

Engineering and Testing for EMC and Safety Compliance

APPLICATION FOR FCC CERTIFICATION

CLASS B DIGITAL DEVICE

MAG Technology Co., Ltd..

9F, No. 245, Sec. 1 Tunhwa S. Road
Taipei, Taiwan, R.O.C.

MODEL: E5005 15" Monitor

FCC ID: IAW E5005

June 30, 1998

| | | |
|---|--------------------------|----------------------------|
| This report concerns (check one): Equipment Type: Monitor | Original Grant: X | Class II Change: |
| Deferred grant requested per 47 CFR 0.457 (d) (1) (ii)? If yes, defer until: _____ | Yes: | No: X Date _____ |
| Company name agrees to notify the Commission by: _____ (date) of the intended date of announcement of the product so that the grant can be issued on that date. | | |
| Transition Rules Request per 15.37? Yes: _____ No: X If no, assumed Part 15, subpart B for unintentional radiators - the new 47 CFR [10-1-90 Edition] provision.. | | |

REPORT PREPARED BY:

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Administrative Writer: Dixie L. Shetter

Rhein Tech Laboratories, Inc.

Document Number : 980372

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TABLE OF CONTENTS

| | |
|--|-----------|
| 1.0 GENERAL INFORMATION | 1 |
| 1.1 PRODUCT DESCRIPTION | 2 |
| 1.2 RELATED SUBMITTAL(S)/GRANT(S) | 3 |
| 1.3 TEST SYSTEM DETAILS | 3 |
| 1.4 CONFIGURATION OF TESTED SYSTEM | 4 |
| 1.5 TEST METHODOLOGY | 5 |
| 1.6 TEST FACILITY | 5 |
| 2.0 PRODUCT LABELING..... | 6 |
| 3.0 SYSTEM TEST CONFIGURATION..... | 8 |
| 3.1 JUSTIFICATION..... | 8 |
| 3.2 EUT EXERCISE SOFTWARE | 8 |
| 3.3 SPECIAL ACCESSORIES | 8 |
| 3.4 CONFORMANCE STATEMENT | 9 |
| 4.0 BLOCK DIAGRAM OF E5005 15 | 10 |
| 5.0 CONDUCTED AND RADIATED MEASUREMENT PHOTOS | 11 |
| 5.1 CONDUCTED MEASUREMENT PHOTOS | 11 |
| 5.2 RADIATED MEASUREMENT PHOTOS | 12 |
| 6.0 CONDUCTED EMISSION DATA | 13 |
| 7.0 RADIATED EMISSION DATA..... | 19 |
| 7.1 FIELD STRENGTH CALCULATION | 21 |
| 8.0 PHOTOS OF TESTED EUT | 22 |

APPENDIX LISTING

| | |
|--|----|
| APPENDIX A: EMISSIONS EQUIPMENT LIST | 23 |
| APPENDIX B: CONDUCTED AND RADIATED TEST METHODOLOGY | 24 |
| APPENDIX C: USER'S MANUAL | 25 |

FIGURE INDEX

| | |
|--|----|
| FIGURE 1: FCC ID LABEL | 6 |
| FIGURE 2: LOCATION OF LABEL ON EUT | 7 |
| FIGURE 3: FRONT OF MONITOR | 22 |
| FIGURE 4: BACK OF MONITOR | 22 |
| FIGURE 5: LEFT SIDE OF MONITOR | 22 |
| FIGURE 6: RIGHT SIDE OF MONITOR | 22 |
| FIGURE 7: BOTTOM OF MONITOR | 22 |
| FIGURE 8: CASE INTERIOR | 22 |
| FIGURE 9: BEZEL INTERIOR WITH BUTTON CONTROL PANEL, SOLDER SIDE | 22 |
| FIGURE 10: BOTTOM INTERIOR | 22 |
| FIGURE 11: RIGHT INTERIOR | 22 |
| FIGURE 12: BACK INTERIOR (WITH CRT NECK BOARD WITH SHIELDING) SOLDER SIDE | 22 |
| FIGURE 13: TOP INTERIOR | 22 |
| FIGURE 14: LEFT INTERIOR | 22 |
| FIGURE 15: BACK OF CRT | 22 |
| FIGURE 16: MAIN BOARD, COMPONENT SIDE AND CRT NECK BOARD WITH SHIELDING | 22 |
| FIGURE 17: MAIN BOARD, COMPONENT SIDE | 22 |
| FIGURE 18: MAIN BOARD, CHASSIS | 22 |
| FIGURE 19: MAIN BOARD, SOLDER SIDE | 22 |
| FIGURE 20: CRT NECK BOARD, COMPONENT SIDE | 22 |
| FIGURE 21: CRT NECK BOARD, COMPONENT SIDE WITH SHIELDING | 22 |
| FIGURE 22: CONTROL PANEL, COMPONENT SIDE | 22 |
| FIGURE 23: CONTROL PANEL, SOLDER SIDE | 22 |
| FIGURE 24: CRT NECK BOARD, SOLDER SIDE | 22 |

