O.C.. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 1992 and CISPR 22/EN 55022 requirements.

1.5 Measurement Uncertainty

All the measurement equipments and accessories have been carefully selected to meet the maximum measurement uncertainty specified below:

Radiated Emission, valid up to 1GHz	+/- 2.16 dB
Radiated Emission, valid up to 26GHz	+/- 3.5 dB
Power Line Conducted Emission, valid up to 30MHz	+/- 2.8 dB
RF Frequency	+/- 2 X 10^-6
RF Peak Power (Conducted)	+/- 0.221 dB
Power Density (Conducted)	+/- 2.0022 dB
Frequency Stability V.S. Voltage	+/- 0.3538 %
Frequency Stability V.S. temperature	+/- 1.8974 %

P.S. Uncertainty figures are valid to confidence level of 95% calculated according to the methods described in the ETR 028[7]

1.6 Special Accessories

Not available for this EUT intended for grant.

1.7 Equipment Modifications

Not available for this EUT intended for grant.

2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner, which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The Tx frequency was fixed which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions (Not apply in the report)

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-1992.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-1992.

2.4 **Limitation**

(1) Conducted Emission (Not applicable in this report)

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

(2) Radiated Emission

a. The field strength of any emission within this band (section 15.227 frequency between 26.96MHz -27.28MHz) shall not exceed 10000 micro volts/meter at 3 meters. (80dBμV at 3m) The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in section 15.35 for limiting peak emissions apply.

b. The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in section 15.209(Intentional Radiators general limit).as below.

Frequency (MHz)	Field strength μV/m	Distance (m)	Field strength at 3m dBμV/m
1.705-30	30	30	69.54
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

Remark: 1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was taken at the antenna, which is at a 3m distance from the closet point of the EUT.
3. Only spurious frequency is permitted to locate within the Restricted Bands specified in provision of ξ 15.205
4. Emission spurious frequency which appearing within the Restricted Bands specified in provision of ξ15.205, then the general radiated emission limits in ξ 15.209 apply.

2.5 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

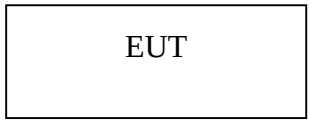


Table 2-1 Equipment Used in Tested System

Item	Equipment	Brand Name	Model/Type No.	FCC ID	Series No.	Remark
1	RF Wireless Keyboard	ORtek	MCK-8800	GM8WKAMPROMCK8800	N/A	EUT

Note: Unless otherwise denoted as EUT in 『Remark』 column , device(s) used in tested system is a support equipment.

3. Summary Of Test Results

FCC Rules	Description Of Test	Result
§15.207	Conducted Emission	N/A
§15.227	Radiated Emission	Compliant
§15.227	26 dB Bandwidth	Compliant

4. Description of test modes

Set EUT under in continuous transmitting mode. The Frequency 27.092MHz is chosen for testing.

5. Conducted Emissions Test

(Not applicable in this report)

5.1 Measurement Procedure:

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

5.2 Test Set-up (Block Diagram of Configuration)

5.3 Measurement Equipment Used:

Conducted Emission Test Site # 3					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCS30	847793/012	12/21/2002	12/20/2003
LISN	R&S	ESH2-Z5	843285/010	12/16/2002	12/15/2003
LISN	EMCO	3825/2	9003-1628	07/26/2002	07/25/2003

