

FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment : Wireless Keyboard

Model No. : KW2033

FCC ID : NIYKW2033

Filing Type : Certification

Applicant : **DEXIN Corporation**
8F-8, No. 502, Yuan Shan Rd., Chung Ho City, Taipei
Hsien, Taiwan, R.O.C.

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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: Apr. 15, 2002

☒ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

for

47 CFR, Part 15, Subpart C

Equipment : Wireless Keyboard
Model No. : KW2033
FCC ID : NIYKW2033
Applicant : **DEXIN Corporation**
8F-8, No. 502, Yuan Shan Rd., Chung Ho City, Taipei
Hsien, Taiwan, R.O.C.

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 Apr. 10, 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

DEXIN Corporation
8F-8, No. 502, Yuan Shan 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 Keyboard
Model No.	: KW2033
FCC ID	: NIYKW2033
Trade Name	: DEXIN Corporation
Power Supply Type	: From Battery
Power Cord	: N/A

1.4. Feature of Equipment under Test

- ☑☑ Frequency band: 27MHz
- ☑☑ Auto sleep mode
- ☑☑ Phantom key detection
- ☑☑ Low power design for stand by state of keyboard
- ☑☑ 4K bps band rate in air
- ☑☑ ID change solution to resist interference
- ☑☑ Compatible with PS/2 Protocol

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: conduction 450 KHz to 30 MHz, radiation 30 MHz to 1000MHz.
- c. The complete test system included FIC PC, HITACHI Monitor, HP Printer, ACEEX Modem, LOGITECH PS/2 Mouse, DEXIN Receiver and EUT for EMI test.

2.2. Description of Test System

Support Unit 1. -- Personal Computer (FIC)

FCC ID	: N/A
Model No.	: P2L97
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 2. -- Monitor (HITACHI)

FCC ID	: M9U970
Model No.	: CM803ET
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0023
Data Cable	: Shielded, 360 degree via metal backshells, 1.7m

Support Unit 3. -- PS/2 Mouse (LOGITECH)

FCC ID	: DZL211029
Model No.	: M-S34
Serial No.	: SP0031
Data Cable	: Shielded, 1.7m

Support Unit 4. -- Printer (HP)

FCC ID	: B94C2642X
Model No.	: DeskJet 400
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0048
Data Cable	: Braided-Shielded, 360 degree via metal backshells, 1.35m

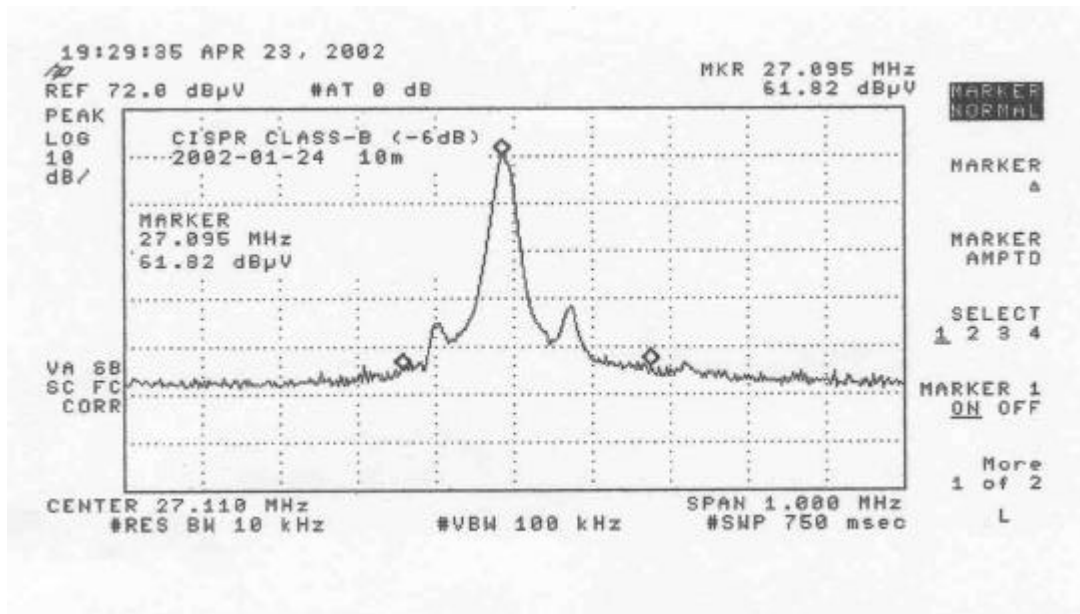
Support Unit 5. -- Modem (ACEEX)

