FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment	:	WIRELESS OFFICE KEYBOARD
Model No.	:	MCK-9000, MCK-9100, MCK-9200
FCC ID	:	GM8LAB2229100100
Filing Type	:	Certification
Applicant	:	**ORtek Technology, Inc.** 13F,NO.150, JIAN YI RD. CHUNG HO CITY, TAIPEI HSIEN, TAIWAN, R.O.C.

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

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History of this test report

Original Report Issue Date: Dec. 31, 2002

■ No additional attachment.

□ Additional attachment were issued as following record :

Attachment No.	Issue Date	Description

Certificate No. : F2N1209

CERTIFICATE OF COMPLIANCE

for

47 CFR, Part 15, Subpart C

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I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 - 1992** and the energy emitted by this equipment was ***passed*** both radiated and conducted emission limits. Testing was carried out on Nov. 26, 2002 at **SPORTON International Inc.** LAB. in Lin Kou.

K. J. Lin
Manager

SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

1. General Description of Equipment under Test

1.1. Applicant

ORtek Technology, Inc.
13F,NO.150, JIAN YI RD. CHUNG HO CITY,
TAIPEI HSIEN, TAIWAN, R.O.C.

1.2. Manufacturer

Same as 1.1.

1.3. Basic Description of Equipment under Test

Equipment	: WIRELESS OFFICE KEYBOARD
Model No.	: MCK-9000, MCK-9100, MCK-9200 **(these three models are identical product, the only difference is the model no.)**
FCC ID	: GM8LAB2229100100
Trade Name	: ORtek Technology, Inc.
Power Supply Type	: From Battery (3V)
Power Cord	: N/A

1.4. Feature of Equipment under Test

OPERATION FREQUENCY	27.045 MHZ
TRANSMISSION DISTANCE	1.5M
MODULATION	FSK
BATTERY TYPE	2 * AA BATTERY
BATTERY LIFE	6 MONTH
CHANNEL	2 CHANNEL
POWER CONSUMPTION (WORKING)	7 ma
POWER CONSUMPTION (SUSPEND)	<60uA
STORAGE TEMPERATURE	-15 ~ +85 C
WORKING TEMPERATURE	-10 ~ +60 C

2. Test Configuration of Equipment under Test

2.1. Test Manner

a. The EUT has been configured and operated pursuant to ANSI C63.4-1992 in a manner which tended to maximize its emission characteristics in a typical application.
b. Frequency range investigated: radiation 30 MHz to 1000MHz.
c. The complete test included HP PC, HITACHI Monitor, ORtek Technology RF Keyboard, ORtek Technology RF Mouse, HP Printer, ACEEX Modem and EUT for EMI test.

2.2. Description of Test System

Support Unit 1. -- Monitor (HITACHI)

FCC ID	: N/A
Model No.	: CM823F
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0013
Data Cable	: Shielded, 360 degree via metal backshells, 1.7m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 2. -- Printer (HP)

FCC ID	: B94C2642X
Model No.	: DJ 400
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0014
Data Cable	: Shielded, 360 degree via metal backshells, 1.35m

Support Unit 3. -- Modem (ACEEX)

FCC ID	: IFAXDM1414
Model No.	: DM1414
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0015
Data Cable	: Shielded, 1.15m

Support Unit 4. -- Personal Computer (HP)

FCC ID	: N/A
Model No.	: DTPC-16
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0039
Data Cable	: Shielded, 360 degree via metal backshells
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 5. – RF Receiver (ORtek Technology)

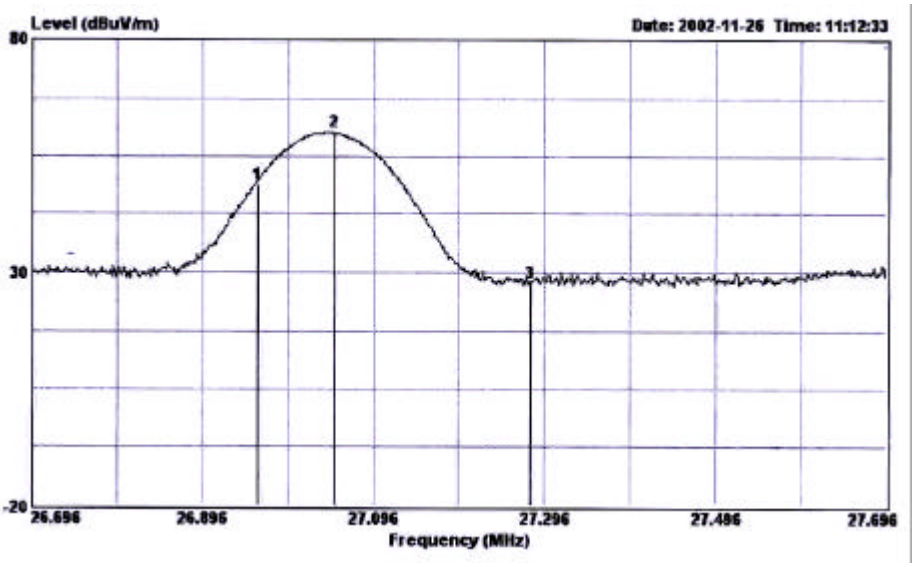
FCC ID	: N/A
Model No.	: MCK-9200
Serial No.	: SP0087