5.4 Measurement Result:

N/A

5.5 Conducted Measurement Photos:

N/A

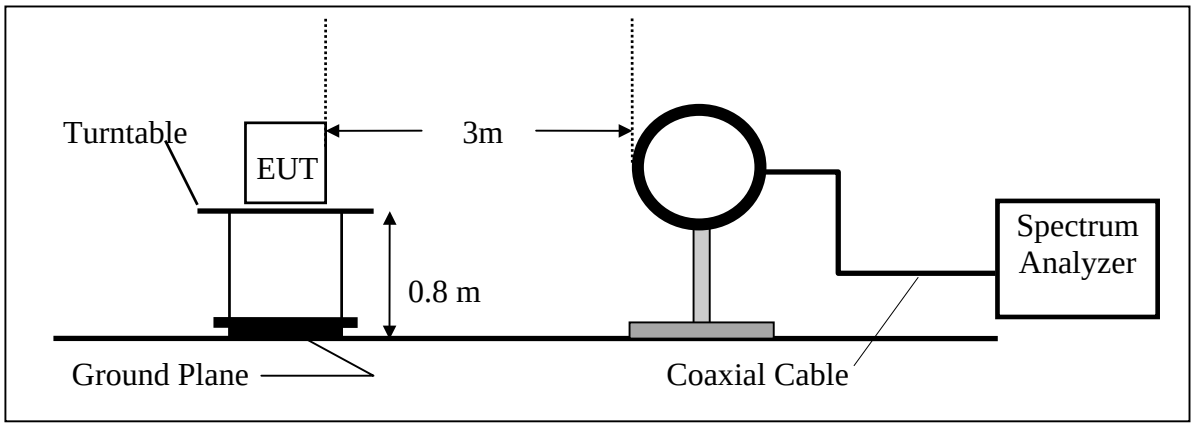
6. Radiated Emission Test

6.1 Measurement Procedure

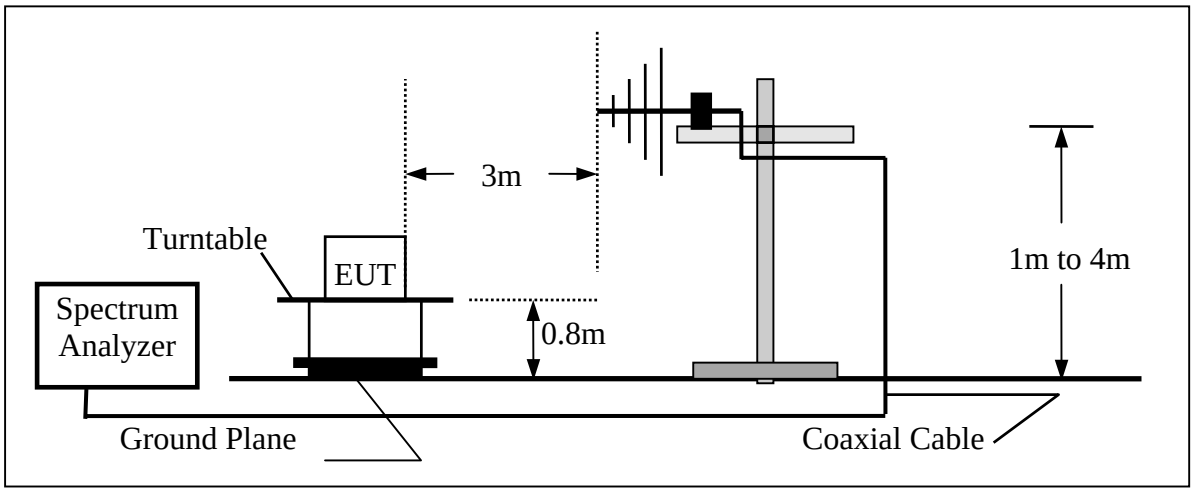
1. The EUT was placed on a turn table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

6.2 Test Set-up (Block Diagram of Configuration)

(A) Radiated Emission Test Set-up (Frequency below 30MHz)



(B) Radiated Emission Test Set-up (Frequency above 1000MHz)



6.3 Measurement Equipment Used:

Open Area Test Site # 3					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer	ADVANTEST	R3261A	N/A	N/A	N/A
EMI Test Receiver	R&S	ESVS20	838804/004	01/09/2003	01/08/2004
Pre-Amplifier	HP	8447D	2944A09173	03/03/2003	03/02/2004
Bilog Antenna	SCHWAZBECK	VULB9163	145	07/06/2002	07/05/2003
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R	N.C.R
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R	N.C.R
Controller	EMCO	2090	9709-1256	N.C.R	N.C.R
RF Switch	ANRITSU	MP59B	M53867	N.C.R	N.C.R
Site NSA	C&C	N/A	N/A	09/07/2002	09/06/2003
Loop Antenna	AQR	PLA-1030/B	1027	01/21/2003	01/20/2004

6.4 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, Cable Factor, subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

6.5 Measurement Result

Operation Mode:	Transmitting Mode			Test Date:	May 28, 2003
Fundamental Frequency:	27.092MHz			Tested By:	Roy
Temperature:	26°C	Humidity:	68%	Pol:	Vertical

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Margin (dB)
27.092	V	Peak	52.52	3.89	56.41	80.00	-23.59
81.300	V	Peak	9.58	9.85	19.43	40.00	-20.57
54.184	V	---	---	---	---	40.00	---
81.276	V	---	---	---	---	40.00	---
108.368	V	---	---	---	---	43.50	---
135.460	V	---	---	---	---	43.50	---
162.552	V	---	---	---	---	43.50	---
189.644	V	---	---	---	---	43.50	---
216.736	V	---	---	---	---	46.00	---
243.828	V	---	---	---	---	46.00	---
270.950	V	---	---	---	---	46.00	---

Remark:

(1) Measuring frequencies from 25 MHz to the 1GHz.
(2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
(3) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
(4) The IF bandwidth of SPA between 25MHz to 30MHz was 10kHz; 30MHz to 1GHz was 100kHz.

