

AQ6-7DR15

*EXHIBIT D*

CKC TEST REPORT



**CERTIFICATION TEST REPORT**

**FOR THE**

**KEYBOARD, RT7D5JTW**

**FCC/CISPR 22/85**

**CLASS B COMPLIANCE**

**DATE OF ISSUE: AUGUST 31, 1998**

**PREPARED FOR:**

NMB Technologies  
9730 Independence Ave  
Chatsworth, CA 91311

P.O. No: Q010979  
W.O. No: 69806

Report No: **FB98-118**

**DOCUMENTATION CONTROL:**

\_\_\_\_\_  
Tracy Phillips  
Documentation Control Supervisor  
CKC Laboratories, Inc.

**PREPARED BY:**

Joyce Walker  
CKC Laboratories, Inc.  
5473A Clouds Rest  
Mariposa, CA 95338

Date of test: August 25 & 26, 1998

**APPROVED BY:**

\_\_\_\_\_  
Dennis Ward  
Director of Laboratories  
CKC Laboratories, Inc.

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ACA/NATA (Australia); SABS (South Africa); SWEDAC (Sweden); TUV Rheinland-Germany; TUV Rheinland-Korea; TUV Rheinland-Russia; Radio Communication Agency (RA); NEMKO (Norway).

## **ADMINISTRATIVE INFORMATION**

**DATE OF TEST:** August 25 & 26, 1998

**PURPOSE OF TEST:** To demonstrate the compliance of the Keyboard, RT7D5JTW, with the requirements for FCC/CISPR 22/85 Class B devices.

**MANUFACTURER:** NMB Technologies  
9730 Independence Ave  
Chatsworth, CA 91311

**REPRESENTATIVE:** Bob Dickerman

**TEST LOCATION:** CKC Laboratories, Inc.  
110 Olinda Place  
Brea, CA 92621

**TEST PERSONNEL:** Stu Yamamoto

**TEST METHOD:** ANSI C63.4 1992

**FREQUENCY RANGE TESTED:** 150kHz – 1000MHz

**EQUIPMENT UNDER TEST:** Keyboard  
Manuf: NMB Technologies, Inc  
Model: RT7D5JTW  
Serial:  
FCC ID:

## SUMMARY OF RESULTS

The NMB Technologies Keyboard, RT7D5JTW was tested in accordance with ANSI C63.4 (1992) for compliance with the Class B requirements of the FCC/CISPR 22/85 Rules.

As received, the above equipment was found to be fully compliant with the Class B limits of FCC/CISPR 22/85 for both radiated and conducted emissions.

## EQUIPMENT UNDER TEST (EUT) DESCRIPTION

Keyboard, Computer HID serial input device.

## MEASUREMENT UNCERTAINTY

Associated with data in this report is a  $\pm 4$ dB measurement uncertainty.

## PERIPHERAL DEVICES

The EUT was tested with the following peripheral devices:

### Computer

Manuf: Intel  
Model: S100EDZ8FLC  
Serial: A05721230  
FCC ID: EJMBATTAHITI

### Modem

Manuf: Hayes  
Model: 6802US  
Serial: B10068023649  
FCC ID: BFI9D9 6802US

### Modem

Manuf: Hayes  
Model: 6802US  
Serial: A00768023303  
FCC ID: BFI9D9 6802US

### Monitor

Manuf: HP  
Model: D2806B  
Serial: KR54366896  
FCC ID: CSYSC-528UXH

### Printer

Manuf: HP  
Model: C2184A  
Serial: CN5B21R1DM  
FCC ID: B94C2184X

### Mouse

Manuf: Microsoft  
Model: MUS9J  
Serial: 0003468  
FCC ID: EMJMUSJP

## REPORT OF MEASUREMENTS

The following Tables 1 and 2 report the six highest radiated and conducted emissions levels recorded during the tests performed on the Keyboard, RT7D5JTW. The data sheets from which these tables were compiled are contained in Appendix B.

Table 1: Six Highest Radiated Emission Levels

| FREQUENCY<br>MHz | METER<br>READING<br>dBμV | CORRECTION FACTORS |           |             |            | CORRECTED<br>READING<br>dBμV/m | SPEC<br>LIMIT<br>dBμV/m | MARGIN<br>dB | NOTES |
|------------------|--------------------------|--------------------|-----------|-------------|------------|--------------------------------|-------------------------|--------------|-------|
|                  |                          | Ant<br>dB          | Amp<br>dB | Cable<br>dB | Dist<br>dB |                                |                         |              |       |
| 49.929           | 42.4                     | 11.0               | -27.9     | 1.4         |            | 26.9                           | 30.0                    | -3.1         | VQ    |
| 74.897           | 47.6                     | 6.2                | -28.1     | 1.9         |            | ✓ 27.6                         | 30.0                    | -2.4         | HDQ   |
| 110.592          | 37.4                     | 14.0               | -27.8     | 2.2         |            | 25.8                           | 30.0                    | -4.2         | HQ    |
| 119.981          | 34.4                     | 15.7               | -27.7     | 2.4         |            | 24.8                           | 30.0                    | -5.2         | HQ    |
| 166.180          | 32.5                     | 17.5               | -28.0     | 2.9         |            | 24.9                           | 30.0                    | -5.1         | VQ    |
| 731.231          | 30.3                     | 22.6               | -27.2     | 7.1         |            | 32.8                           | 37.0                    | -4.2         | HQ    |

Test Method:  
Spec Limit :  
Test Distance:

ANSI C63.4 1992  
FCC Class B  
10 Meters

NOTES:

H = Horizontal Polarization  
V = Vertical Polarization  
N = No Polarization  
D = Dipole Reading  
Q = Quasi Peak Reading  
A = Average Reading

11  
47.6  
6.2  
1.9  
55.7  
-28.1  
27.6

COMMENTS: The EUT is a keyboard and is connected to the host computer. The computer also has a monitor, mouse, printer, and two modems connected. The EUT is continually sending H's to the computer and the H's are being displayed on the monitor. Voltage to computer is 120 VAC, 60 Hz. Temperature: 23°C Humidity: 53%.