Support Unit 6. – RF Mouse (ORtek Technology)

FCC ID	: GM8PROM910JOR1001
Model No.	: MCK-9100
Serial No.	: SP0088

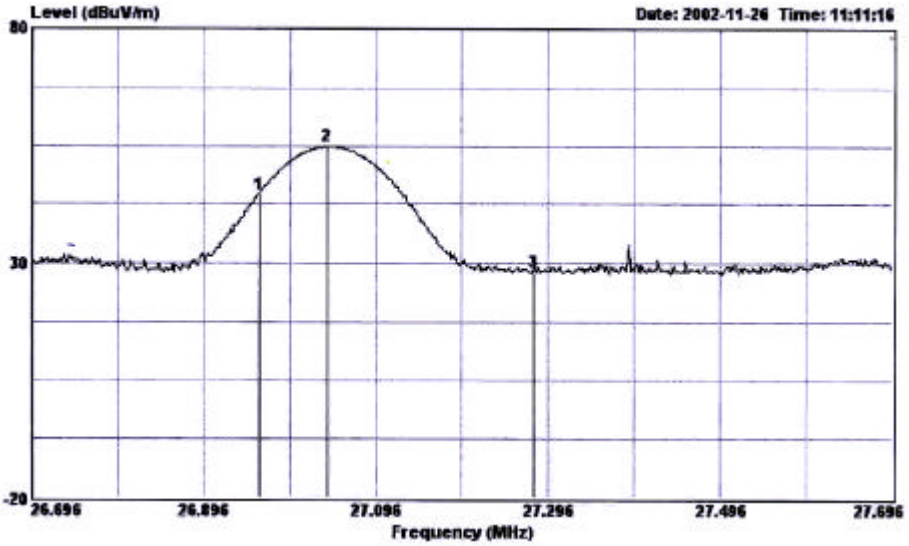
2.3. Band edge compliance plot per 15.227(b).

Vertical



Mark 2 : 27.050MHz 46.15dBuV/m

Horizontal

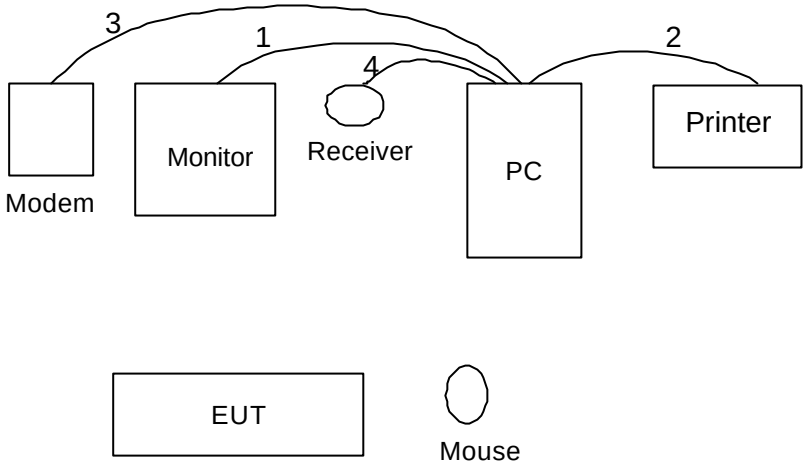


Mark 2 : 27.040MHz 41.17dBuV/m

RBW:120KHz,VBW:300KHz

Conformation of the fundamental frequency

2.4. Connection Diagram of Test System



1. The I/O cable is connected from PC to the support unit 1.
2. The I/O cable is connected from PC to the support unit 2
3. The I/O cable is connected from PC to the support unit 3.
4. The I/O cable is connected from PC to the support unit 4.

3. General Information of Test

3.1. Test Facility

This test was carried out by SPORTON International Inc.

Test Site Location : No. 30-2, Lin 6, Diing-Fwu Tsuen, Lin-Kou-Hsiang, Taipei Hsien, Taiwan, R.O.C.
TEL : 886-2-2601-1640
FAX : 886-2-2601-1695

Test Site No : 03CH03-HY

3.2. Test Voltage

115V/60Hz

3.3. Standard for Methods of Measurement

ANSI C63.4-1992

3.4. Test in Compliance with

FCC Part 15, Subpart C

3.5. Frequency Range Investigated

a. Radiation : from 30 MHz to 1 GHz

3.6. Test Distance

The test distance of radiated emission from antenna to EUT is 3 M.