6.6 Measurement Result

Operation Mode:	Transmitting Mode			Test Date:	May 28, 2003
Fundamental Frequency:	27.092MHz			Tested By:	Roy
Temperature:	26°C	Humidity:	68%	Pol:	Horizontal

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Margin (dB)
27.092	H	Peak	52.52	3.89	56.41	80.00	-23.59
81.300	H	Peak	26.74	9.85	36.59	40.00	-3.41
54.184	H	---	---	---	---	40.00	---
81.276	H	---	---	---	---	40.00	---
108.368	H	---	---	---	---	46.00	---
135.460	H	---	---	---	---	43.50	---
162.552	H	---	---	---	---	43.50	---
189.644	H	---	---	---	---	47.00	---
216.736	H	---	---	---	---	46.00	---
243.828	H	---	---	---	---	46.00	---
270.920	H	---	---	---	---	46.00	---

Remark:

(1) Measuring frequencies from 25 MHz to the 1GHz.
(2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
(3) Data of measurement within this frequency range shown " - " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
(4) The IF bandwidth of SPA between 25MHz to 30MHz was 10kHz; 30MHz to 1GHz was 100kHz.

7. Occupied Bandwidth

7.1 Measurement Procedure

1. The EUT was placed on a turn table, which is 0.8m above ground plane.
2. Set EUT as normal operation
3. Set SPA Center Frequency = fundamental frequency, RBW, VBW= 10kHz, Span =100kHz.
4. Set SPA to Max hold, the mark peak and measure 26dB bandwidth.

7.2 Test Set-up (Block Diagram of Configuration)

Same as 6.2 Radiated Emission Measurements.

7.3 Measurement Equipment Used:

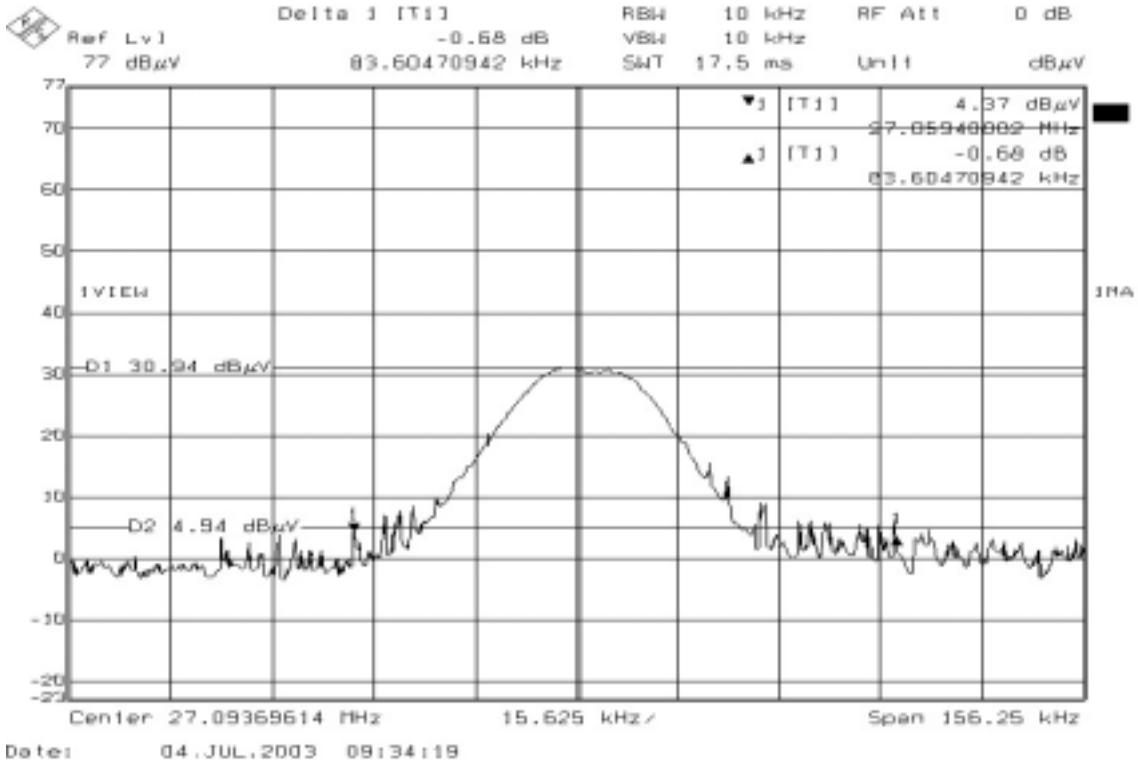
Same as 6.3 Radiated Emission Measurement.