**Table 2: Six Highest Conducted Emission Levels**

| FREQUENCY<br>MHz | METER<br>READING<br>dB $\mu$ V | CORRECTION FACTORS |  |  |  | CORRECTED<br>READING<br>dB $\mu$ V | SPEC<br>LIMIT<br>dB $\mu$ V | MARGIN<br>dB | NOTES |
|------------------|--------------------------------|--------------------|--|--|--|------------------------------------|-----------------------------|--------------|-------|
|                  |                                | Lisn<br>dB         |  |  |  |                                    |                             |              |       |
| 0.203283         | 44.8                           | 0.0                |  |  |  | 44.8                               | 53.5                        | -8.7         | B     |
| 0.398209         | 35.9                           | 0.0                |  |  |  | 35.9                               | 47.9                        | -12.0        | B     |
| 0.469279         | 37.3                           | 0.0                |  |  |  | 37.3                               | 46.5                        | -9.2         | B     |
| 0.593652         | 36.4                           | 0.0                |  |  |  | 36.4                               | 46.0                        | -9.6         | B     |
| 1.191820         | 34.5                           | 0.0                |  |  |  | 34.5                               | 46.0                        | -11.5        | W     |
| 3.135687         | 34.1                           | 0.0                |  |  |  | 34.1                               | 46.0                        | -11.9        | W     |

Test Method: ANSI C63.4 1992  
Spec Limit : FCC Class B  
Test Distance: No Distance

NOTES: Q = Quasi Peak Reading  
A = Average Reading  
B = Black Lead  
W = White Lead

COMMENTS: The EUT is a keyboard and is connected to the host computer. The computer also has a monitor, mouse, printer, and two modems connected. The EUT is continually sending H's to the computer and the H's are being displayed on the monitor. Voltage to computer is 120 VAC 60 Hz. Temperature: 23°C Humidity: 53%.

**TABLE A****LIST OF TEST EQUIPMENT****VCCI Acceptance No. R-301 & C-314**

1. Spectrum Analyzer, Hewlett Packard, Model No. 8568A, S/N 2049A01287. Display  
85680A S/N 2106A02109.
2. Preamp, Hewlett Packard, Model No. 8447D, S/N 1937A02548.
3. Quasi-Peak Adapter, Hewlett Packard, Model No. 85650A, S/N – 3303A01884.
4. Biconical Antenna, A & H Systems, Model No. SAS-200/540, S/N 220.
5. Log Periodic Antenna, A & H Systems, Model No. SAS-200/516, S/N 331.
6. Power Analyzer, Voltech, Model PM3000A v2.11, S/N 1730.
7. LISN, Solar Electronics, Model No. 50 uH, S/N Brea #2.
8. Test software, EMI Test 2.91.

## EUT SETUP

The equipment under test (EUT) and the peripherals listed were setup in a manner that represented their normal use, as shown in the setup photographs in Appendix A. Any special conditions required for the EUT to operate normally are identified in the comments that accompany Table 1 for radiated emissions, and Table 2 for conducted emissions. Additionally, a complete description of all the ports and I/O cables is included on the information sheets contained in Appendix A.

During radiated emissions testing, the EUT was mounted on a nonconductive, rotating table 80 cm above the conductive grid. The nonconductive table dimensions were 1 meter by 1.5 meters. This configuration is typical for radiated emissions testing of table top devices.

I/O cables were connected to the EUT and peripherals in the manner required for normal operation of the system. Excess cabling was bundled in the center in a serpentine fashion using 30-40 centimeter lengths.

During conducted emissions testing, the EUT was located 80 centimeters above the conducting ground plane on the same nonconducting table as was used for radiated testing. The metal plane was grounded to the earth through the green wire safety ground. Power to the Host PC was provided via 3 meters of shielded power cable from a filter grounded to the metal plane to a LISN. The LISN was also grounded to the plane and attached to the LISN was a 4 ganged grounded outlet whose source was also shielded and 60 cm in length. All other objects were kept a minimum of 1 meter away from the EUT during the conducted test.

## TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed in Table A were used to collect both the radiated and conducted emissions data for the Keyboard, RT7D5JTW. For radiated measurements below 300 MHz, the biconical antenna was used. For frequencies from 300 to 1000 MHz, the log periodic antenna was used. All antennas were located at a distance of 10 meters from the edge of the EUT. Conducted emissions tests required the use of the FCC type LISN's.

The HP spectrum analyzer was used for all measurements. Table B shows the analyzer bandwidth settings that were used in designated frequency bands. For conducted emissions, a reference level of 100 dB $\mu$ V and a vertical scale size of 10 dB per division were used. A 10 dB external attenuator was also used during conducted tests, with internal offset correction in the analyzer. During radiated testing, the measurements were made with 0 dB of attenuation, a reference level of 97 dB $\mu$ V, and a vertical scale of 10 dB per division.

TABLE B : ANALYZER BANDWIDTH SETTINGS PER FREQUENCY RANGE

| TEST                | BEGINNING FREQUENCY | ENDING FREQUENCY | BANDWIDTH SETTING |
|---------------------|---------------------|------------------|-------------------|
| CONDUCTED EMISSIONS | 150 kHz             | 30 MHz           | 9 kHz             |
| RADIATED EMISSIONS  | 30 MHz              | 1000 MHz         | 120 kHz           |

## **SPECTRUM ANALYZER DETECTOR FUNCTIONS**

The notes that accompany the measurements contained in Tables 1 and 2 indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "Peak" mode. Whenever a "Quasi-Peak" or "Average" reading is listed as one of the six highest readings, this is indicated as a "Q" or an "A" in Table 1 or Table 2. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data for the Keyboard. RT7D5JTW.