4. Test of Conducted Powerline

The power supply of the EUT is from battery.

So the conducted powerline test is not applicable to the EUT.

5. Test of Radiated Emission

Radiated emissions from 30 MHz to 1 GHz were measured with a bandwidth of 120 kHz according to the methods defines in ANSI C63.4-1992. The EUT was placed on a nonmetallic stand in the open-field site, 0.8 meter above the ground plane, as shown in section 5.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

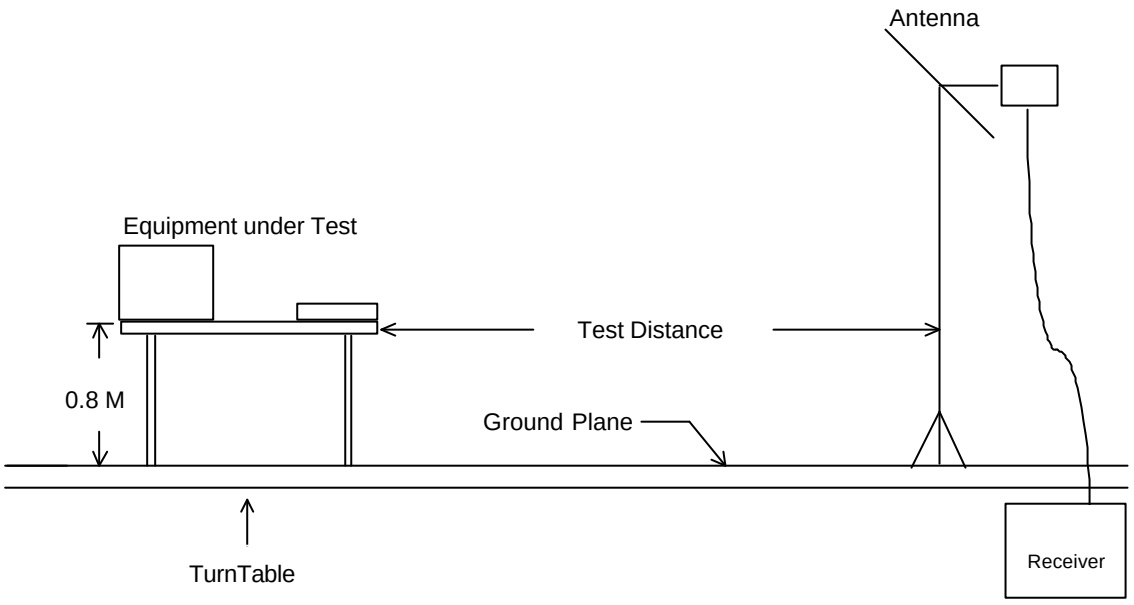
5.1. Major Measuring Instruments

• Amplifier	(HP 8447D)
RF Gain	30 dB
Signal Input	100 KHz to 1.3 GHz
• Spectrum Analyzer	(R&S FSP)
Attenuation	10 dB
Start Frequency	30 MHz
Stop Frequency	1000 MHz
Resolution Bandwidth	120 KHz
Signal Input	9 KHz to 7 GHz

5.2. Test Procedures

a. The EUT was placed on a rotatable table top 0.8 meter above ground.
b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
c. The table was rotated 360 degrees to determine the position of the highest radiation.
d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
e. For each suspected emission the EUT was arranged to its worst case and then adjust the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.

5.3. Typical Test Setup Layout of Radiated Emission



5.4. Test Result of Radiated Emission

- Test Distance : 3 M
- Temperature : 24°C
- Relative Humidity : 55 %
- Test Date : Nov. 25, 2002
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

The Radiated Emission test was passed at minimum margin
36.210 MHz / 35.44 dBuV/m (VERTIVCAL) Antenna Height 2 Meter, Turntable Degree 183 °.

