

MEASUREMENT/TECHNICAL REPORT

APPLICANT: SPEC RESEARCH INC.

MODEL NO.: SP2000, SP3000

FCC ID: ~~OCJSP2000~~ N F S SP2000

This report concerns (check one) : **Original Grant** ☒
 Class II Change ☐

Equipment type: Mouse

Deferred grant requested per 47CFR 0.457(d)(1)(ii)?

Yes ☐ No ☒ If yes, defer until: _____ (date)

We, the undersigned, agree to notify the Commission by (date) _____ / _____ / _____ of the
intended date of announce ment of the product so that the grant can be issued on that date.

Transiyion Rules Request per 15.37?

Yes ☐ No ☒

If no, assumed Part 15, Subpart B for unintentional radiator the new 47 CFR (10-1-90 Edition)
provision.

Report Prepared

by Testing House : Neutron Engineering Inc.

for Company :

Name SPEC RESEARCH INC.

Address 16725E, Gale Ave., City of Industry, CA91745, U.S.A.

Applicant Signature :


Joseph Shih

CERTIFICATION

We hereby certify that:

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)/CISPR22(1996) 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, Subpart B/CISPR22(1996).

Prepared by : Sherry Kuo

Sherry Kuo

Reviewed by : Andy Chiu

Andy Chiu

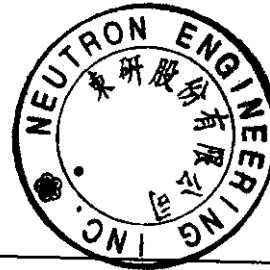
Approved by : George Yao

George Yao

Issued Date : Jan. 14, 1999

Report No. : NEI-FCCB-98221

Company Stamp :



NEUTRON ENGINEERING INC.

20, Alley 50, Lane 119, Dong Hwu Rd.,

P.O. Box 6-158, Nei Hwu,

Taipei, Taiwan

TEL : (02) 2633-6872 FAX : (02) 2633-4578

Table of Contents

| | |
|---|----|
| 1. General Information | |
| 1-1 Product Description | 4 |
| 1-2 Related Submittal(s)/Grant(s) | 4 |
| 1-3 Tested System Details | 5 |
| 1-4 Test Methodology | 6 |
| 1-5 Test Facility | 6 |
| 2. Product Labelling | |
| Figure 2-1 FCC ID Lable | 7 |
| Figure 2-2 Location of Label on EUT | 7 |
| 3. System Test Configuration | |
| 3-1 Justification | 8 |
| 3-2 EUT Exercise Software | 8 |
| 3-3 Special Accessories | 9 |
| 3-4 Equipment Modifications | 9 |
| 3-5 Configuration of Tested System | 10 |
| Figure 3-1 Configuration of Tested System | 12 |
| 4. Block Diagram(s) | 13 |
| 5. Conducted and Radiated Measurement Photos | 14 |
| Figure 5-1. Conducted Measurement Photos | 14 |
| Figure 5-2 Radiated Emission Data | 15 |
| 6. Conducted Emission Datas | 16 |
| 7. Radiated Emission Datas | 17 |
| 7-1 Reaiated Emission Data | 17 |
| 7-2 Field Strength Calculation | 18 |
| 7-3 Correction Factor Table VS Frequency | 19 |
| 8. Attachment | |
| Photos of Tested EUT | 20 |
| User Manual | 21 |

1-3. Tested System Details

The FCC IDs for all equipments, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

| Model No. | FCC ID | Equipment | Cable |
|-----------|----------------|-----------|--|
| SP2000 | OCJSP20000 (1) | Mouse | Shielded Data Cable |
| 93V | ANO6282 | PC | Shielded Power Cord |
| 4500DC-E | GWGMULTI82 | Monitor | Shielded Data Cable ⁽²⁾ Un-Shielded Power Cord |
| HP2225C+ | DSI6XU2225 | Printer | Shielded Parallel Data Cable Un-Shielded Power Cord |
| AT-1200CK | E2O5OV1200CK | Modem | Shielded Serial Data Cable Un-Shielded Power Cord |
| FDA-102A | F4Z4K3FDA-102A | Keyboard | Shielded Data Cable |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Notes:

(1) EUT submitted for grant.