FCC ID	: IFAXDM1414
Model No.	: DM1414
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0015
Data Cable	: Shielded, 360 degree via metal backshells, 1.15m

Support Unit 6. -- Receiver (DEXIN)

FCC ID	: N/A
Model No.	: RX2033
Serial No.	: SP0039
Data Cable	: Non-Shielded, 1.2m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

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

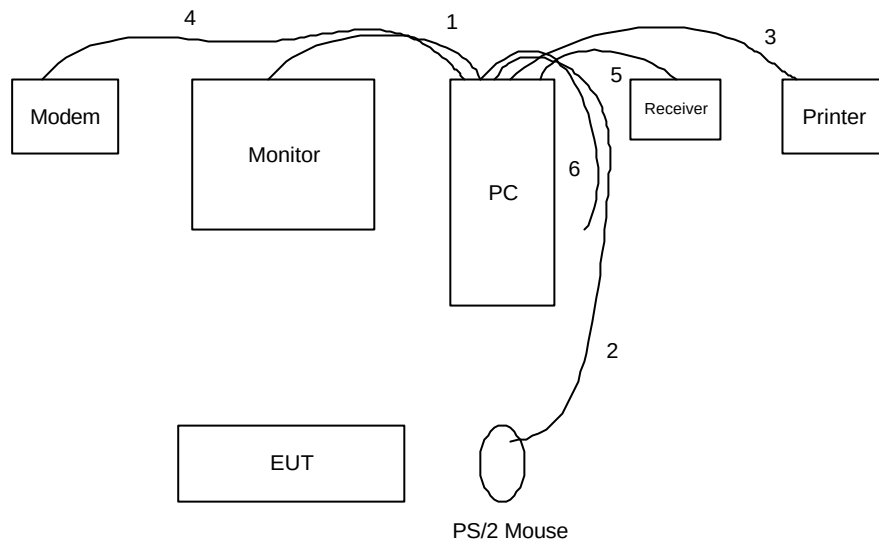


Mark 1 : 26.96MHz

Mark 3 : 27.28MHz

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 2.
2. The I/O cable is connected from PC to the support unit 3.
3. The I/O cable is connected from PC to the support unit 4.
4. The I/O cable is connected from PC to the support unit 5.
5. The I/O cable is connected from PC to the support unit 6.
6. The I/O cable is floating. (This connector is used only for mouse transmitter, not for keyboard transmitter)

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

3.2. Standard for Methods of Measurement

ANSI C63.4-1992

3.3. Test in Compliance with

FCC Part 15, Subpart C

3.4. Frequency Range Investigated

- a. Conduction: from 450 kHz to 30 MHz
- b. Radiation : from 30 MHz to 1 GHz

3.5. 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 DC power source.

