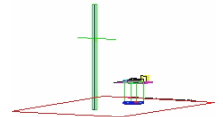


# PCTEST Engineering Laboratory, Inc.

6660-B Dobbin Road • Columbia, MD 21045 • U.S.A.

TEL (410) 290-6652 • FAX (410) 290-6654

<http://www.pctestlab.com>



## CERTIFICATE OF COMPLIANCE

NEC Technologies, Inc.  
1250 N. Arlington Heights Rd., Suite 500  
Itasca, IL 60143-1248  
Attn: Amin Fatani, Senior Engineer  
Compliance Engineering Dept.

Dates of Tests: March 21-22, 2002  
Test Report S/N: B.22031119.A3D  
Test Site: PCTEST Lab, Columbia, MD

FCC ID

**A3DNR-9100A**

APPLICANT

**NEC TECHNOLOGIES, INC.**

Rule Part(s): FCC Part 15 Subpart B  
Equipment Class: Class B Peripheral Device (JBP)  
EUT Type: Internal CD-R/RW Drive  
Trade Name: NEC®  
Model: NR-9100A

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-1992.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

  
Randy Ortañez  
President



|                                    |                                                                                                       |                               |                     |                                 |
|------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------|---------------------|---------------------------------|
| PCTEST™ Class B Report             |  EVALUATION REPORT |                               |                     | Reviewed By:<br>Quality Manager |
| Test Report S/N:<br>B.22031119.A3D | Test Dates:<br>March 21-22, 2002                                                                      | Phone Type:<br>INTERNAL CD-RW | FCC ID: A3DNR-9100A | Page 1 of 30                    |

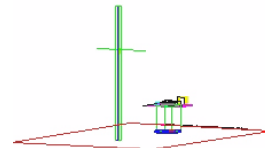
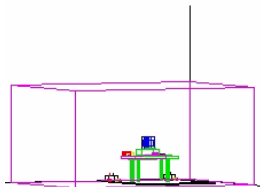
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|--------------------------------------------|--------------------------------------------------------------------------------------------------------------|--------------------------------------|----------------------------|----------------------------------------|
| <b>PCTEST™ Class B REPORT</b>              |  <b>EVALUATION REPORT</b> |                                      |                            | <b>Reviewed By:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>B.220301119.A3D | <b>Test Dates:</b><br>March 21-22, 2002                                                                      | <b>Phone Type:</b><br>INTERNAL CD-RW | <b>FCC ID:</b> A3DNR-9100A | Page 2 of 30                           |

## PRODUCT EVALUATION REPORT



*Scope - Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.*

|                      |                                                                            |
|----------------------|----------------------------------------------------------------------------|
| <b>Company Name:</b> | <b>NEC TECHNOLOGIES, INC.</b>                                              |
| <b>Address:</b>      | <b>1250 N. Arlington Heights Road, Suite 500<br/>Itasca, IL 60143-1248</b> |
| <b>Attention:</b>    | <b>Amin Fatani – Senior Engineer<br/>Compliance Engineering Department</b> |

- FCC ID: **A3DNR-9100A**
- Class: B Digital Device / Peripheral (JBP)
- EUT Type: Internal CD-R/RW Drive
- Trade Name: **NEC®**
- Model: **NR-9100A**
- Rule Part(s): FCC Part 15 Subpart B
- Test Procedure(s): ANSI C63.4 (1992)
- Dates of Tests: March 21-22, 2002
- Place of Tests: PCTEST Lab, Columbia, MD
- Test Report S/N: B.220301119.A3D

*NOTE: The NEC Model NR-9100A internal CD-R/RW Drive was tested with the internal terminator enabled.*

**NVLAP**  
Lab Code 100431-0

|                                     |                                                                                     |                             |                     |                                 |
|-------------------------------------|-------------------------------------------------------------------------------------|-----------------------------|---------------------|---------------------------------|
| PCTEST™ CLASS B REPORT              |  | FCC CERTIFICATION           | <b>NEC</b>          | Reviewed By:<br>Quality Manager |
| Test Report S/N:<br>B.220301119.A3D | Test Dates:<br>March 21-22, 2002                                                    | EUT Type:<br>INTERNAL CD-RW | FCC ID: A3DNR-9100A | Page 3 of 30                    |

## 1.1 INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-1992) was used in determining radiated and conducted emissions emanating from **NEC Internal CD-R/RW Drive FCC ID: A3DNR-9100A**.

These measurement tests were conducted at **PCTEST Engineering Laboratory, Inc.** facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49'38" W longitude. The facility is 1.5 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on October 19, 1992.

## 1.2 PCTEST Location

The map at right shows the location of the PCTEST Lab, its proximity to the FCC Lab, the Columbia vicinity area, the Baltimore-Washington International (BWI) airport, and the city of Baltimore, and the Washington, D.C. area. (see Figure1).