(2) Monitor's attached video cable without ferrite core.

1-4. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (1992)/CISPR 22(1996). Radiated testing was performed at an antenna to EUT distance 10 meters.

1-5. Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of No. 5, All 2, Lane 220, Kang Lo St., Nei Hwu, Taipei, Taiwan, R.O.C. of NEUTRON ENGINEERING INC. This site has been fully described in report dated Feb.4, 1998 Submitted to your office, and accepted in a letter dated March 28, 1998 (31040/SIT-1300F2).

3. System Test Configuration

3-1. Justification

The system was configured for testing in a typical fashion (as a customer would normally use it). The mouse was connected to support equipment-keyboard. Peripherals of PC, such as monitor, keyboard, modem and printer were contained in this system in order to comply with the ANSI C63.4/CISPR 22(1996) Rules requirement. The PC operated in the default 640x480/31.5KHz VGA Graphic mode. This operating condition was tested and used to collect the included data.

3-2. EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software, contained on a 3-1/2 inch disk, was inserted into driver A and is auto-starting on power-up. Once loaded, the program sequentially exercises each system component in turn. The sequence used is:

1. Read (write) from (to) mass storage device (Disk).
2. Send "H" pattern to video port device (Monitor).
3. Send " H " pattern to parallel port device (Printer).
4. Send " H " pattern to COM port device (Modem).
5. Repeated from 1 to 4 continuously.

As the Keyboard and mouse are strictly input devices, no data is transmitted to (from) them during test. They are, however, continuously scanned for data input activity.

3-3. Special Accessories

Not available for this EUT intended for grant.

3-4. Equipment Modifications

Not available for this EUT intended for grant.

Applicant Signature :

Joseph Shih
Joseph Shih

Date :

Jan. 14, 1999

Type/Printed Name :

Position :

President

3.5 Configuration of Tested System

The configuration of tested system is described as the block diagram shown in next page Figure 3.1 and details information of I/O cable and power cord connection are tabulated as Table A and B. The monitor is powered from a floor mounted receptacle (referred to as the wall outlet in the previous described) was tested.

TABLE A - Test Equipment

| Item | Equipment | Mfr. | Model/Type No. | I/O Port | FCC ID | Remarks |
|------|-----------|-------------|----------------|----------------|----------------|---------|
| E-1 | PC | IBM | 93V | | ANO6282 | |
| E-2 | Monitor | TECO | RE995B | VGA Port | E80TE995 | |
| E-3 | Mouse | SPEC | SP2000 | PS/2 Port | OCJSP2000 | EUT |
| E-4 | Printer | HP | HP2225C+ | Centronic Port | DSI6XU2225 | |
| E-5 | Modem | Datatronics | AT-1200CK | Com Port | E205OV1200CK | |
| E-6 | Keyboard | Forward | FDA-102A | PS/2 Port | F4Z4K3FDA-102A | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Remark:

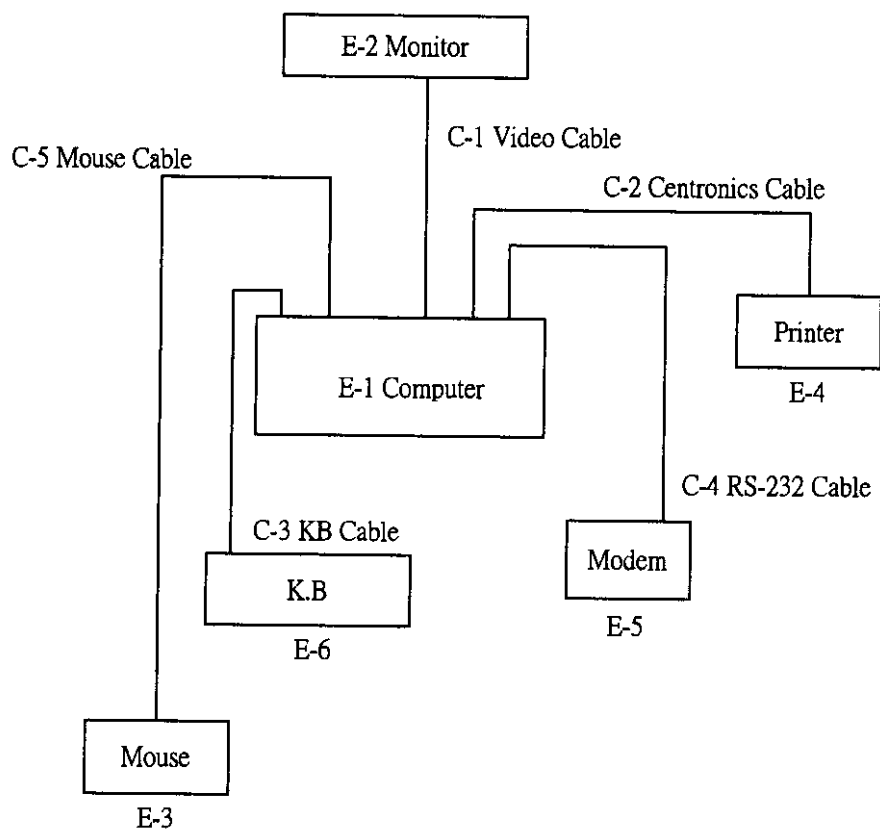
- (1) Unless otherwise denoted as EUT in 'Remark' column, device(s) used in tested system is a support equipment.
- (2) Unless otherwise marked as ※ in 'Remark' column, Neutron consigns the supporting equipment(s) to the tested system.

Table B. - Informations Cable Information

| Item | I/O Cable | Device Connected | Shielded | Ferrite Core | Detachable/Permanently | Length | Note |
|------|------------------|------------------|----------|--------------|----------------------------------|--------|------|
| C-1 | VGA Cable | PC-Monitor | Yes | No | Permanently attached on Monitor | 150cm | |
| C-2 | Centronics Cable | PC-Printer | Yes | No | Part of Printer, Detachable | 200cm | |
| C-3 | Keyboard Cable | PC-Keyboard | Yes | No | Permanently attached on Keyboard | 200cm | |
| C-4 | RS-232C Cable | PC-Modem | Yes | No | Part of Modem, Detachable | 180cm | |
| C-5 | Mouse Cable | PC-Mouse | Yes | No | Permanently attached on Mouse | 180cm | ※ |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Note:

- (1) Unless otherwise marked as ※ in 「Remark」 colum, Neutron consigns the supporting equipment(s) to the tested system.

Figure 3.1 Configuration of Tested System

4. Block Diagram(s)

Figure 4.1 Block diagram of system, Page 13.A

6. Conducted Emission Datas

6.1 The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Judgement: Passed by **-12.78 dB** in mode of **Neutral** terminal **0.51 MHz**

| Freq. (MHz) | Terminal L/N | Measured(dBuV) | | Limits(dBuV) | | Safe Margins (dBuV) | |
|----------------|-----------------|----------------|---------|--------------|---------|------------------------|------|
| | | QP-Mode | AV-Mode | QP-Mode | AV-Mode | | Note |
| 0.28 | Line | 46.01 | * | 60.76 | 50.76 | -14.75 | (QP) |
| 0.36 | Line | 43.29 | * | 58.71 | 48.71 | -15.42 | (QP) |
| 0.63 | Line | 41.72 | * | 56.00 | 46.00 | -14.28 | (QP) |
| 0.76 | Line | 42.48 | * | 56.00 | 46.00 | -13.52 | (QP) |
| 6.06 | Line | 42.28 | * | 60.00 | 50.00 | -17.72 | (QP) |
| 0.28 | Neutral | 45.49 | * | 60.85 | 50.85 | -15.36 | (QP) |
| 0.51 | Neutral | 43.22 | * | 56.00 | 46.00 | -12.78 | (QP) |
| 0.63 | Neutral | 41.91 | * | 56.00 | 46.00 | -14.09 | (QP) |
| 0.76 | Neutral | 43.19 | * | 56.00 | 46.00 | -12.81 | (QP) |
| 6.09 | Neutral | 43.63 | * | 60.00 | 50.00 | -16.37 | (QP) |

