

# FCC TEST REPORT

for

47 CFR, Part 15, Subpart C

Equipment : RF Mouse and Keyboard (Mouse)

Model No. : AKM-7500X, AKM-9600X, 41162B,  
A-AKM-7500X, XK-220, 86017, 86013, 86007,  
86023, WK930, AKM-7500, 0186403480,  
62052S, AKM-7500, MT134, WCPA0D

FCC ID : HQXAGM-9600

Filing Type : Certification

Applicant : **Sysgration Ltd.**  
8F, No. 542-7, Chung Cheng Rd., Hsin Tien, Taipei,  
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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# CERTIFICATE OF COMPLIANCE

for

## 47 CFR, Part 15, Subpart C

Equipment : RF Mouse and Keyboard (Mouse)

Model No. : AKM-7500X, AKM-9600X, 41162B, A-AKM-7500X,  
XK-220, 86017, 86013, 86007, 86023, WK930, AKM-7500,  
0186403480, 62052S, AKM-7500, MT134, WCPA0D

FCC ID : HQXAGM-9600

Applicant : **Sysgration Ltd.**  
8F, No. 542-7, Chung Cheng Rd., Hsin Tien, Taipei,  
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 Jul. 30, 2002 at **SPORTON International Inc.** LAB.

K. J. Lin Oct. 21, 2002

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**

Sysgration Ltd.  
8F, No. 542-7, Chung Cheng Rd., Hsin Tien City, Taipei, Taiwan, R.O.C.

### **1.2. Manufacturer**

Same as 1.1

### **1.3. Basic Description of Equipment under Test**

Equipment : RF Mouse and Keyboard (Mouse)  
Model No. : AKM-7500X, AKM-9600X, 41162B, A-AKM-7500X, XK -220, 86017, 86013, 86007, 86023, WK930, AKM-7500, 0186403480, 62052S, AKM-7500, MT134, WCPA0D  
FCC ID : HQXAGM-9600  
Trade Name : Sysgration, AGILER, ANUBIS, ASSMANN, INTERACT, EDNET, PROSERVICE, KARSTADT, SAKAR, CDC, MEDIATECH, CREATIVE  
Power Supply Type : From Battery  
AC Power Cord : N/A

### **1.4. Feature of Equipment under Test**

- Working Frequency: 27.042MHz
- Channel number: 1
- ID Number: 256
- RF output power: -2dBm  $\pm$ 2dBm
- Modulation method: FSK
- Power requirements: 3.0V, AA size battery 2 pieces
- Current Dissipation: 7mA (Typ)  $\pm$ 2mA
- Standby Mode Current: 2.5mA (Typ)  $\pm$ 0.8mA
- Sleeping Mode Current: 0.06mA (Typ)  $\pm$ 0.02Ma
- Working Distance: 1.5 meters

## 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. The complete test system included HP PC, HITACHI Monitor, HP Printer, ACEEX Modem, Sysgration Receiver, Sysgration RF Keyboard and EUT for EMI test.
- c. Frequency range investigated: radiation 30 MHz to 1000MHz.

### 2.2. Description of Test System

#### Support Unit 1. -- Personal Computer (HP)

FCC ID : N/A  
Model No. : VECTRA VL420 DT  
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 : N/A  
Model No. : DJ82  
Power Supply Type : Switching  
Power Cord : Non-Shielded  
Serial No. : SP0023  
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 3. -- Printer (HP)

FCC ID : B94C2642X  
Model No. : C2642A  
Power Supply Type : Linear  
Power Cord : Non-Shielded  
Serial No. : SP0048  
Data Cable : Shielded, 360 degree via metal backshells, 1.8m