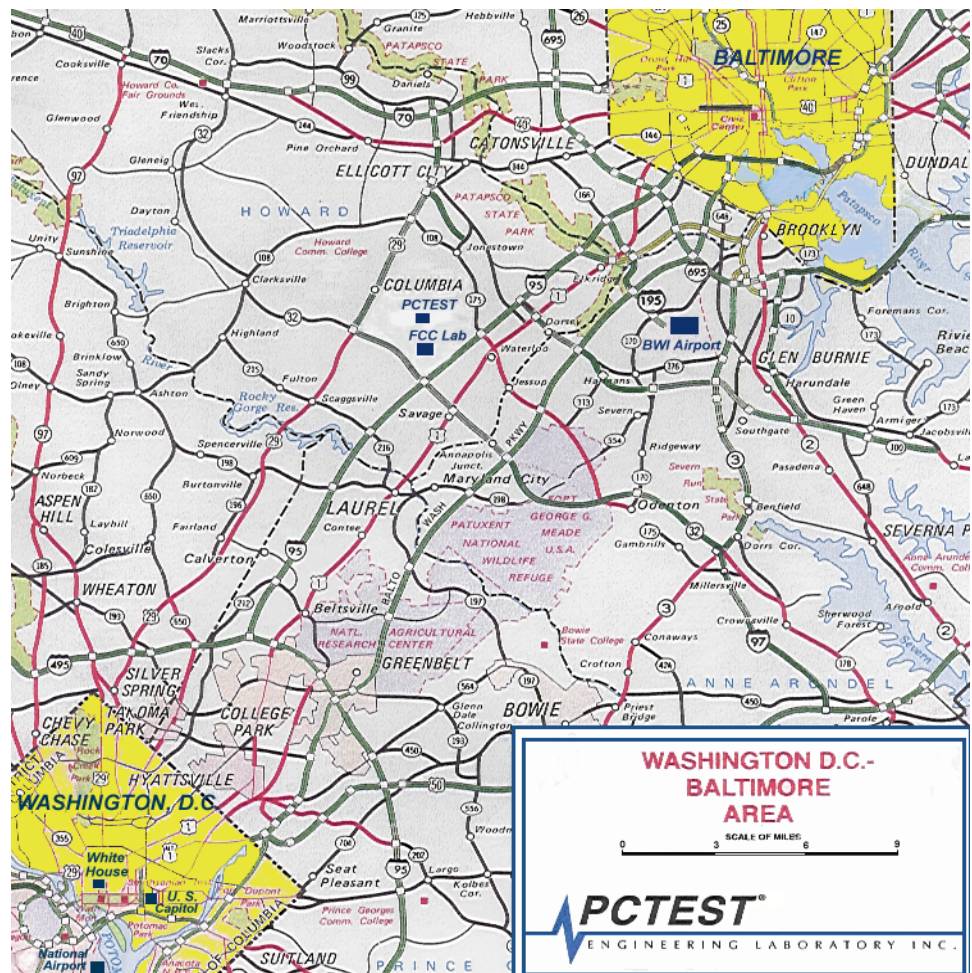


Figure 1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area.

|                                     |                                                                                                       |                             |                                     |
|-------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------|-------------------------------------|
| PCTEST™ CLASS B REPORT              |  FCC CERTIFICATION | <b>NEC</b>                  | Reviewed By:<br>Quality Manager     |
| Test Report S/N:<br>B.220301119.A3D | Test Dates:<br>March 21-22, 2002                                                                      | EUT Type:<br>INTERNAL CD-RW | FCC ID: A3DNR-9100A<br>Page 4 of 30 |

## 2.1 Product Information

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### 2.2 Equipment Description

The Equipment Under Test (EUT) is the **NEC Internal CD-R/RW Drive Model: NR-9100A.**

#### CD-R/RW & CD ROM Section:

|                      |                                           |
|----------------------|-------------------------------------------|
| User Data Capacity:  | 656 Mbytes, Mode 1                        |
| User Data Blocks:    | 2048 Bytes/block                          |
| Burst Transfer Rate: | PIO mode 4, DMA Single Word Mode 2        |
| Access Time:         | 98 msec (1/3 stroke read, typical)        |
| Hard Error Rate:     | Below $10^{-12}$ (After error correction) |

#### CD Audio Section:

|                            |                                 |
|----------------------------|---------------------------------|
| Frequency Response:        | 20Hz – 20 kHz + 3.0 dB, -3.0 Db |
| S/N Ratio:                 | 80 dB (1kHz)                    |
| Total Harmonic Distortion: | 0.09% (1kHz)                    |
| Wow & Flutter:             | Below measurable amount         |