Remark :

- (1) Reading in which marked as QP means measurements by using are Quasi-Peak Mode with Detector BW=9KHz ; SPA setting in RBW=100KHz, VBW =100KHz, Swp. Time = 0.3 sec./MHz . Reading in which marked as AV means measurements by using are Average Mode with instrument setting in RBW=1MHz, VBW=10Hz, Swp. Time =0.3 sec./MHz .
- (2) All readings are QP Mode value unless otherwise stated AVG in colum of 『Note』 . If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemed to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform . In this case, a " * " marked in AVG Mode colum of Interference Voltage Measured .
- (3) Measuring frequency range from 150KHz to 30MHz .

Review :  Test Personnel. :  Date: Dec. 7, 1998

7. Radiated Emission Datas

7.1 The following data lists the significant emission frequency, measured levels, correction factor (includes cable and antenna corrections), the corrected reading, as well as the limit. Explanation of the Correction Factor is given in paragraph 7.2.

Judgement: Passed by **-3.35 dB** in polarity of **Horizontal 31.40 MHz**

| Freq. (MHz) | Ant. H/V | Reading(RA) (dBuV) | Corr.Factor(CF) (dB) | Measured(FS) (dBuV/m) | Limits(QP) (dBuV/m) | Safe Margins (dBuV/m) | Note |
|----------------|-------------|-----------------------|-------------------------|--------------------------|------------------------|--------------------------|------|
| 31.40 | H | 31.82 | - 5.17 | 26.65 | 30.00 | - 3.35 | |
| 70.10 | H | 30.15 | - 8.20 | 21.95 | 30.00 | - 8.05 | |
| 70.30 | V | 32.69 | - 8.24 | 24.45 | 30.00 | - 5.55 | |
| 131.70 | V | 28.41 | - 2.77 | 25.64 | 30.00 | - 4.36 | |
| 151.70 | V | 27.25 | - 2.61 | 24.64 | 30.00 | - 5.36 | |
| 157.80 | H | 24.93 | - 1.75 | 23.18 | 30.00 | - 6.82 | |
| 226.40 | V | 25.89 | - 3.72 | 22.17 | 30.00 | - 7.83 | |
| 228.80 | H | 23.17 | - 3.56 | 19.61 | 30.00 | - 10.39 | |
| 298.40 | H | 29.13 | 1.36 | 30.49 | 37.00 | - 6.51 | |
| 332.35 | H | 31.49 | 1.56 | 33.05 | 37.00 | - 3.95 | |
| 365.60 | V | 24.98 | 1.99 | 26.97 | 37.00 | - 10.03 | |
| 461.60 | V | 25.54 | 5.12 | 30.66 | 37.00 | - 6.34 | |

Remark :

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=1MHz, VBW=1MHz, Swp. Time = 0.3 sec./MHz.
- (2) All readings are Peak unless otherwise stated QP in column of 'Note'. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (3) Measuring frequency range from 30MHz to 1000MHz.
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table.

Review :

Test Personnel :

Date:

Dec. 7, 1998

7-2. Field Strength Calculation

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

$$FS = RA + AF + CF - AG$$

Where **FS = Field Strength**

RA = Receiver Amplitude

AF = Antenna Factor (1)

CF = Cable Attenuation Factor (1)

AG = Amplifier Gain (1) (2)

Remark :

(1) The Correction Factor = $AF + CF - AG$, as shown in the data tables' Correction Factor column.