## Support Unit 4. -- 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, 1.1m

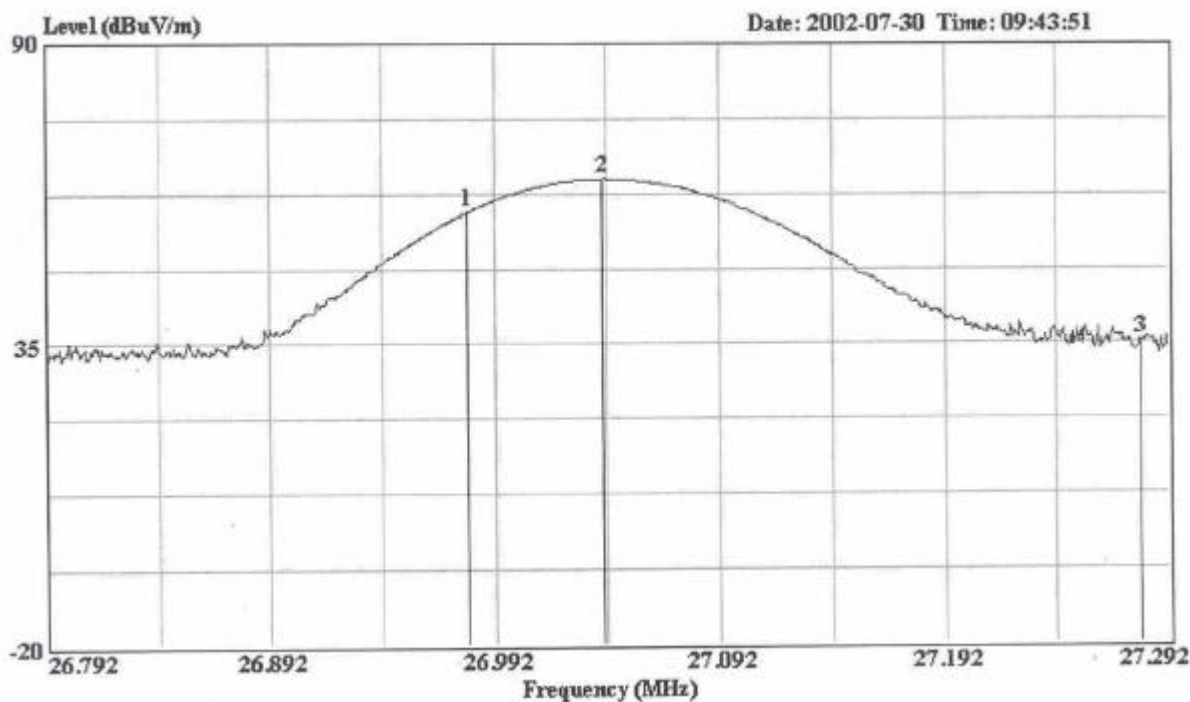
## Support Unit 5. -- Receiver (Sysgration)