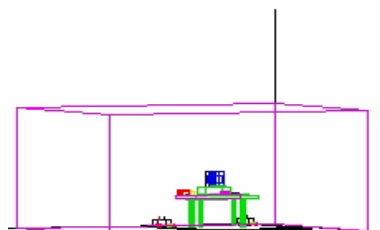
#### General:

|                         |                      |
|-------------------------|----------------------|
| Power Supply:           | 5V 1.5A/ 12V 1.5 A   |
| Dimensions (W x H x D): | 14.8 x 4.2 x 19.8 cm |
| Weight:                 | 2.29 lbs             |

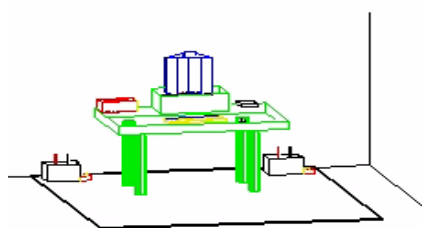
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|-------------------------------------|-------------------------------------------------------------------------------------|-----------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| PCTEST™ CLASS B REPORT              |  | FCC CERTIFICATION           |  | Reviewed By:<br>Quality Manager |
| Test Report S/N:<br>B.220301119.A3D | Test Dates:<br>March 21-22, 2002                                                    | EUT Type:<br>INTERNAL CD-RW | FCC ID: A3DNR-9100A                                                                   | Page 5 of 30                    |

## 3.1 Description of Tests

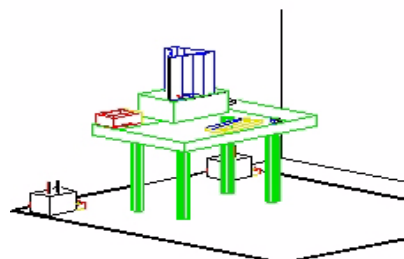
### 3.2 Conducted Emissions



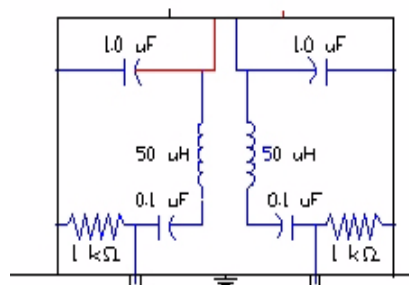
**Figure 2. Shielded Enclosure  
Line-Conducted Test Facility**



**Figure 3. Line Conducted**



**Figure 4. Wooden Table &  
Bonded LISNs**



**Figure 5. LISN Schematic  
Diagram**

The line-conducted facility is located inside a 16'x20'x10' shielded enclosure. It is manufactured by Ray Proof Series 81 (see Figure 2). The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 604-05. A 1m. x 1.5m. wooden table 80cm. high is placed 40cm. away from the vertical wall and 1.5m away from the side wall of the shielded room (see Figure 3). Solar Electronics and EMCO Model 3725/2 (10kHz-30MHz) 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room (see Figure 4). The EUT is powered from the Solar LISN and the support equipment is powered from the EMCO LISN. Power to the LISNs are filtered by a high-current high-insertion loss Ray Proof power line filters (100dB 14kHz-10GHz). The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure. All electrical cables are shielded by braided tinned copper zipper tubing with inner diameter of 1/2". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the Solar LISN. LISN schematic diagram is shown in Figure 5. All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 450kHz to 30MHz with 20 msec. sweep time. The frequency producing the maximum level was reexamined using EMI/ Field Intensity Meter and Quasi-Peak adapter. The detector function was set to CISPR quasi-peak mode. The bandwidth of the receiver was set to 10 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by: switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Attachment H. Each EME reported was calibrated using the HP8640B signal generator.

|                                     |                                                                                                       |                             |                                                                                       |                                 |
|-------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| PCTEST™ CLASS B REPORT              |  FCC CERTIFICATION |                             |  | Reviewed By:<br>Quality Manager |
| Test Report S/N:<br>B.220301119.A3D | Test Dates:<br>March 21-22, 2002                                                                      | EUT Type:<br>INTERNAL CD-RW | FCC ID: A3DNR-9100A                                                                   | Page 6 of 30                    |