### **Peak**

In this mode, the Spectrum Analyzer or test engineer recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature of the analyzer called "peak hold," the analyzer had the ability to measure transients or low duty cycle transient emission peak levels. In this mode the analyzer made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

### **Quasi-Peak**

When the true peak values exceeded or were within 2 dB of the specification limit, quasi-peak measurements were taken using the HP 85650A Quasi-Peak Adapter for the HP 8568B Spectrum Analyzer. The detailed procedure for making quasi peak measurements contained in the HP Quasi-Peak Adapter manual were followed.

### **Average**

For frequencies below 30MHz and exceeding 1 GHz, average measurements may be made using the spectrum analyzer. To make these measurements, the test engineer reduces the video bandwidth on the analyzer until the modulation of the signal is filtered out. At this point the analyzer is set into the linear mode and the scan time is reduced.

## TEST METHODS

The radiated and conducted emissions data of the Keyboard, RT7D5JTW, was taken with the HP Spectrum Analyzer. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the "Sample Calculations". The corrected data was then compared to the FCC/CISPR 22/85 Class B emissions limits to determine compliance.

Preliminary and final measurements were taken in order to better ensure that all emissions from the EUT were found and maximized.

### Radiated Emissions Testing

During the preliminary radiated scan, the EUT was powered up and operating in its defined FCC test mode, with the I/O cables and line cords facing the antenna. The frequency range of 30 MHz - 88 MHz was then scanned with the biconical antenna located about 1.5 meter above the ground plane in the vertical configuration. During this scan, the turntable was rotated and all peaks which were at or near the limit were recorded. The frequency range of 100 - 300 MHz was scanned in the same manner, using the biconical antenna, and the peaks recorded. Lastly, a scan of the FM band from 88 - 110 MHz was made, using a reduced resolution bandwidth and a reduced frequency span. The biconical antenna was changed to the horizontal polarity and the above steps were repeated. After changing to the log periodic antenna in the horizontal configuration, the frequency range of 300 - 1000 MHz was scanned. The log periodic antenna was changed to the vertical polarity and the frequency range of 300 - 1000 MHz was again scanned. Care was taken to ensure that no frequencies were missed within the FM and TV bands. An analysis was performed to determine if the signals that were at or near the limit were caused by an ambient transmission. If unable to determine by analysis, the equipment was powered down to make the final determination if the EUT was the source of the emission.

For the final radiated scan, the equipment was again positioned with its I/O and power cables facing the antenna. A thorough scan of all frequencies was manually made using a small frequency span, rotating the turntable as needed. Comparison with the previously recorded measurements was then made.

Using the peak readings from both scans as a guide, the test engineer then maximized the readings with respect to the table rotation, antenna height and configuration of the peripherals and cables. Maximizing of the cables was achieved by monitoring the spectrum analyzer on a closed circuit television monitor while the EUT cables were being moved and rearranged on the EUT table for maximum emissions. Photographs showing the final worst case configuration of the EUT are contained in Appendix A.

### Conducted Emissions Testing

For conducted emissions testing, a 30 to 50 second sweep time was used for automated measurements in the frequency bands of 150 kHz to 1.705 MHz, 1.705 MHz to 3 MHz, and 3 MHz to 30 MHz. All readings within 20 dB of the limit were recorded. At frequencies where the recorded emissions were close to the limit, further investigation was performed manually at a slower sweep rate.

### **SAMPLE CALCULATIONS**

The basic spectrum analyzer reading was converted using correction factors as shown in the six highest emissions readings in Tables 1 and 2. For radiated emissions in dB $\mu$ V/m, the spectrum analyzer reading in dB $\mu$ V was corrected by using the following formula:

$$\begin{aligned} & \text{Meter reading (dB}\mu\text{V)} \\ & + \text{Antenna Factor (dB)} \\ & + \text{Cable Loss (dB)} \\ & - \text{Distance Correction (dB)} \\ & - \text{Pre-amplifier Gain (dB)} \\ & = \text{Corrected Reading (dB}\mu\text{V/m)} \end{aligned}$$

This reading was then compared to the applicable specification limit to determine compliance. For conducted emissions, no correction factors were needed when 50  $\mu$ H LISN's were used.

**APPENDIX A**  
**INFORMATION ABOUT THE EQUIPMENT UNDER TEST**

### INFORMATION ABOUT THE EQUIPMENT UNDER TEST

|                                   |                 |
|-----------------------------------|-----------------|
| Test Software/Firmware:           |                 |
| CRT was displaying:               | Scrolling "H's" |
| Power Supply Manufacturer:        |                 |
| Power Supply Part Number:         |                 |
| AC Line Filter Manufacturer:      |                 |
| AC Line Filter Part Number:       |                 |
| Line voltage used during testing: | 120V 60Hz       |

### I/O PORTS

| Type             | # |
|------------------|---|
| Serial, Keyboard | 1 |

### CRYSTAL OSCILLATORS

| Type                 | Freq In MHz |
|----------------------|-------------|
| RC Resonator (Clock) | 4           |

### PRINTED CIRCUIT BOARDS

| Function         | Model & Rev   | Clocks, MHz | Layers | Location   |
|------------------|---------------|-------------|--------|------------|
| Logic Z86K15 MPU | 123452 Rev. A | 4           | 1      | Inside K/B |