7.4 Measurement Results:

26dB bandwidth = 83.604 kHz

Refer to attached data chart.

26dB Band Width Test Data



APPENDIX 1

PHOTOGRAPHS OF SET UP

Radiated Emission Setup Photos

APPENDIX 2

EXTERNAL PHOTOGRAPHS OF EUT

Front View of EUT

Back View of EUT

APPENDIX 3

INTERNAL PHOTOGRAPHS OF EUT

Internal of EUT --- 1

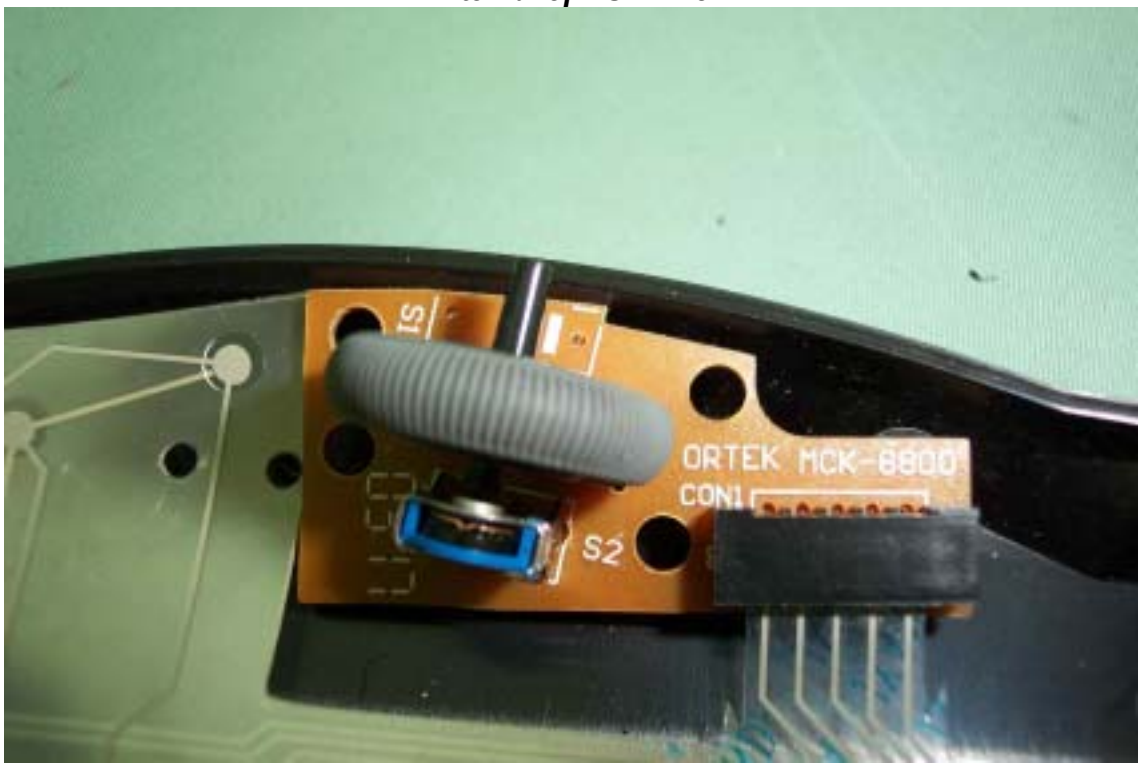
Internal of EUT --- 2

Internal of EUT --- 3

Internal of EUT --- 4

Internal of EUT --- 5

Internal of EUT --- 6



Internal of EUT --- 7

Internal of EUT --- 8

Internal of EUT --- 9