## 3.1 Description of Tests (continued)

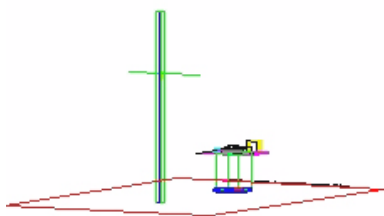


Figure 6. 3-Meter Test Site

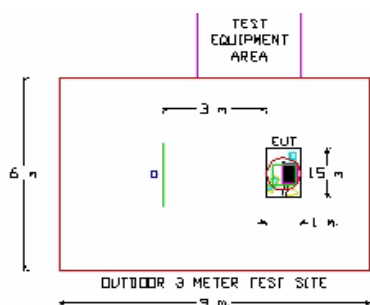


Figure 7. Dimensions of Outdoor Test Site

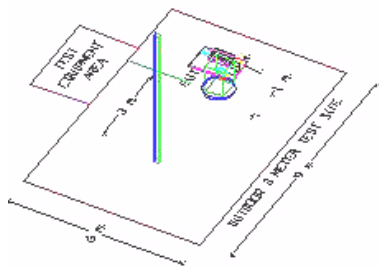


Figure 8. Turntable and System Setup

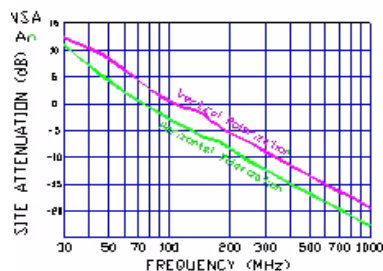


Figure 9. Normalized Site Attenuation Curves (H&V)

### 3.3 Radiated Emissions

Preliminary measurements were made indoors at 1 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 200 MHz using biconical antenna and from 200 to 1000 MHz using log-spiral antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3-meter test range using Roberts™ Dipole antennas or horn antenna (see Figure 6). The test equipment was placed on a wooden and plastic bench situated on a 1.5 x 2 meter area adjacent to the measurement area (see Figure 7). Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using EMI/Field Intensity Meter and Quasi-Peak Adapter. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 100kHz or 1 MHz depending on the frequency or type of signal.

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table (see Figure 8). The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment, and powering the monitor from the floor mounted outlet box and the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Attachment H. Each EME reported was calibrated using the HP8640B signal generator. The Theoretical Normalized Site Attenuation Curves for both horizontal and vertical polarization are shown in Figure 9.

|                                     |                                  |                             |                     |                                 |
|-------------------------------------|----------------------------------|-----------------------------|---------------------|---------------------------------|
| PCTEST™ CLASS B REPORT              | PCTEST                           | FCC CERTIFICATION           | NEC                 | Reviewed By:<br>Quality Manager |
| Test Report S/N:<br>B.220301119.A3D | Test Dates:<br>March 21-22, 2002 | EUT Type:<br>INTERNAL CD-RW | FCC ID: A3DNR-9100A | Page 7 of 30                    |

## 4.1 Support Equipment Used

|                              |                                                                                           |                      |
|------------------------------|-------------------------------------------------------------------------------------------|----------------------|
| 1. NEC CDR/RW Internal Drive | FCC ID: A3DNR-9100A (EUT)<br>0.5 m. unshielded audio cable                                |                      |
| 2. GATEWAY Mid/Tower PC      | Model: P55C-200<br>1.8 m. unshielded AC Power Cord                                        | S/N: 7078699         |
| 3. LG Electronics Monitor    | FCC ID: BEJLG56AM<br>1.8 m. unshielded AC power cord<br>1.8 m. shielded D-Sub Video cable | S/N: MUL5010A0001556 |
| 4. HP Thinkjet Printer       | FCC ID: BS46XU2225C<br>1.8 m. unshielded AC power cord<br>1.6 m. shielded parallel cable  | S/N: 2651S40366      |
| 5. GATEWAY Mouse             | FCC ID: MOSKA<br>1.6 m. shielded cable                                                    | S/N: PCT387          |
| 6. GATEWAY Keyboard          | FCC ID: D7J2196003-XX<br>1.6 m. shielded data cable                                       | S/N: 05400225        |
| 7. ZOOM Modem                | FCC ID: BDNV34MINI-EXT<br>1.8 m. unshielded DC power cord<br>1.5 m. shielded serial cable | S/N: 3117ZM4X40211   |
| 8. SONY Headphones           | Model: MDR-V2<br>2.0 m. shielded Audio Cable                                              | S/N: PCT2006         |

**(See "Attachment G - Test Setup Photographs" for actual system test setup.)**

|                                     |                                                                                     |                             |                     |                                 |
|-------------------------------------|-------------------------------------------------------------------------------------|-----------------------------|---------------------|---------------------------------|
| PCTEST™ CLASS B REPORT              |  | FCC CERTIFICATION           | <b>NEC</b>          | Reviewed By:<br>Quality Manager |
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## 5.1 LINE-CONDUCTED TEST DATA

---

### 5.2 Conducted Emissions

(See Data under PLOTS – Attachment D)

**NOTES:**

1. All modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B device is 250 $\mu$ V from 450kHz to 30MHz.
3. Line A = Phase; Line B = Neutral
4. Deviations to the Specifications: None

---

\* All readings are calibrated by HP8640B signal generator with accuracy traceable to the National Institute of Standards and Technology (formerly NBS).

\*\* Measurements using CISPR quasi-peak mode.