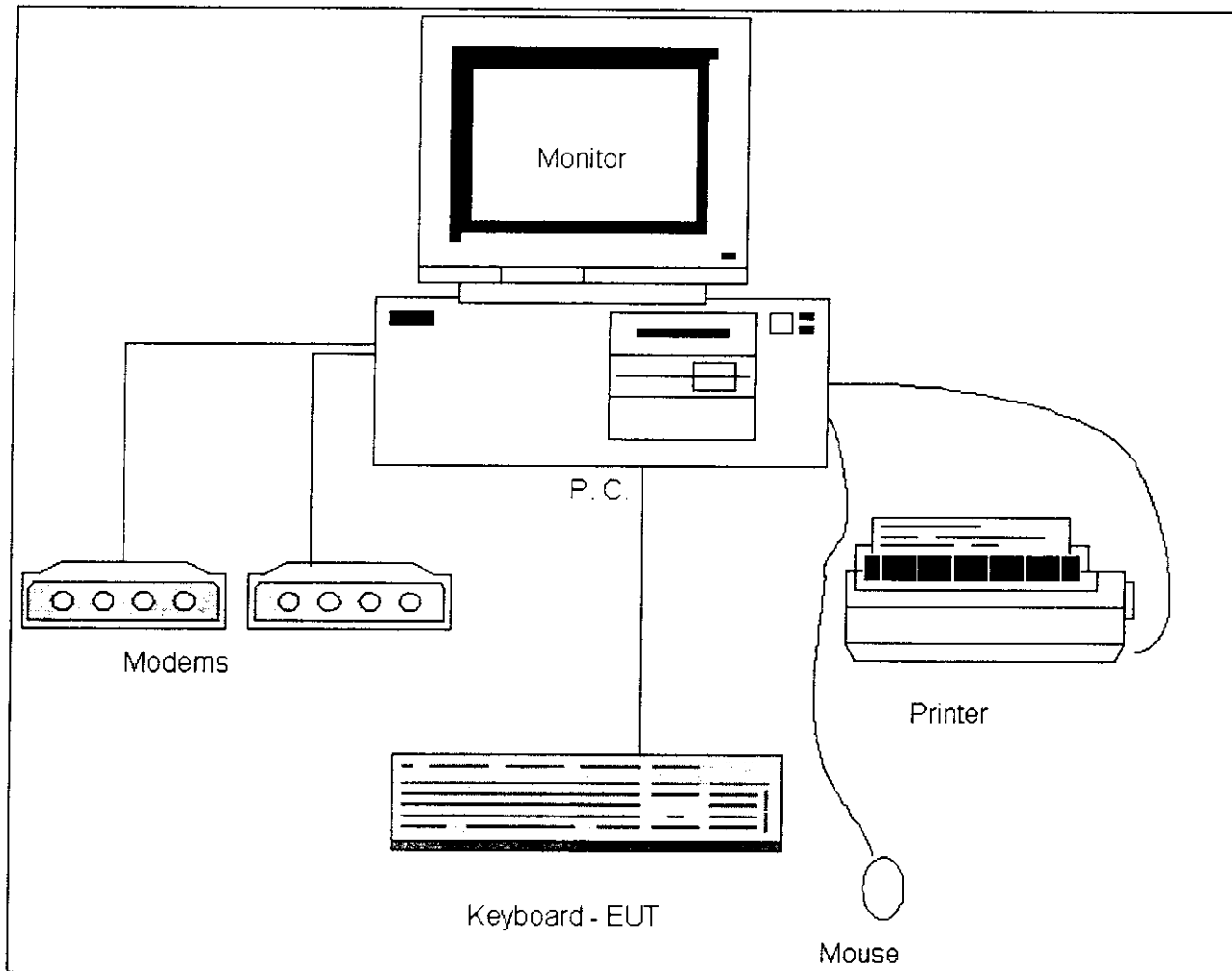
### REQUIRED EUT CHANGES TO COMPLY:

|            |
|------------|
| C1 = 100pF |
|------------|

### CABLE INFORMATION

|                                                                                                                                                                |                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cable #: 1                                                                                                                                                     | Cable(s) of this type: 1                                                                                                                                              |
| Cable Type: Serial<br>Construction: Round<br>Connected To End (1): Mini Din<br>Connector At End (1):<br>Shield Grounded At (1): Chassis Ground<br>Part Number: | Shield Type: Foil<br>Length In Meters: 2.3<br>Connected To End (2): PCB<br>Connector At End (2):<br>Shield Grounded At (2): Chassis Ground<br>Number of Conductors: 4 |
| Notes:                                                                                                                                                         |                                                                                                                                                                       |

## EQUIPMENT CONFIGURATION BLOCK DIAGRAM



Block Diagram

NOTES:

**APPENDIX B**  
**MEASUREMENT DATA SHEETS**

Test Location: CKC LABORATORIES INC • 110 N. OLINDA PL. • BREA, CA 92823 • 714-993-6112

Customer: NMB Technologies Inc. Date: Aug-25-98  
 Specification: CISPR 22 B RADIATED Time: 18:36  
 Test Type: Maximized Emissions Sequence#: 2  
 Equipment: Keyboard  
 Manufacturer: NMB Technologies, Inc Tested By: Stu Yamamoto  
 Model: RT7D5JTW  
 S/N:

**Equipment Under Test (\* = EUT):**

| Function  | Manufacturer          | Model #  | S/N |
|-----------|-----------------------|----------|-----|
| Keyboard* | NMB Technologies, Inc | RT7D5JTW |     |

**Support Devices:**

| Function | Manufacturer | Model #     | S/N          |
|----------|--------------|-------------|--------------|
| Computer | Intel        | S100EDZ8FLC | A05721230    |
| Modem    | Hayes        | 6802US      | B10068023649 |
| Modem    | Hayes        | 6802US      | A00768023303 |
| Monitor  | HP           | D2806B      | KR54366896   |
| Printer  | HP           | C2184A      | CN5B21R1DM   |
| Mouse    | Microsoft    | MUS9J       | 0003468      |

**Test Conditions / Notes:**

The EUT is a keyboard and is connected to the host computer. The computer also has a monitor, mouse, printer, and two modems connected. The EUT is continually sending H's to the computer and the H's are being displayed on the monitor. Voltage to computer is 120 VAC 60 Hz. Temperature: 23°C Humidity: 53%.