TABLE INDEX

| | |
|---|----|
| TABLE 1: CONDUCTED EMISSIONS: 640 x 480 @ 85Hz (MONITOR TO LISN) | 13 |
| TABLE 2: CONDUCTED EMISSIONS: 1024 x 768 @ 85Hz (MONITOR TO LISN) | 14 |
| TABLE 3: CONDUCTED EMISSIONS: 1280 x 1024 @ 60Hz (MONITOR TO LISN) | 15 |
| TABLE 4: CONDUCTED EMISSIONS: 640 x 480 @ 85Hz (PC TO LISN) | 16 |
| TABLE 5: CONDUCTED EMISSIONS: 1024 x 768 @ 85Hz (PC TO LISN) | 17 |
| TABLE 6: CONDUCTED EMISSIONS: 1280 x 1024 @ 60Hz (PC TO LISN) | 18 |
| TABLE 7: RADIATED EMISSIONS: 640 x 480 @ 85 Hz | 19 |
| TABLE 8: RADIATED EMISSIONS: 1024 x 768 @ 85 Hz | 19 |
| TABLE 9: RADIATED EMISSIONS: 1280 x 1024 @ 60 Hz | 20 |

1.0 GENERAL INFORMATION

The following Application for FCC Certification of a Class B Digital Device is prepared on behalf of MAG Technology Co., Ltd., in accordance with Part 2, and Part 15, Subparts A and B of the Federal Communications Commissions rules and regulations. The Equipment Under Test (EUT) was the MAG Technology Co., Ltd., E5005 15" Monitor, FCC ID: IAW5005. The test results reported in this document relate only to the item that was tested.

All measurements contained in this Application were conducted in accordance with ANSI C63.4 Methods of Measurement of Radio Noise Emissions, 1992. The instrumentation utilized for the measurements conforms with the ANSI C63.4 standard for EMI and Field Strength Instrumentation. Some accessories are used to increase sensitivity and prevent overloading of the measuring instrument. These are explained in the appendix of this report. Calibration checks are performed regularly on the instruments, and all accessories including the high pass filter, preamplifier and cables.

All radiated and conducted emissions measurement were performed manually at Rhein Tech, Incorporated. The radiated emissions measurements required by the rules were performed on the ten meter, open field, test range maintained by Rhein Tech Laboratories, Inc., 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. Complete description and site attenuation measurement data have been placed on file with the Federal Communications Commission. The power line conducted emission measurements were performed in a shielded enclosure also located at the Herndon, Virginia facility. Rhein Tech, Labs, Inc. is accepted by the FCC as a Facility available to do measurement work for others on a contract basis.

1.1 PRODUCT DESCRIPTION

Features of the E5005:

- Multi-scanning at horizontal frequencies of 30KHz to 70KHz and vertical frequencies of 50Hz to 120Hz.
- 1280 x 1024 maximum resolution
- 15-inch (13.9" viewable) Flat square tube, anti-glare, anti-static
- 0.28mm dot pitch
- Microprocessor-based design with digital controls
- JAG™ OSD Control
- Unlimited colors
- Compatible with standard IBM® VGA, extended VGA, Super VGA, IBM® XGA modes, as well as VESA® ergonomic standards
- Universal power supply
- Tilt and swivel base
- MPR-II compliant
- TCO-1992/TCO-1995 compliant (optional)
- VESA® Display Power Management (DPMS™) compatible
- Microsoft® Windows® 95 compatible and VESA® Display Data Channel (DDC) 1/2B compatible
- EPA Energy Star™ compliant power saving

1.2 RELATED SUBMITTAL(S)/GRANT(S)

N/A. This is an original submission for Certification.