FCC ID : N/A  
Model No. : AKM-7500X  
Serial No. : SP0019

## Support Unit 6. -- RF Keyboard (Sysgration)

FCC ID : HQXAKM-7500  
Model No. : AKM-7500X  
Serial No. : SP0089

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



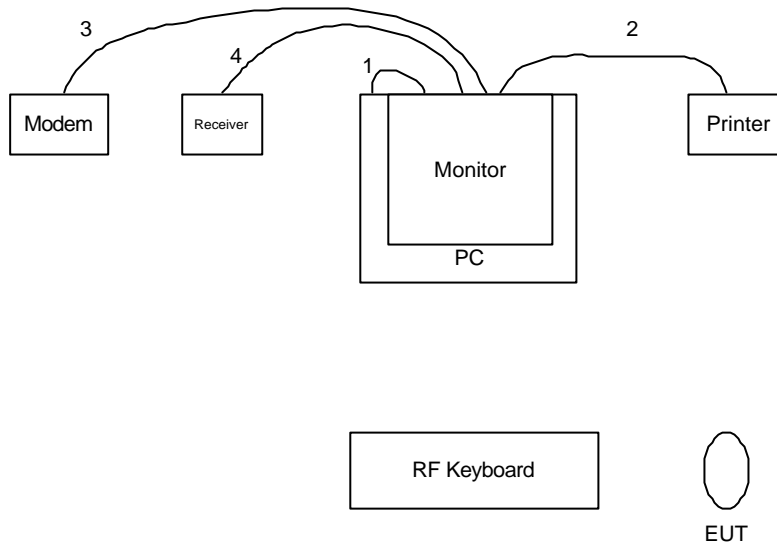
Mark 1 : 26.98MHz  
 Mark 3 : 27.28MHz

Conformation of the fundamental frequency

Frequency ( MHz )	Antenna Polarity	Cable Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits ( dBuV/m )	( uV/m )	Emission Level ( dBuV/m )	( uV/m )	Margin ( dB )	Detect Mode
26.980	H	15.40	0.93	28.95	69.54	2999	45.28	183.65	-24.26	Peak
27.040	H	15.40	0.93	35.02	80.00	10000	51.35	369.40	-28.65	Peak
27.280	H	15.40	0.93	5.05	69.54	2999	21.38	11.72	-48.16	Peak



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 EUT cable is connected from PC to the support unit 5.

### **3. General Information of Test**

#### **3.1. Test Facility**

Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park,  
Kwei-Shan Hsiag, Tao Yuan Hsien, Taiwan, R.O.C.  
TEL : 886-3-327-3456  
FAX : 886-3-318-0055

Test Site No : SH03

#### **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 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.

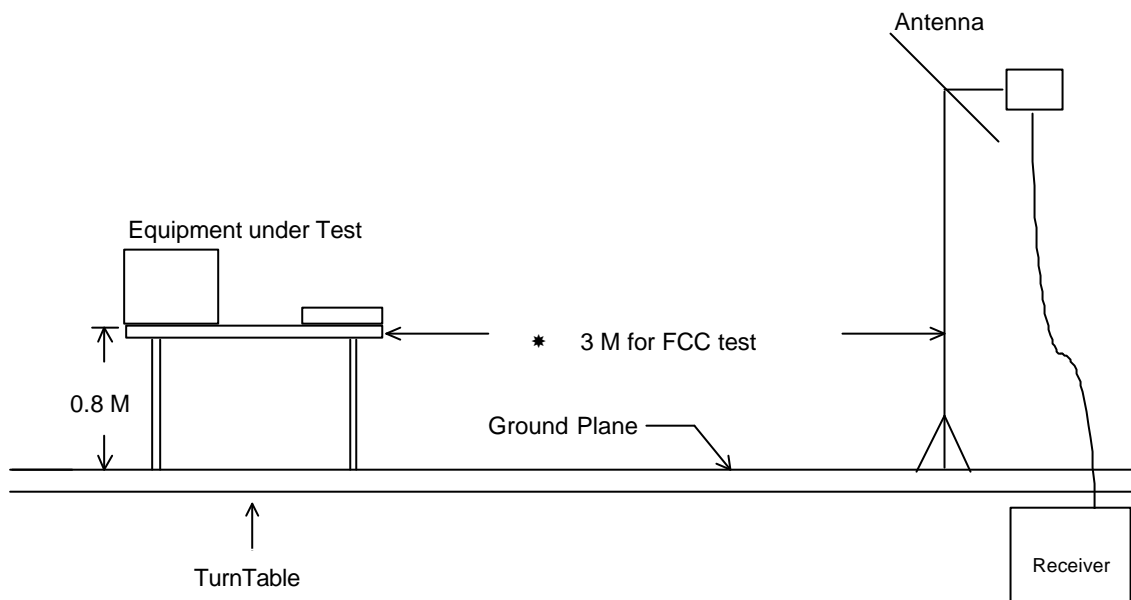
### 5.1. Major Measuring Instruments

- Amplifier (ADVANTEST BB525C)
  - Attenuation 10 dB
  - RF Gain 30 dB
  - Signal Input 9 KHz to 3 GHz
  
- Spectrum Analyzer (RAHDE&SCHEARZ & FSP7)
  - 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 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 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 : 29.4°C
- Relative Humidity : 57 %
- Test Date : Jul. 24, 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**