**Measurement Data:**

Sorted by Margin

Test Distance: 10 Meters

| # | Freq<br>MHz | Rdng<br>dBμV | BICON<br>dB | Cable<br>dB | Cable<br>dB | LOG<br>dB | Dist<br>DB | Corr<br>dBμV/m | Spec<br>dBμV/m | Margin<br>dB | Polar |
|---|-------------|--------------|-------------|-------------|-------------|-----------|------------|----------------|----------------|--------------|-------|
| 1 | 74.897      | 47.6         | +0.0        | +1.6        | +0.3        | +0.0      | +0.0       | 27.6           | 30.0           | -2.4         | Horiz |
|   |             |              | -28.1       | +6.2        |             |           |            |                |                |              |       |
|   | Dipole QP   |              |             |             |             |           |            |                |                |              |       |
|   | Keyboard    |              |             |             |             |           |            |                |                |              |       |
| ^ | 74.897      | 46.5         | +7.4        | +1.6        | +0.3        | +0.0      | +0.0       | 27.7           | 30.0           | -2.3         | Horiz |
|   | Quasi Peak  |              | -28.1       | +0.0        |             |           |            |                |                |              |       |
|   | Keyboard    |              |             |             |             |           |            |                |                |              |       |
| 3 | 74.902      | 46.9         | +0.0        | +1.6        | +0.3        | +0.0      | +0.0       | 26.9           | 30.0           | -3.1         | Vert  |
|   | Dipole QP   |              | -28.1       | +6.2        |             |           |            |                |                |              |       |
|   | Keyboard    |              |             |             |             |           |            |                |                |              |       |
| ^ | 74.902      | 45.9         | +7.4        | +1.6        | +0.3        | +0.0      | +0.0       | 27.1           | 30.0           | -2.9         | Vert  |
|   | Quasi Peak  |              | -28.1       | +0.0        |             |           |            |                |                |              |       |
|   | Keyboard    |              |             |             |             |           |            |                |                |              |       |
| 5 | 49.929      | 42.4         | +11.0       | +1.2        | +0.2        | +0.0      | +0.0       | 26.9           | 30.0           | -3.1         | Vert  |
|   | Quasi Peak  |              | -27.9       | +0.0        |             |           |            |                |                |              |       |
|   | Keyboard    |              |             |             |             |           |            |                |                |              |       |

|    |              |      |       |      |      |       |      |      |      |      |       |
|----|--------------|------|-------|------|------|-------|------|------|------|------|-------|
| 6  | 731.231      | 30.3 | +0.0  | +6.0 | +1.1 | +22.6 | +0.0 | 32.8 | 37.0 | -4.2 | Horiz |
|    | Quasi Peak   |      | -27.2 | +0.0 |      |       |      |      |      |      |       |
|    | non keyboard |      |       |      |      |       |      |      |      |      |       |
| 7  | 110.592      | 37.4 | +14.0 | +1.9 | +0.3 | +0.0  | +0.0 | 25.8 | 30.0 | -4.2 | Horiz |
|    | Quasi Peak   |      | -27.8 | +0.0 |      |       |      |      |      |      |       |
|    | non keyboard |      |       |      |      |       |      |      |      |      |       |
| 8  | 110.591      | 36.6 | +14.0 | +1.9 | +0.3 | +0.0  | +0.0 | 25.0 | 30.0 | -5.0 | Vert  |
|    | Quasi Peak   |      | -27.8 | +0.0 |      |       |      |      |      |      |       |
|    | non keyboard |      |       |      |      |       |      |      |      |      |       |
| 9  | 166.180      | 32.5 | +17.5 | +2.4 | +0.5 | +0.0  | +0.0 | 24.9 | 30.0 | -5.1 | Vert  |
|    | Quasi Peak   |      | -28.0 | +0.0 |      |       |      |      |      |      |       |
|    | non keyboard |      |       |      |      |       |      |      |      |      |       |
| 10 | 119.981      | 34.4 | +15.7 | +2.0 | +0.4 | +0.0  | +0.0 | 24.8 | 30.0 | -5.2 | Horiz |
|    | Quasi Peak   |      | -27.7 | +0.0 |      |       |      |      |      |      |       |
|    | non keyboard |      |       |      |      |       |      |      |      |      |       |
| 11 | 150.024      | 32.3 | +17.6 | +2.3 | +0.6 | +0.0  | +0.0 | 24.7 | 30.0 | -5.3 | Horiz |
|    | Quasi Peak   |      | -28.1 | +0.0 |      |       |      |      |      |      |       |
|    | non keyboard |      |       |      |      |       |      |      |      |      |       |
| 12 | 197.996      | 31.9 | +16.7 | +2.8 | +0.7 | +0.0  | +0.0 | 24.0 | 30.0 | -6.0 | Vert  |
|    | Quasi Peak   |      | -28.1 | +0.0 |      |       |      |      |      |      |       |
| 13 | 70.717       | 42.5 | +7.3  | +1.7 | +0.3 | +0.0  | +0.0 | 23.9 | 30.0 | -6.1 | Vert  |
|    |              |      | -27.9 | +0.0 |      |       |      |      |      |      |       |
| 14 | 631.523      | 31.7 | +0.0  | +5.4 | +0.9 | +20.4 | +0.0 | 30.8 | 37.0 | -6.2 | Vert  |
|    |              |      | -27.6 | +0.0 |      |       |      |      |      |      |       |
| 15 | 83.254       | 42.0 | +8.1  | +1.6 | +0.2 | +0.0  | +0.0 | 23.7 | 30.0 | -6.3 | Horiz |
|    | Quasi Peak   |      | -28.2 | +0.0 |      |       |      |      |      |      |       |
| 16 | 598.272      | 33.3 | +0.0  | +5.1 | +0.8 | +19.1 | +0.0 | 30.6 | 37.0 | -6.4 | Horiz |
|    | Quasi Peak   |      | -27.7 | +0.0 |      |       |      |      |      |      |       |
| 17 | 330.010      | 33.5 | +0.0  | +3.6 | +0.5 | +21.0 | +0.0 | 30.6 | 37.0 | -6.4 | Horiz |
|    |              |      | -28.0 | +0.0 |      |       |      |      |      |      |       |
| 18 | 49.886       | 39.0 | +11.0 | +1.2 | +0.2 | +0.0  | +0.0 | 23.5 | 30.0 | -6.5 | Horiz |
|    |              |      | -27.9 | +0.0 |      |       |      |      |      |      |       |
| 19 | 167.982      | 31.0 | +17.5 | +2.4 | +0.5 | +0.0  | +0.0 | 23.4 | 30.0 | -6.6 | Vert  |
|    | Quasi Peak   |      | -28.0 | +0.0 |      |       |      |      |      |      |       |
| 20 | 269.969      | 33.9 | +20.5 | +3.3 | +0.7 | +0.0  | +0.0 | 30.4 | 37.0 | -6.6 | Vert  |
|    |              |      | -28.0 | +0.0 |      |       |      |      |      |      |       |
| 21 | 432.074      | 37.1 | +0.0  | +4.4 | +0.8 | +16.1 | +0.0 | 30.2 | 37.0 | -6.8 | Horiz |
|    | Quasi Peak   |      | -28.2 | +0.0 |      |       |      |      |      |      |       |
| 22 | 221.995      | 30.5 | +17.5 | +2.8 | +0.4 | +0.0  | +0.0 | 23.2 | 30.0 | -6.8 | Horiz |
|    |              |      | -28.0 | +0.0 |      |       |      |      |      |      |       |
| 23 | 282.012      | 32.7 | +21.6 | +3.3 | +0.6 | +0.0  | +0.0 | 30.2 | 37.0 | -6.8 | Vert  |
|    |              |      | -28.0 | +0.0 |      |       |      |      |      |      |       |
| 24 | 54.138       | 39.8 | +9.8  | +1.3 | +0.2 | +0.0  | +0.0 | 23.1 | 30.0 | -6.9 | Horiz |
|    |              |      | -28.0 | +0.0 |      |       |      |      |      |      |       |
| 25 | 166.170      | 30.4 | +17.5 | +2.4 | +0.5 | +0.0  | +0.0 | 22.8 | 30.0 | -7.2 | Horiz |
|    | Quasi Peak   |      | -28.0 | +0.0 |      |       |      |      |      |      |       |
| 26 | 209.992      | 30.4 | +17.0 | +2.8 | +0.6 | +0.0  | +0.0 | 22.7 | 30.0 | -7.3 | Horiz |
|    | Quasi Peak   |      | -28.1 | +0.0 |      |       |      |      |      |      |       |
| 27 | 209.996      | 30.4 | +17.0 | +2.8 | +0.6 | +0.0  | +0.0 | 22.7 | 30.0 | -7.3 | Vert  |
|    | Quasi Peak   |      | -28.1 | +0.0 |      |       |      |      |      |      |       |