- Spurious Emissions:

Frequency		Antenna	Cable	Reading	Limits		Emission Level		Margin	Detect
	Polarity	Factor	Loss							
(MHz)		(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)	Mode
36.210	V	15.01	0.96	19.47	46.00	200	35.44	59.16	-10.56	Peak
62.940	V	6.04	1.37	9.74	40.00	100	17.15	7.20	-22.85	Peak
94.530	V	9.64	1.60	5.94	43.50	150	17.18	7.23	-26.32	Peak
108.570	V	11.16	1.70	6.13	43.50	150	18.99	8.90	-24.51	Peak
251.940	V	12.35	2.70	8.77	46.00	200	23.82	15.52	-22.18	Peak
67.530	H	5.07	1.40	11.82	40.00	100	18.29	8.21	-21.71	Peak
95.340	H	9.78	1.61	8.79	43.50	150	20.18	10.21	-23.32	Peak
108.570	H	11.16	1.70	11.43	43.50	150	24.29	16.39	-19.21	Peak
217.650	H	8.76	2.48	16.29	46.00	200	27.53	23.80	-18.47	Peak
231.420	H	9.78	2.60	19.93	46.00	200	32.31	41.26	-13.69	Peak
338.500	H	13.88	3.10	13.39	46.00	200	30.37	33.00	-15.63	Peak

- Field strength of fundamental and harmonics

Frequency		Antenna	Cable	Reading	Limits		Emission Level		Margin	Detect
	Polarity	Factor	Loss							
(MHz)		(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)	Mode
27.050	V	15.40	0.93	29.82	80.00	10000	46.15	203.00	-33.85	Peak
27.040	H	15.40	0.93	24.84	80.00	10000	41.17	114.42	-38.83	Peak

Test Engineer : Wayne Hsu

6. EMI Suppression Component List

⇒No EMI suppression components.

7. Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	18.10	0.90
35	16.00	0.90
40	13.19	1.09
45	10.57	1.10
50	8.00	1.21
55	6.30	1.30
60	5.30	1.30
65	4.95	1.40
70	5.19	1.40
75	6.05	1.49
80	6.86	1.50
85	7.94	1.60
90	8.60	1.60
95	9.70	1.60
100	10.26	1.69
110	11.19	1.70
120	11.60	1.81
130	11.42	1.90
140	10.92	1.99
150	10.20	2.00
160	9.20	2.11
170	9.00	2.20
180	8.60	2.29
190	8.70	2.30
200	8.10	2.40
220	8.86	2.51
240	10.70	2.60
260	13.10	2.71
280	12.50	2.80
300	13.00	2.90
320	13.51	3.00
340	13.90	3.10
360	14.43	3.30
380	14.79	3.30
400	15.80	3.40
450	16.37	3.59
500	17.40	3.80
550	18.57	3.90
600	18.50	4.20
650	18.93	4.40
700	19.03	4.40
750	19.84	4.71
800	19.82	4.90
850	20.30	5.00
900	20.32	5.11
950	20.82	5.60
1000	21.20	5.50

8. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP	838858/037	9KHz – 7GHz	Jan. 08, 2002	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Oct. 21, 2002	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL6112B	2687	30MHz –2GHz	Dec. 21, 2002	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
Half-wave dipole antenna	R&S	HZ12 HZ13	83924403 83924503	30MHz - 1GHz	Sep. 23, 2002	Radiation (03CH03-HY)

※ Calibration Interval of instruments listed above is one year.

9. Uncertainty of Test Site

Uncertainty of Radiated Emission Measurement

Contribution	**Probability Distribution**	**3m**
Antenna factor calibration	normal(k=2)	±1
cable loss calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
Antenna Directivity	rectangular	±3
Antenna Factor V.S. Height	rectangular	±2
Antenna Factor Interpolation for Frequency	rectangular	±0.25
site imperfection	rectangular	±2
Mismatch Receiver VSWR Γ1=0.09 Antenna VSWR Γ2=0.67 Uncertainty=20log(1-Γ1*Γ2)	U-shaped	±0.54
combined standard uncertainty Ue(y)	**normal**	**±2.7**
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	**normal (k=2)**	**±5.4**

$U=\sqrt{\{(1/2)^2+(0.3/2)^2+(2^2+0.5^2+2^2+0.25^2+2^2)/3+(0.54)^2/2\}}=2.2$ for 10m test distance

$U=\sqrt{\{(1/2)^2+(0.3/2)^2+(2^2+3^2+2^2+0.25^2+2^2)/3+(0.54)^2/2\}}=2.7$ for 3m test distance

Uncertainty of Conducted Emission Measurement

Contribution	Probability Distribution	150KHz – 30MHz
Cable and I/P attenuator calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2
LISN coupling specification	rectangular	±1.5
Transducer factor frequency interpolation	rectangular	±0.2
Mismatch Receiver VSWR Γ1=0.09 LISN VSWR Γ2=0.33 Uncertainty=20log(1-Γ1*Γ2)	U-shaped	0.2
combined standard uncertainty Ue(y)	**normal**	**±1.66**
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	**normal (k=2)**	**±3.32**

$U=\sqrt{\{(0.3/2)^2+(2^2+1.5^2+0.2^2)/3+(0.2)^2/2\}}=1.66$