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

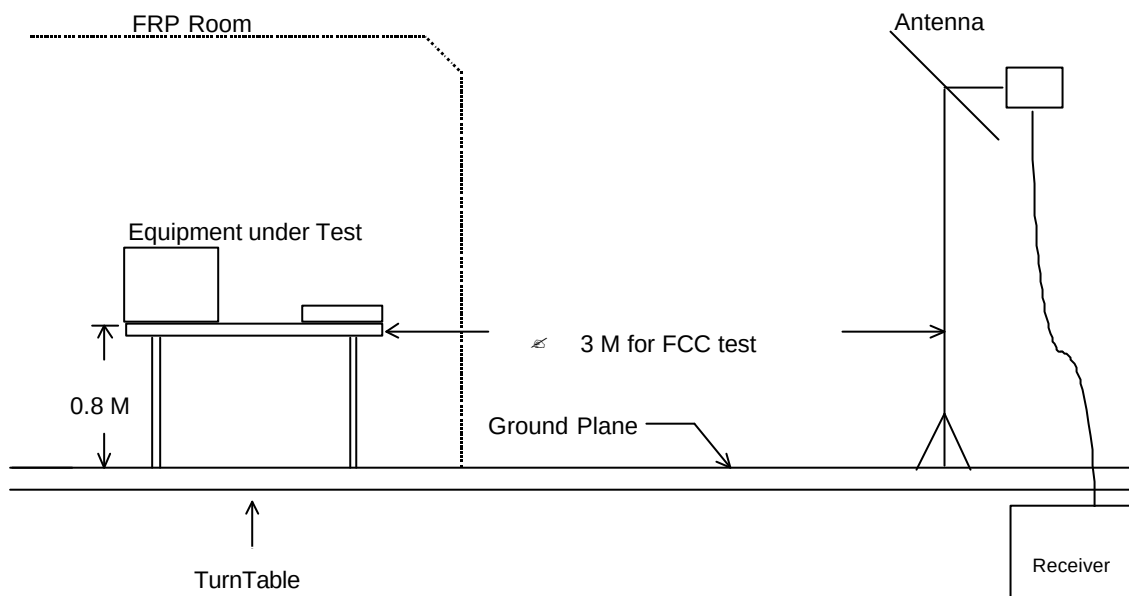
5.1.1. from 30MHz to 1GHz

EE Amplifier	(HP 87405A)
Attenuation	10 dB
RF Gain	25 dB
Signal Input	10 MHz to 1.3 GHz
EE Spectrum Analyzer	(HP 8560E)
Attenuation	10 dB
Start Frequency	30 MHz
Stop Frequency	1000 MHz
Resolution Bandwidth	1 MHz
Video Bandwidth	1 MHz
Signal Input	30 Hz to 2.9 GHz
EE Test Receiver	(R&S ESVP)
Resolution Bandwidth	120 KHz
Frequency Band	20 MHz to 1.3 GHz
Quasi-Peak Detector	ON for Quasi-Peak Mode OFF for Peak Mode

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 tune 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 6 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 6 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 : 23°C

✍ Relative Humidity : 54 %

✍ Test Date : Apr. 10, 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

735.10 MHz / 42.93 dBuV/m (VERTICAL) Antenna Height 4 Meter, Turntable Degree 183 °.

✍ Spurious Emissions:

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	(uV/m)	Emission Level (dBuV/m) (uV/m)		Margin (dB)	Detect Mode
434.30	H	16.34	1.33	24.30	46.02	200	41.97	125.46	-4.05	Peak
468.00	H	17.07	1.45	24.31	46.02	200	42.83	138.52	-3.19	Peak
500.80	H	17.76	1.67	21.47	46.02	200	40.90	110.92	-5.12	Peak
528.00	H	18.26	1.76	19.47	46.02	200	39.49	94.30	-6.53	Peak
735.20	H	18.96	1.83	21.30	46.02	200	42.09	127.20	-3.93	Peak
735.10	V	18.96	1.83	22.14	46.02	200	42.93	140.12	-3.09	Peak

✍ Field strength of fundamental and harmonics

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits (dBuV/m)	(uV/m)	Emission Level (dBuV/m) (uV/m)		Margin (dB)	Detect Mode
27.10	H	15.34	0.75	45.23	80.00	10000	61.32	1164.13	-30.16	A.V.
27.10	H	15.34	0.75	46.06	100.00	100000	62.15	1280.86	-16.53	Peak
27.10	V	15.34	0.75	47.40	100.00	100000	63.49	1494.51	-37.36	Peak
27.10	V	15.34	0.75	46.56	80.00	10000	62.65	1356.75	-23.33	A.V.