|    |            |      |                |              |      |       |      |      |      |       |       |
|----|------------|------|----------------|--------------|------|-------|------|------|------|-------|-------|
| 28 | 179.980    | 30.1 | +17.3<br>-27.9 | +2.6<br>+0.0 | +0.5 | +0.0  | +0.0 | 22.6 | 30.0 | -7.4  | Vert  |
| 29 | 191.980    | 30.3 | +16.9<br>-28.0 | +2.7<br>+0.0 | +0.6 | +0.0  | +0.0 | 22.5 | 30.0 | -7.5  | Vert  |
| 30 | 54.070     | 39.2 | +9.8<br>-28.0  | +1.3<br>+0.0 | +0.2 | +0.0  | +0.0 | 22.5 | 30.0 | -7.5  | Vert  |
| 31 | 192.010    | 29.8 | +16.9<br>-28.0 | +2.7<br>+0.0 | +0.6 | +0.0  | +0.0 | 22.0 | 30.0 | -8.0  | Horiz |
|    | Quasi Peak |      |                |              |      |       |      |      |      |       |       |
| 32 | 731.234    | 26.4 | +0.0<br>-27.2  | +6.0<br>+0.0 | +1.1 | +22.6 | +0.0 | 28.9 | 37.0 | -8.1  | Vert  |
|    | Quasi Peak |      |                |              |      |       |      |      |      |       |       |
| 33 | 83.239     | 40.1 | +8.1<br>-28.2  | +1.6<br>+0.0 | +0.2 | +0.0  | +0.0 | 21.8 | 30.0 | -8.2  | Vert  |
| 34 | 179.997    | 29.2 | +17.3<br>-27.9 | +2.6<br>+0.0 | +0.5 | +0.0  | +0.0 | 21.7 | 30.0 | -8.3  | Horiz |
|    | Quasi Peak |      |                |              |      |       |      |      |      |       |       |
| 35 | 221.995    | 28.9 | +17.5<br>-28.0 | +2.8<br>+0.0 | +0.4 | +0.0  | +0.0 | 21.6 | 30.0 | -8.4  | Vert  |
|    | Quasi Peak |      |                |              |      |       |      |      |      |       |       |
| 36 | 70.751     | 40.2 | +7.3<br>-27.9  | +1.7<br>+0.0 | +0.3 | +0.0  | +0.0 | 21.6 | 30.0 | -8.4  | Horiz |
| 37 | 129.005    | 30.5 | +16.4<br>-27.8 | +2.1<br>+0.0 | +0.4 | +0.0  | +0.0 | 21.6 | 30.0 | -8.4  | Horiz |
|    | Quasi Peak |      |                |              |      |       |      |      |      |       |       |
| 38 | 258.015    | 32.9 | +19.4<br>-27.8 | +3.2<br>+0.0 | +0.6 | +0.0  | +0.0 | 28.3 | 37.0 | -8.7  | Vert  |
| 39 | 66.550     | 38.9 | +7.6<br>-28.0  | +1.6<br>+0.0 | +0.3 | +0.0  | +0.0 | 20.4 | 30.0 | -9.6  | Vert  |
| 40 | 531.797    | 31.7 | +0.0<br>-27.9  | +4.9<br>+0.0 | +0.7 | +17.8 | +0.0 | 27.2 | 37.0 | -9.8  | Vert  |
|    | Quasi Peak |      |                |              |      |       |      |      |      |       |       |
| 41 | 66.588     | 38.7 | +7.6<br>-28.0  | +1.6<br>+0.0 | +0.3 | +0.0  | +0.0 | 20.2 | 30.0 | -9.8  | Horiz |
| 42 | 111.977    | 30.8 | +14.2<br>-27.8 | +1.9<br>+0.0 | +0.3 | +0.0  | +0.0 | 19.4 | 30.0 | -10.6 | Vert  |
|    | Quasi Peak |      |                |              |      |       |      |      |      |       |       |