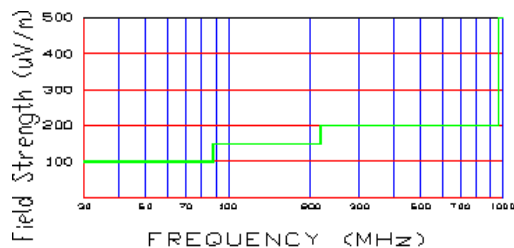
|                                     |                                                                                     |                             |                     |                                 |
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| PCTEST <sup>™</sup> CLASS B REPORT  |  | FCC CERTIFICATION           | <b>NEC</b>          | Reviewed By:<br>Quality Manager |
| Test Report S/N:<br>B.220301119.A3D | Test Dates:<br>March 21-22, 2002                                                    | EUT Type:<br>INTERNAL CD-RW | FCC ID: A3DNR-9100A | Page 9 of 30                    |

## 6.1 RADIATED TEST DATA

### 6.3.1 Radiated Emissions

| FREQ.<br>(MHz) | Level*<br>(dBm) | AFCL**<br>(dB) | POL<br>(H/V) | Height<br>(m) | Azimuth<br>(° angle) | F/S<br>( $\mu$ V/m) | Margin***<br>(dB) |
|----------------|-----------------|----------------|--------------|---------------|----------------------|---------------------|-------------------|
| 147.3          | - 89.0          | 13.4           | V            | 2.9           | 85                   | 55.0                | - 8.7             |
| 186.6          | - 88.2          | 15.8           | V            | 2.8           | 90                   | 53.8                | - 8.9             |
| 272.8          | - 89.9          | 19.6           | H            | 2.3           | 135                  | 68.4                | - 9.3             |
| 287.5          | - 90.7          | 20.2           | H            | 1.9           | 120                  | 66.9                | - 9.5             |
| 306.4          | - 92.0          | 20.8           | V            | 1.7           | 110                  | 61.7                | - 10.2            |
| 355.1          | - 93.1          | 22.4           | H            | 1.4           | 75                   | 65.4                | - 9.7             |
| 407.5          | - 95.4          | 23.9           | H            | 1.3           | 280                  | 59.6                | - 10.5            |

Table 1. Radiated Measurements at 3-meters.



#### NOTES:

1. All modes of operation were investigated and the worst-case emissions are reported.

2. The radiated limits are shown on Figure 10. Above 1GHz the limit is 500  $\mu$ V/m.

Figure 10. Limits at 3 meters

\* All readings are calibrated by HP8640B signal generator with accuracy traceable to the National Institute of Standards and Technology (formerly NBS).

\*\* AFCL = Antenna Factor (Roberts dipole) and Cable Loss (30 ft. RG58C/U).

\*\*\* Measurements using CISPR quasi-peak mode. Above 1GHz, peak detector function mode is used using a resolution bandwidth of 1MHz and a video bandwidth of 1MHz. The peak level complies with the average limit. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

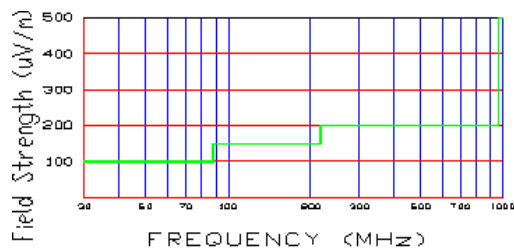
|                                     |                                                                                                                                                                                             |                             |                     |                                 |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------|---------------------------------|
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## 6.1 RADIATED TEST DATA

### 6.3.2 Radiated Emissions

| FREQ.<br>(MHz) | Level*<br>(dBμV/m) | AFCL**<br>(dB) | POL<br>(H/V) | Height<br>(m) | Azimuth<br>(° angle) | F/S<br>(dBμV/m) | Margin***<br>(dB) |
|----------------|--------------------|----------------|--------------|---------------|----------------------|-----------------|-------------------|
| 147.3          | 9.8                | 13.4           | V            | 3.0           | 90                   | 23.2            | - 6.8             |
| 186.6          | 7.1                | 15.8           | V            | 2.9           | 110                  | 22.9            | - 7.1             |
| 272.8          | 9.2                | 19.6           | H            | 2.5           | 120                  | 28.8            | - 8.2             |
| 287.5          | 8.3                | 20.2           | H            | 2.1           | 155                  | 28.5            | - 8.5             |
| 306.4          | 6.9                | 20.8           | V            | 1.8           | 125                  | 27.7            | - 9.3             |
| 355.1          | 6.5                | 22.4           | H            | 1.5           | 95                   | 28.1            | - 8.1             |
| 407.5          | 4.2                | 23.9           | H            | 1.3           | 265                  | 28.1            | - 8.9             |

Table 1. Radiated Measurements at 10-meters.



#### NOTES:

1. All modes of operation were investigated and the worst-case emissions are reported.

2. The radiated limits are shown on Figure 10. Above 1GHz the limit is 500 μV/m.

Figure 10. Limits at 3 meters

\* All readings are calibrated by HP8640B signal generator with accuracy traceable to the National Institute of Standards and Technology (formerly NBS).