Test Engineer :



Chi Ming Chu

6. EMI Suppression Component List

1. A ferrite core is added on internal data cable.
(As the Internal photo No.1)

7. Antenna Factor & Cable Loss

Frequency (Mhz)	Antenna Factor (dB)	Cable Loss (dB)
30	17.4	0.5
35	16.5	0.4
40	14.4	0.5
45	10.8	0.6
50	7.9	0.6
55	6.8	0.6
60	5.6	0.7
65	5.8	0.7
70	6.0	0.8
75	6.7	0.5
80	7.5	0.7
85	8.8	0.7
90	10.0	0.8
95	10.8	0.8
100	11.6	0.8
110	11.8	0.8
120	11.9	0.8
130	11.7	0.7
140	11.3	0.8
150	10.9	0.9
160	10.2	1.0
170	9.5	1.0
180	9.3	0.8
190	9.4	1.1
200	9.6	1.0
220	10.8	1.0
240	12.0	1.0
260	13.0	1.2
280	13.5	1.2
300	14.1	1.3
320	14.4	1.3
340	14.7	1.3
360	15.0	1.3
380	15.3	1.3
400	15.6	1.3
450	16.7	1.3
500	17.7	1.7
550	18.7	1.8
600	19.6	1.5
650	19.2	1.8
700	18.8	1.8
750	19.0	1.8
800	19.2	2.0
850	19.8	2.2
900	20.5	2.3
950	21.4	2.7
1000	22.4	2.0

8. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer (Site 4)	HP	8560E	3728A03190	30Hz - 2.9GHz	Sep. 03, 2001	Radiation
Test Receiver (Site 4)	R&S	ESVP	893610/003	20MHz - 1.3GHz	May 04, 2001	Radiation
Amplifier (Site 4)	HP	87405A	3207A01441	10MHz - 3GHz	Aug. 14, 2001	Radiation
Bilog Antenna (Site 4)	CHASE	CBL6112A	2445	30MHz -2GHz	Feb. 08, 2002	Radiation
Half-wave dipole antenna (Site 4)	EMCO	3121C	9705-1285	28 M - 1GHz	May 17, 2001	Radiation
Turn Table (site 4)	EMCO	2080	9711-1090	0 ? 360 degree	N/A	Radiation
Antenna Mast (site 4)	EMCO	2075	9711-2114	1 m- 4 m	N/A	Radiation

※ Calibration Interval of instruments listed above is one year.

9. Uncertainty of Test Site

Uncertainty of Radiated Emission Measurement

Contribution	Probability Distribution	3m	10m
Antenna factor calibration	normal(k=2)	± 1.6	± 1.6
cable loss calibration	normal(k=2)	± 0.3	± 0.3
RCV/SPA specification	rectangular	± 2	± 2
Antenna Directivity	rectangular	± 3	± 0.5
Antenna Factor V.S. Height	rectangular	± 2	± 2
Antenna Factor Interpolation for Frequency	rectangular	± 0.25	± 0.25
site imperfection	rectangular	± 2	± 2
Mismatch Receiver VSWR ? 1=0.09 Antenna VSWR ? 2=0.67 Uncertainty=20log(1-? 1*? 2)	U-shaped	± 0.54	± 0.54
combined standard uncertainty Ue(y)	normal	± 2.8	± 2.2
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	normal (k=2)	± 5.6	± 4.4

$U = \sqrt{\{(1.6/2)^2 + (0.3/2)^2 + (3^2 + 0.5^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.6$ for 10m test distance

$U = \sqrt{\{(1.6/2)^2 + (0.3/2)^2 + (3^2 + 3^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 3.1$ for 3m test distance