Test Location: CKC LABORATORIES INC • 110 N. OLINDA PL. • BREA, CA 92823 • 714-993-6112

Customer: NMB Technologies Inc.  
Specification: CISPR22 B COND [AVE]  
Test Type: Conducted Emissions  
Equipment: Keyboard  
Manufacturer: NMB Technologies, Inc  
Model: RT7D5JTW  
S/N:

Date: Aug-25-98  
Time: 19:02  
Sequence#: 3  
Tested By: Stu Yamamoto

**Equipment Under Test (\* = EUT):**

| Function  | Manufacturer          | Model #  | S/N |
|-----------|-----------------------|----------|-----|
| Keyboard* | NMB Technologies, Inc | RT7D5JTW |     |

**Support Devices:**

| Function | Manufacturer | Model #     | S/N          |
|----------|--------------|-------------|--------------|
| Computer | Intel        | S100EDZ8FLC | A05721230    |
| Modem    | Hayes        | 6802US      | B10068023649 |
| Modem    | Hayes        | 6802US      | A00768023303 |
| Monitor  | HP           | D2806B      | KR54366896   |
| Printer  | HP           | C2184A      | CN5B21R1DM   |
| Mouse    | Microsoft    | MUS9J       | 0003468      |

**Test Conditions / Notes:**

The EUT is a keyboard and is connected to the host computer. The computer also has a monitor, mouse, printer, and two modems connected. The EUT is continually sending H's to the computer and the H's are being displayed on the monitor. Voltage to computer is 120 VAC 60 Hz. Temperature: 23°C Humidity: 53%.

**Measurement Data:**

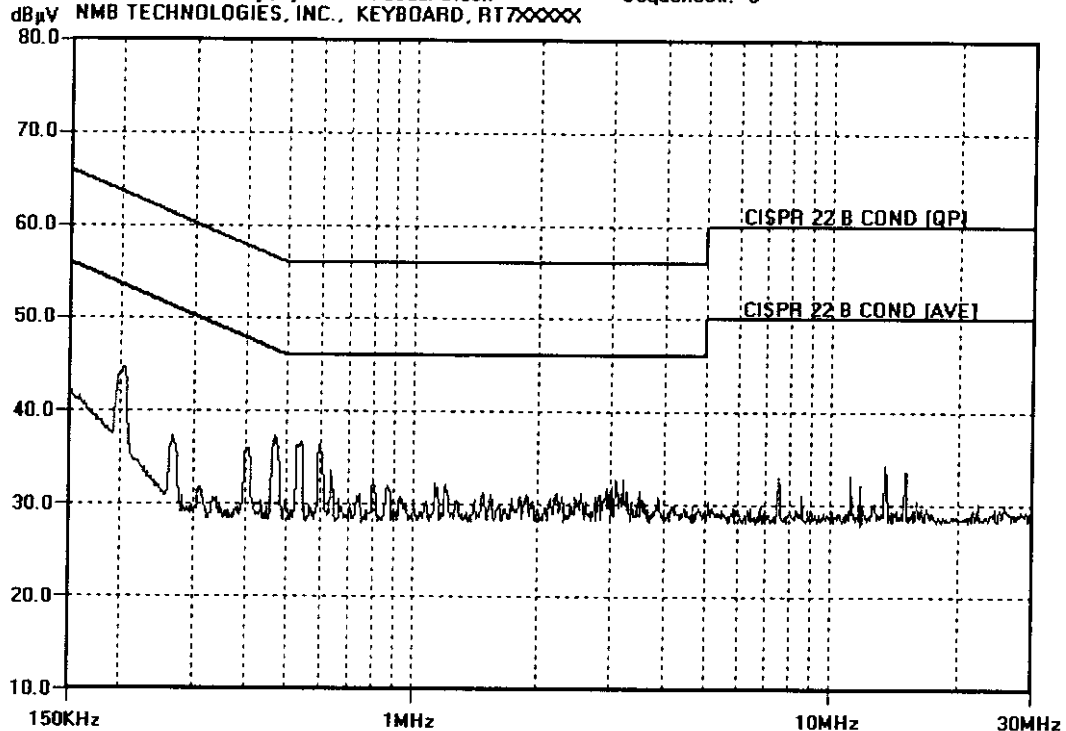
Sorted by Margin

Test Lead: Black

| # | Freq     | Rdng<br>dB $\mu$ V | dB | dB | dB | dB | Dist<br>dB | Corr<br>dB $\mu$ V/m | Spec<br>dB $\mu$ V/m | Margin<br>dB | Polar |
|---|----------|--------------------|----|----|----|----|------------|----------------------|----------------------|--------------|-------|
| 1 | 203.283k | 44.8               |    |    |    |    | +0.0       | 44.8                 | 53.5                 | -8.7         | Black |
| 2 | 469.279k | 37.3               |    |    |    |    | +0.0       | 37.3                 | 46.5                 | -9.2         | Black |
| 3 | 538.375k | 36.6               |    |    |    |    | +0.0       | 36.6                 | 46.0                 | -9.4         | Black |
| 4 | 593.652k | 36.4               |    |    |    |    | +0.0       | 36.4                 | 46.0                 | -9.6         | Black |
| 5 | 398.209k | 35.9               |    |    |    |    | +0.0       | 35.9                 | 47.9                 | -12.0        | Black |
| 6 | 637.742k | 33.5               |    |    |    |    | +0.0       | 33.5                 | 46.0                 | -12.5        | Black |
| 7 | 3.205M   | 32.6               |    |    |    |    | +0.0       | 32.6                 | 46.0                 | -13.4        | Black |
| 8 | 3.064M   | 32.6               |    |    |    |    | +0.0       | 32.6                 | 46.0                 | -13.4        | Black |