(2) AG is not available for Neutron's Open Site Facility

Example of Calculation:

Assume a Receiver Reading of 23.7 dBuV is obtained with an Antenna Factor of 7.2 dBuV and a Cable Factor of 1.1 dBuV. Then:

1. The Correction Factor will be calculated by

$$\text{Correction Factor} = AF + CF - AG = 7.2 + 1.1 - 0 = 8.3 \text{ (dBuV)}$$

as shown in the data tables' Correction Factor column.

2. The Field Strength will be calculated by

$$FS = RA + \text{Correction Factor} = 23.7 + 8.3 = 32 \text{ (dBuV)}.$$

FS is the value shown in the data tables' Corrected Reading column and RA is the value shown in

the data tables' Receiver Reading column. The 32 dBuV/m value was mathematically converted to its corresponding level in uV/m as:

$$\text{Log}^{-1} \left[(32.0 \text{ dBuV/m}) / 20 \right] = 39.8 \text{ (uV/m)}$$

7-3. Correction Factor VS Frequency

| Frequency (MHz) | Antenna Factor (dB) | Cable Loss (dB) |
|-----------------|---------------------|-----------------|
| 30.00 | 11.10 | 0.20 |
| 35.00 | 10.80 | 0.00 |
| 40.00 | 11.20 | 0.40 |
| 45.00 | 11.50 | 0.40 |
| 50.00 | 11.30 | 0.90 |
| 55.00 | 10.50 | 0.00 |
| 60.00 | 9.90 | 0.00 |
| 65.00 | 8.70 | 0.20 |
| 70.00 | 7.60 | 0.00 |
| 75.00 | 6.40 | 0.50 |
| 80.00 | 6.10 | 0.10 |
| 85.00 | 7.00 | 0.80 |
| 90.00 | 8.00 | 0.30 |
| 95.00 | 10.00 | 0.40 |
| 100.00 | 11.20 | 0.60 |
| 110.00 | 12.60 | 0.60 |
| 120.00 | 13.00 | 0.60 |
| 130.00 | 12.50 | 0.50 |
| 140.00 | 12.00 | 0.20 |
| 150.00 | 12.00 | 1.00 |
| 160.00 | 13.20 | 1.20 |
| 170.00 | 14.80 | 1.60 |
| 180.00 | 16.30 | 1.90 |
| 190.00 | 17.00 | 1.90 |
| 200.00 | 17.30 | 1.40 |
| 225.00 | 10.50 | 1.10 |
| 250.00 | 11.70 | 2.00 |
| 275.00 | 12.80 | 2.40 |
| 300.00 | 14.50 | 2.40 |
| 325.00 | 14.00 | 1.90 |
| 350.00 | 14.20 | 2.40 |
| 375.00 | 14.60 | 2.90 |
| 400.00 | 15.10 | 2.70 |
| 450.00 | 16.20 | 3.20 |
| 500.00 | 17.60 | 3.70 |
| 550.00 | 17.80 | 3.90 |
| 600.00 | 18.40 | 4.30 |
| 650.00 | 19.50 | 4.00 |
| 700.00 | 20.80 | 4.10 |
| 750.00 | 20.50 | 5.30 |
| 800.00 | 21.10 | 5.90 |
| 850.00 | 22.40 | 5.80 |
| 900.00 | 23.50 | 5.50 |
| 950.00 | 24.00 | 6.30 |
| 1000.00 | 24.80 | 5.20 |

8. Photos of Tested EUT:

1. Photo # 1. SP2000 Front View
2. Photo # 2. SP2000 Rear View
3. Photo # 3. SP2000 Unit Partially Disassembled
4. Photo # 4. SP2000 Unit Partially Disassembled
5. Photo # 5. SP2000 Unit Partially Disassembled
6. Photo # 6. SP2000 Unit Partially Disassembled
7. Photo # 7. SP3000 Front View
8. Photo # 8. SP3000 Rear View
9. Photo # 9. SP3000 Unit Partially Disassembled
10. Photo # 10. SP3000 Unit Partially Disassembled
11. Photo # 11. SP3000 Unit Partially Disassembled
12. Photo # 12. SP3000 Unit Partially Disassembled