\*\* AFCL = Antenna Factor (Roberts dipole) and Cable Loss (30 ft. RG58C/U).

\*\*\* Measurements using CISPR quasi-peak mode. Above 1GHz, peak detector function mode is used using a resolution bandwidth of 1MHz and a video bandwidth of 1MHz. The peak level complies with the average limit. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

|                                     |                                  |                             |                            |                                 |
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## 7.1 Sample Calculations

$$\text{dB}\mu\text{V} = 20 \log_{10} (\mu\text{V}/\text{m})$$

$$\text{dB}\mu\text{V} = \text{dBm} + 107$$

### 7.2 Example 1:

**@ 20.3 MHz**

|                             |                                              |
|-----------------------------|----------------------------------------------|
| Class B limit               | = 250 $\mu\text{V}$ = 47.96 dB $\mu\text{V}$ |
| Reading                     | = - 67.8 dBm (calibrated level)              |
| Convert to dB $\mu\text{V}$ | = - 67.8 + 107 = 39.2 dB $\mu\text{V}$       |
| $10^{(39.2/20)}$            | = 91.2 $\mu\text{V}$                         |
| <b>Margin</b>               | = 39.2 - 47.96 = - 8.76                      |
|                             | = <b>8.8 dB below limit</b>                  |

### 7.3 Example 2:

**@ 66.7 MHz**

|                                      |                                                                |
|--------------------------------------|----------------------------------------------------------------|
| Class B limit                        | = 100 $\mu\text{V}/\text{m}$ = 47.96 dB $\mu\text{V}/\text{m}$ |
| Reading                              | = - 76.0 dBm (calibrated level)                                |
| Convert to dB $\mu\text{V}/\text{m}$ | = - 76.0 + 107 = 31.0 dB $\mu\text{V}/\text{m}$                |
| Antenna Factor + Cable Loss          | = 5.8 dB                                                       |
| Total                                | = 36.8 dB $\mu\text{V}/\text{m}$                               |
| <b>Margin</b>                        | = 36.8 - 40.0 = - 3.2                                          |
|                                      | = <b>3.2 dB below limit</b>                                    |

|                                     |                                                                                                                                                                                             |                             |                     |                                 |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------|---------------------------------|
| PCTEST™ CLASS B REPORT              |  FCC CERTIFICATION  |                             |                     | Reviewed By:<br>Quality Manager |
| Test Report S/N:<br>B.220301119.A3D | Test Dates:<br>March 21-22, 2002                                                                                                                                                            | EUT Type:<br>INTERNAL CD-RW | FCC ID: A3DNR-9100A | Page 12 of 30                   |

## 8.1 Accuracy of Measurement

### 8.2 Measurement Uncertainty Calculations:

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994).

| Contribution<br>(Line Conducted)                                                                                                                       | Probability<br>Distribution | Uncertainty ( $\pm$ dB) |           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-------------------------|-----------|
|                                                                                                                                                        |                             | 9kHz-150MHz             | 150-30MHz |
| Receiver specification                                                                                                                                 | Rectangular                 | 1.5                     | 1.5       |
| LISN coupling specification                                                                                                                            | Rectangular                 | 1.5                     | 1.5       |
| Cable and input attenuator calibration                                                                                                                 | Normal (k=2)                | 0.3                     | 0.5       |
| Mismatch: Receiver VRC $\Gamma_1 = 0.03$<br>LISN VRC $\Gamma_R = 0.8$ (9kHz) 0.2 (30MHz)<br>Uncertainty limits $20\text{Log}(1 \pm \Gamma_1 \Gamma_R)$ | U-Shaped                    | 0.2                     | 0.35      |
| System repeatability                                                                                                                                   | Std. deviation              | 0.2                     | 0.05      |
| Repeatability of EUT                                                                                                                                   |                             | -                       | -         |
| Combined standard uncertainty                                                                                                                          | Normal                      | 1.26                    | 1.30      |
| Expanded uncertainty                                                                                                                                   | Normal (k=2)                | 2.5                     | 2.6       |

Calculations for 150kHz to 30MHz:

$$u_C(y) = \sqrt{\sum_{i=1}^m u_i^2(y)} = \pm \sqrt{\frac{1.5^2 + 1.5^2}{3} + \left(\frac{0.5}{2}\right)^2 + 0.35} = \pm 1.298\text{dB}$$