|    |          |      |      |      |      |       |       |
|----|----------|------|------|------|------|-------|-------|
| 9  | 806.367k | 32.5 | +0.0 | 32.5 | 46.0 | -13.5 | Black |
| 10 | 1.132M   | 32.3 | +0.0 | 32.3 | 46.0 | -13.7 | Black |
| 11 | 151.276k | 42.1 | +0.0 | 42.1 | 55.9 | -13.8 | Black |
| 12 | 1.195M   | 32.1 | +0.0 | 32.1 | 46.0 | -13.9 | Black |
| 13 | 266.777k | 37.3 | +0.0 | 37.3 | 51.2 | -13.9 | Black |
| 14 | 866.085k | 32.0 | +0.0 | 32.0 | 46.0 | -14.0 | Black |
| 15 | 3.032M   | 31.9 | +0.0 | 31.9 | 46.0 | -14.1 | Black |

CKC LABORATORIES INC Date: Tue Aug-25-1998 Time: 19:02:01 WO#: 69806  
 CISPR 22 B COND (QP) Test Lead: Black Sequence#: 3  
 NMB TECHNOLOGIES, INC., KEYBOARD, RT7XXXXX



Test Location: CKC LABORATORIES INC • 110 N. OLINDA PL. • BREA, CA 92823 • 714-993-6112

Customer: NMB Technologies Inc.  
Specification: CISPR22 B COND [AVE]  
Test Type: Conducted Emissions  
Equipment: Keyboard  
Manufacturer: NMB Technologies, Inc  
Model: RT7D5JTW  
S/N:

Date: Aug-25-98  
Time: 19:05  
Sequence#: 4  
Tested By: Stu Yamamoto

**Equipment Under Test (\* = EUT):**

| Function  | Manufacturer          | Model #  | S/N |
|-----------|-----------------------|----------|-----|
| Keyboard* | NMB Technologies, Inc | RT7D5JTW |     |

**Support Devices:**

| Function | Manufacturer | Model #     | S/N          |
|----------|--------------|-------------|--------------|
| Computer | Intel        | S100EDZ8FLC | A05721230    |
| Modem    | Hayes        | 6802US      | B10068023649 |
| Modem    | Hayes        | 6802US      | A00768023303 |
| Monitor  | HP           | D2806B      | KR54366896   |
| Printer  | HP           | C2184A      | CN5B21R1DM   |
| Mouse    | Microsoft    | MUS9J       | 0003468      |

**Test Conditions / Notes:**

The EUT is a keyboard and is connected to the host computer. The computer also has a monitor, mouse, printer, and two modems connected. The EUT is continually sending H's to the computer and the H's are being displayed on the monitor. Voltage to computer is 120 VAC 60 Hz. Temperature: 23°C Humidity: 53%.

**Measurement Data:**

Sorted by Margin

Test Lead: White

| # | Freq     | Rdng<br>dB $\mu$ V | dB | dB | dB | dB | Dist<br>dB | Corr<br>dB $\mu$ V/m | Spec<br>dB $\mu$ V/m | Margin<br>dB | Polar |
|---|----------|--------------------|----|----|----|----|------------|----------------------|----------------------|--------------|-------|
| 1 | 205.198k | 42.8               |    |    |    |    | +0.0       | 42.8                 | 53.4                 | -10.6        | White |
| 2 | 469.279k | 35.3               |    |    |    |    | +0.0       | 35.3                 | 46.5                 | -11.2        | White |
| 3 | 1.192M   | 34.5               |    |    |    |    | +0.0       | 34.5                 | 46.0                 | -11.5        | White |
| 4 | 594.968k | 34.5               |    |    |    |    | +0.0       | 34.5                 | 46.0                 | -11.5        | White |
| 5 | 638.071k | 34.4               |    |    |    |    | +0.0       | 34.4                 | 46.0                 | -11.6        | White |
| 6 | 3.136M   | 34.1               |    |    |    |    | +0.0       | 34.1                 | 46.0                 | -11.9        | White |
| 7 | 531.795k | 34.1               |    |    |    |    | +0.0       | 34.1                 | 46.0                 | -11.9        | White |
| 8 | 538.375k | 33.9               |    |    |    |    | +0.0       | 33.9                 | 46.0                 | -12.1        | White |

|    |          |      |      |      |      |       |       |
|----|----------|------|------|------|------|-------|-------|
| 9  | 3.205M   | 33.0 | +0.0 | 33.0 | 46.0 | -13.0 | White |
| 10 | 402.157k | 34.8 | +0.0 | 34.8 | 47.8 | -13.0 | White |
| 11 | 3.098M   | 32.7 | +0.0 | 32.7 | 46.0 | -13.3 | White |
| 12 | 410.054k | 34.2 | +0.0 | 34.2 | 47.6 | -13.4 | White |
| 13 | 806.367k | 32.5 | +0.0 | 32.5 | 46.0 | -13.5 | White |
| 14 | 874.228k | 32.4 | +0.0 | 32.4 | 46.0 | -13.6 | White |
| 15 | 2.928M   | 32.3 | +0.0 | 32.3 | 46.0 | -13.7 | White |