**433.000 MHz / 40.40 dBuV/m (HORIZONTAL) Antenna Height 2 Meter, Turntable Degree 60 °.**

Frequency ( MHz )	Polarity	Antenna Factor ( dB/m )	Cable Loss ( dB )	Reading ( dBuV )	Limits		Emission Level		Margin ( dB )	Detect Mode
					( dBuV/m )	( uV/m )	( dBuV/m )	( uV/m )		
405.000	H	16.06	3.53	14.11	46.00	200	33.70	48.42	-12.30	Peak
433.000	H	16.31	3.70	20.39	46.00	200	40.40	104.71	-5.60	Peak
458.900	H	16.56	3.85	15.70	46.00	200	36.11	63.90	-9.89	Peak
514.200	H	17.23	4.05	10.18	46.00	200	31.46	37.41	-14.54	Peak
433.000	V	16.31	3.70	13.80	46.00	200	33.81	33.81	-12.19	Peak
458.900	V	16.56	3.85	10.85	46.00	200	31.26	31.26	-14.74	Peak

Test Engineer : Wayue Hsu  
Wayue 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	0.99
35	16.00	1.07
40	13.29	1.13
45	10.75	1.20
50	8.10	1.26
55	6.40	1.32
60	5.36	1.40
65	4.94	1.41
70	5.19	1.51
75	6.05	1.57
80	6.96	1.60
85	8.04	1.70
90	8.76	1.70
95	9.70	1.75
100	10.30	1.79
110	11.17	1.93
120	11.60	1.95
130	11.23	2.01
140	10.61	2.12
150	10.10	2.20
160	9.20	2.26
170	9.01	2.33
180	8.71	2.40
190	8.80	2.52
200	8.24	2.55
220	8.80	2.64
240	10.72	2.78
260	13.20	2.89
280	12.50	2.98
300	12.96	3.11
320	13.50	3.20
340	13.93	3.25
360	14.39	3.44
380	14.70	3.63
400	15.76	3.50
450	16.35	3.82
500	17.29	4.01
550	18.50	4.16
600	18.43	4.39
650	18.85	4.72
700	18.93	4.71
750	19.75	4.83
800	19.92	5.27
850	20.24	5.22
900	20.30	5.22
950	20.46	5.54
1000	20.80	5.81

## 8. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	RAHDE & SCHEARZ	FSP7	838858/039	9KHz – 7GHz	Jan. 07, 2002	Radiation (SH03)
Amplifier	ADVANTEST	BB525C	CH300001	9KHz – 3GHz	Nov. 15, 2001	Radiation (SH03)
Bilog Antenna	SCHAFFNER	CBL61128	2681	30MHz –2GHz	Dec. 23, 2001	Radiation (SH03)
Turn Table	HD	DS 420	420/649/00	0 ~ 360 degree	N/A	Radiation (SH03)
Antenna Mast	HD	MA 240	240/559/00	1 m - 4 m	N/A	Radiation (SH03)
Half-wave dipole antenna	Schwarzbeck	UHAP VHAP	995+99 1024+1024	30MHz - 1GHz	Sep. 27, 2001	Radiation (SH03)

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 $\Gamma_1=0.09$ Antenna VSWR $\Gamma_2=0.67$ Uncertainty= $20\log(1-\Gamma_1*\Gamma_2)$	U-shaped	±0.54
<b>combined standard uncertainty Ue(y)</b>	<b>normal</b>	<b>±2.7</b>
<b>Measuring uncertainty for a level of confidence of 95% U=2Ue(y)</b>	<b>normal (k=2)</b>	<b>±5.4</b>

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

$U = \{(1/2)^2 + (0.3/2)^2 + (2^2 + 3^2 + 2^2 + 0.25^2 + 2^2) / 3 + (0.54)^2 / 2\} = 2.7$  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 $\Gamma_1=0.09$ LISN VSWR $\Gamma_2=0.33$ Uncertainty= $20\log(1-\Gamma_1*\Gamma_2)$	U-shaped	0.2
<b>combined standard uncertainty Ue(y)</b>	<b>normal</b>	<b>±1.66</b>
<b>Measuring uncertainty for a level of confidence of 95% U=2Ue(y)</b>	<b>normal (k=2)</b>	<b>±3.32</b>

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