$$U = 2U_C(y) = \pm 2.6\text{dB}$$

| Contribution<br>(Radiated Emissions)                                                                                                                 | Probability<br>Distribution | Uncertainties ( $\pm$ dB) |                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------------|-----------------|
|                                                                                                                                                      |                             | 3 m                       | 10 m            |
| Ambient Signals                                                                                                                                      |                             | -                         | -               |
| Antenna factor calibration                                                                                                                           | Normal (k=2)                | $\pm 1.0$                 | $\pm 1.0$       |
| Cable loss calibration                                                                                                                               | Normal (k=2)                | $\pm 0.5$                 | $\pm 0.5$       |
| Receiver specification                                                                                                                               | Rectangular                 | $\pm 1.5$                 | $\pm 1.5$       |
| Antenna directivity                                                                                                                                  | Rectangular                 | + 0.5 / - 0               | + 0.5           |
| Antenna factor variation with height                                                                                                                 | Rectangular                 | $\pm 2.0$                 | $\pm 0.5$       |
| Antenna phase centre variation                                                                                                                       | Rectangular                 | 0.0                       | $\pm 0.2$       |
| Antenna factor frequency interpolation                                                                                                               | Rectangular                 | $\pm 0.25$                | $\pm 0.25$      |
| Measurement distance variation                                                                                                                       | Rectangular                 | $\pm 0.6$                 | $\pm 0.4$       |
| Site imperfections                                                                                                                                   | Rectangular                 | $\pm 2.0$                 | $\pm 2.0$       |
| Mismatch: Receiver VRC $\Gamma_1 = 0.2$<br>Antenna VRC $\Gamma_R = 0.67$ (Bi) 0.3 (Lp)<br>Uncertainty limits $20\text{Log}(1 \pm \Gamma_1 \Gamma_R)$ | U-Shaped                    | + 1.1<br>- 1.25           | $\pm 0.5$       |
| System repeatability                                                                                                                                 | Std. Deviation              | $\pm 0.5$                 | $\pm 0.5$       |
| Repeatability of EUT                                                                                                                                 |                             | -                         | -               |
| Combined standard uncertainty                                                                                                                        | Normal                      | + 2.19 / - 2.21           | + 1.74 / - 1.72 |
| Expanded uncertainty U                                                                                                                               | Normal (k=2)                | + 4.38 / - 4.42           | + 3.48 / - 3.44 |

Calculations for 3m biconical antenna. Coverage factor of k=2 will ensure that the level of confidence will be approximately 95%, therefore:

$$U = 2u_C(y) = 2 \times \pm 2.19 = \pm 4.38\text{dB}$$

|                                     |                                                                                                                                                                                             |                             |                     |                                 |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------|---------------------------------|
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| Test Report S/N:<br>B.220301119.A3D | Test Dates:<br>March 21-22, 2002                                                                                                                                                            | EUT Type:<br>INTERNAL CD-RW | FCC ID: A3DNR-9100A | Page 13 of 30                   |