1.3 TEST SYSTEM DETAILS

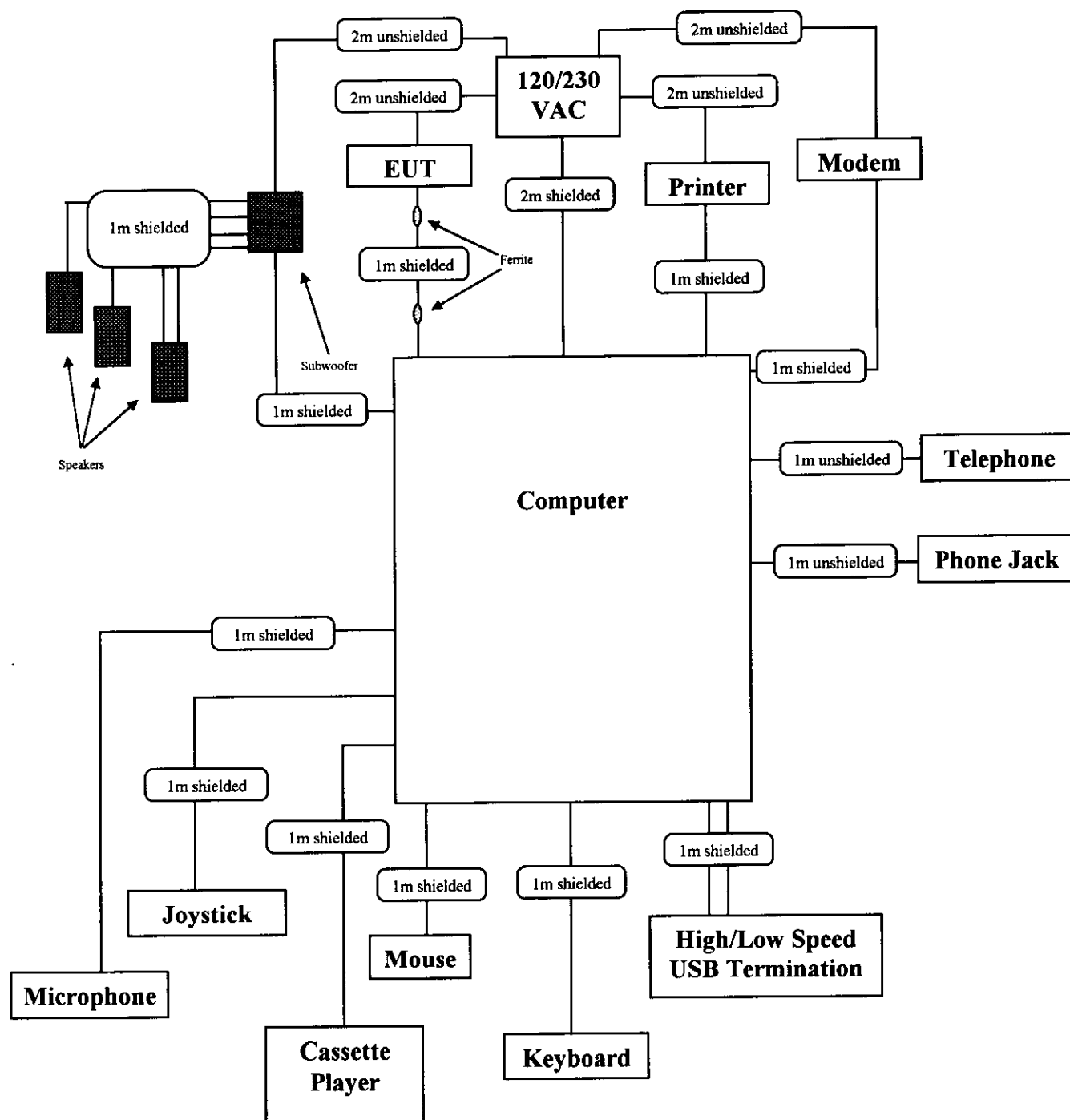
The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

| DESCRIPTION | MANUFACTURER | MODEL | SERIAL No | FCC ID | CABLE DESCRIPTIONS | RTL BAR CODE |
|---------------|--------------------------|--------------------------------|---------------|--------------------|---|--------------|
| AUDIO DEVICE | RADIO SHACK | SCP-63 | N/A | N/A | SHIELDED I/O | 900699 |
| JOYSTICK | MICROSOFT CORP. | SIDEWINDER 3D PRO | 01946903 | C3KMJ1 | SHIELDED I/O | 8530 |
| KEYBOARD | MAXI SWITCH | 2196003-XX-XXX | 50432723 | D7J2196003-XX | SHIELDED I/O | 8441 |
| MICROPHONE | TELEX | N/A | 700373-000 | N/A | SHIELDED I/O | 7269 |
| MODEM | US ROBOTICS | 0413 | 839032B86P9WV | DoC | SHIELDED I/O, UNSHIELDED POWER | 900409 |
| MONITOR (EUT) | MAG TECHNOLOGY Co., LTD. | E5005 | SMAE5005009 | IAWE5005 (PENDING) | SHIELDED I/O, FERRITE ON BOTH ENDS, UNSHIELDED POWER | 9329 |
| MOUSE | MICROSOFT CORP. | INTELLIMOUSE 1.1A | 01504632 | C3KKMP5 | SHIELDED I/O | 8449 |
| PRINTER | EPSON | P880A | 3BT1810257 | BKMP880A | SHIELDED I/O, UNSHIELDED POWER | 6714 |
| SPEAKERS | BOSTON ACCOUSTICS | BA635 | 02 | N/A | UNSHIELDED I/O | 9088 |
| SPEAKERS | BOSTON ACCOUSTICS | BA635 | 02 | N/A | UNSHIELDED I/O | 9089 |
| SPEAKERS | BOSTON ACCOUSTICS | BA635 | 02 | N/A | SHIELDED I/O, UNSHIELDED POWER | 9087 |
| SYSTEM | GATEWAY 2000, INC. | ANDOVER/LOW PROFILE MINI-TOWER | N/A | DoC | N/A | 9047 |
| TELEPHONE | PANASONIC | KX-T7020 | 3CICO16307 | N/A | UNSHIELDED I/O | 900690 |
| TERMINATION | RADIO SHACK | 600 OHM PHONE JACK | N/A | N/A | UNSHIELDED I/O | 8963 |

INTERNAL COMPONENTS

| DESCRIPTION | MANUFACTURER | MODEL | SERIAL No | FCC ID | CABLE DESCRIPTIONS | RTL BAR CODE |
|--------------|-----------------|--------------------|--------------|-------------|--------------------|--------------|
| CD-ROM | TOSHIBA | XM-6202B | 834B000800 | CJ6AT97-029 | INTERNAL RIBBON | 9170 |
| CD-ROM | PHILIPS | CDD3610/31 | E118405 | DoC | INTERNAL RIBBON | 9126 |
| CPU | INTEL | PENTIUM II 333 MHz | R7480952-212 | N/A | N/A | 8698 |
| FLOPPY DRIVE | PANASONIC | JU-256A216P | 00595548 | N/A | INTERNAL RIBBON | 8051 |
| HARD DRIVE | WESTERN DIGITAL | AC34600-00LC | WT4200658504 | N/A | INTERNAL RIBBON | 9050 |
| MODEM | US ROBOTICS | 0484 (PYTHON) | 210V2148TE63 | DoC | UNSHIELDED I/O | 9029 |
| MOTHERBOARD | ANIGMA | ANDOVER | N/A | N/A | INTERNAL RIBBON | 8697 |
| POWER SUPPLY | ASTEC | ATX202-3515 | 2420029519 | N/A | SHIELDED POWER | 7247 |

1.4 CONFIGURATION OF TESTED SYSTEM



1.5 TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 1992. Radiated testing was performed at an antenna to EUT distance of 10 meters.

1.6 TEST FACILITY

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of Rhein Tech Laboratories, Inc. 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report dated June 24, 1996, submitted to and approved by the Federal Communication Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 1992).

3.0 SYSTEM TEST CONFIGURATION

3.1 JUSTIFICATION

The system was configured for testing in a typical fashion (as a customer would normally use it). The system was tested in 640 x 480, 1024 x 768 and 1280 x 1024. CPU Speed: 333 MHz.

The host computer was tested with all ports attached to external peripherals. The E5005 15" Monitor was investigated as powered from the wall outlet since there is no auxiliary power outlet on the host computer.