## 9.1 Test Equipment

| 9.2 Type                         | Model                                                                       | Cal. Due Date | S/N                    |
|----------------------------------|-----------------------------------------------------------------------------|---------------|------------------------|
| Microwave Spectrum Analyzer      | HP 8566B (100Hz-22GHz)                                                      | 12/05/012     | 3638A08713             |
| Microwave Spectrum Analyzer      | HP 8566B (100Hz-22GHz)                                                      | 04/17/02      | 2542A11898             |
| Spectrum Analyzer/Tracking Gen.  | HP 8591A (9kHz-1.8GHz)                                                      | 06/02/02      | 3144A02458             |
| Spectrum Analyzer                | HP 8591A (9kHz-1.8GHz)                                                      | 10/15/02      | 3108A02053             |
| Spectrum Analyzer                | HP 8594A (9kHz-2.9GHz)                                                      | 11/02/02      | 3051A00187             |
| Signal Generator*                | HP 8640B (500Hz-1GHz)                                                       | 06/02/02      | 2232A19558             |
| Signal Generator*                | HP 8640B (500Hz-1GHz)                                                       | 06/02/02      | 1851A09816             |
| Signal Generator*                | Rohde & Schwarz (0.1-1000MHz)                                               | 09/11/02      | 894215/012             |
| Ailtech/Eaton Receiver           | NM 37/57A-SL (30-1000MHz)                                                   | 04/12/03      | 0792-03271             |
| Ailtech/Eaton Receiver           | NM 37/57A (30-1000MHz)                                                      | 03/11/03      | 0805-03334             |
| Ailtech/Eaton Receiver           | NM 17/27A (0.1-32MHz)                                                       | 09/17/012     | 0608-03241             |
| Quasi-Peak Adapter               | HP 85650A                                                                   | 08/09/02      | 2043A00301             |
| Ailtech/Eaton Adapter            | CCA-7 CISPR/ANSI QP Adapter                                                 | 03/11/03      | 0194-04082             |
| RG58 Coax Test Cable             | No. 167                                                                     |               | n/a                    |
| Harmonic/Flicker Test System     | HP 6841A (IEC 555-2/3)                                                      |               | 3531A00115             |
| Broadband Amplifier (2)          | HP 8447D                                                                    |               | 1145A00470, 1937A03348 |
| Broadband Amplifier              | HP 8447F                                                                    |               | 2443A03784             |
| Transient Limiter                | HP 11947A (9kHz-200MHz)                                                     |               | 2820A00300             |
| Horn Antenna                     | EMCO Model 3115 (1-18GHz)                                                   |               | 9704-5182              |
| Horn Antenna                     | EMCO Model 3115 (1-18GHz)                                                   |               | 9205-3874              |
| Horn Antenna                     | EMCO Model 3116 (18-40GHz)                                                  |               | 9203-2178              |
| Biconical Antenna (4)            | Eaton 94455/Eaton 94455-1/Singer 94455-1/Compliance Design 1295, 1332, 0355 |               |                        |
| Log-Spiral Antenna (3)           | Ailtech/Eaton 93490-1                                                       |               | 0608, 1103, 1104       |
| Roberts Dipoles                  | Compliance Design (1 set) A100                                              |               | 5118                   |
| Ailtech Dipoles                  | DM-105A (1 set)                                                             |               | 33448-111              |
| EMCO LISN (2)                    | 3816/2                                                                      |               | 1077, 1079             |
| EMCO LISN                        | 3725/2                                                                      |               | 2009                   |
| Microwave Preamplifier 40dB Gain | HP 83017A (0.5-26.5GHz)                                                     |               | 3123A00181             |
| Microwave Cables                 | MicroCoax (1.0-26.5GHz)                                                     |               |                        |
| Ailtech/Eaton Receiver           | NM37/57A-SL                                                                 |               | 0792-03271             |
| Spectrum Analyzer                | HP 8591A                                                                    |               | 3034A01395             |
| Modulation Analyzer              | HP 8901A                                                                    |               | 2432A03467             |
| NTSC Pattern Generator           | Leader 408                                                                  |               | 0377433                |
| Noise Figure Meter               | HP 8970B                                                                    |               | 3106A02189             |
| Noise Figure Meter               | Ailtech 7510                                                                |               | TE31700                |
| Noise Generator                  | Ailtech 7010                                                                |               | 1473                   |
| Microwave Survey Meter           | Holaday Model 1501 (2.450GHz)                                               |               | 80931                  |
| Digital Thermometer              | Extech Instruments 421305                                                   |               | 426966                 |
| Attenuator                       | HP 8495A (0-70dB) DC-4GHz                                                   |               |                        |
| Bi-Directional Coax Coupler      | Narda 3020A (50-1000MHz)                                                    |               |                        |
| Shielded Screen Room             | RF Lindgren Model 26-2/2-0                                                  |               | 6710 (PCT270)          |
| Shielded Semi-Anechoic Chamber   | Ray Proof Model S81                                                         |               | R2437 (PCT278)         |
| Environmental Chamber            | Associated Systems Model 1025 (Temperature/Humidity)                        |               | PCT285                 |

\* Calibration traceable to the National Institute of Standards and Technology (NIST).

|                                     |                                                                                     |                             |                     |                                 |
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## 10.1 Test Software Used

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```
10    CLS:COLOR 7,0
20    FOR I = 1 TO 80
30    PRINT H;
40    NEXT I
50    FOR K= 1 TO 25
60    LPRINT H;
70    NEXT K
80    OPEN COM1:1200,N,8,1,CS0,DS0" FOR OUTPUT AS #1
90    PRINT#1,ATDT,0123456789"
100   CLOSE:GOTO 20
```

NOTE: This is a sample of the basic program used during the test. However, during testing a different software program may be used; whichever determines the worst-case condition. In addition, the program used also depends on the number and type of devices being tested.

The EUT was exercised by copying CD Data to the hard drive.

|                                            |                                                                                     |                                    |                            |                                        |
|--------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------|----------------------------|----------------------------------------|
| <b>PCTEST</b> <sup>™</sup> CLASS B REPORT  |  | FCC CERTIFICATION                  | <b>NEC</b>                 | <b>Reviewed By:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>B.220301119.A3D | <b>Test Dates:</b><br>March 21-22, 2002                                             | <b>EUT Type:</b><br>INTERNAL CD-RW | <b>FCC ID:</b> A3DNR-9100A | Page 15 of 30                          |

## 11.1 Conclusion

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The data collected shows that the **NEC (Model: NR-9100A) Internal CD-R/RW Drive FCC ID: A3DNR-9100A** complies with §15.107 and §15.109 of the FCC Rules.

No modifications were made to the device.

|                                     |                                                                                     |                             |                     |                                 |
|-------------------------------------|-------------------------------------------------------------------------------------|-----------------------------|---------------------|---------------------------------|
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| Test Report S/N:<br>B.220301119.A3D | Test Dates:<br>March 21-22, 2002                                                    | EUT Type:<br>INTERNAL CD-RW | FCC ID: A3DNR-9100A | Page 16 of 30                   |