3.2 EUT EXERCISE SOFTWARE

The EUT exercise program used during radiated and conducted testing has been designed to exercise the various system components in a manner similar to a typical use. The software, contained on the hard disk drive sequentially exercises each system component: 1) an H prints on the monitor, 2) an H prints on the printer, 3) an H is sent to serial ports, 4) a file is read from the floppy diskette, 5) a file is read from the hard drive and any other hard drive present, 6) a file is read from the CD-ROM drive. In cases that implement the use of Universal Serial Bus (USB) ports, a looped batch program is initiated to render a continuous flow of data through the USB ports. The complete cycle takes less than one second and is repeated continually. Systems that utilize network cards are connected to a server and are configured to transmit and receive packets of data continuously. As the keyboard and mouse are strictly input devices, no data was transmitted to them during test. They are, however, continuously scanned for data input activity.

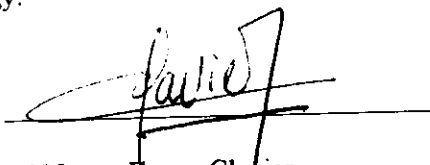
3.3 SPECIAL ACCESSORIES

All interface cables used for compliance testing should be the same type as shown in Section 1.3 of this test report.

3.4 CONFORMANCE STATEMENT

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this attached test record. No modifications were made during testing to the equipment in order to achieve compliance with these standards.
Furthermore, there was no deviation from, additions to or exclusions from the ANSI 63.4 test methodology.

Signature:



Date: June 30, 1998

Typed/Printed Name: Bruno Clavier

Position: Quality Manager
(NVLAP Signatory)

NVLAP Accredited by the National Voluntary Accreditation Program for the specific scope of accreditation under Lab Code 20061-0.

Note: This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

6.0 CONDUCTED EMISSION DATA

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. If the conducted emissions exceed the average limit with the instrument set to the quasi-peak mode, then measurements are made in the average mode.

The conducted test was performed with the EUT exercise program loaded, and the emissions were scanned between 150 kHz to 30 MHz on the NEUTRAL SIDE and HOT SIDE, herein referred to as L1 and L2, respectively.

TABLE 1: CONDUCTED EMISSIONS: 640 x 480 @ 85Hz (MONITOR TO LISN)

NEUTRAL SIDE (Line 1)

| EMISSION FREQUENCY (MHz) | TEST DETECTOR (1) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB) | EMISSION LEVEL (dBuV) | EN55022/ CISPR22 QP LIMIT (dBuV) | EN55022/ CISPR22 QP MARGIN (dBuV) | EN55022/ CISPR22 AV LIMIT (dBuV) | EN55022/ CISPR22 AV MARGIN (dBuV) |
|--------------------------------|-------------------------|-------------------------------|--------------------------------------|-----------------------------|--|---|--|---|
| 0.176 | Pk | 48.3 | 0.2 | 48.5 | 64.7 | -16.2 | 54.7 | -6.2 |
| 0.220 | Pk | 44.5 | 0.3 | 44.8 | 62.8 | -18.0 | 52.8 | -8.0 |
| 0.264 | Pk | 40.6 | 0.3 | 40.9 | 61.3 | -20.4 | 51.3 | -10.4 |
| 0.565 | Pk | 37.3 | 0.4 | 37.7 | 56.0 | -18.3 | 46.0 | -8.3 |
| 1.816 | Pk | 38.8 | 0.8 | 39.6 | 56.0 | -16.4 | 46.0 | -6.4 |
| 2.018 | Pk | 33.1 | 0.9 | 34.0 | 56.0 | -22.0 | 46.0 | -12.0 |
| 8.940 | Pk | 30.3 | 1.9 | 32.2 | 60.0 | -27.8 | 50.0 | -17.8 |
| 29.800 | Pk | 33.3 | 4.5 | 37.8 | 60.0 | -22.2 | 50.0 | -12.2 |

HOT SIDE (Line 2)

| EMISSION FREQUENCY (MHz) | TEST DETECTOR (1) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB) | EMISSION LEVEL (dBuV) | EN55022/ CISPR22 QP LIMIT (dBuV) | EN55022/ CISPR22 QP MARGIN (dBuV) | EN55022/ CISPR22 AV LIMIT (dBuV) | EN55022/ CISPR22 AV MARGIN (dBuV) |
|--------------------------------|-------------------------|-------------------------------|--------------------------------------|-----------------------------|--|---|--|---|
| 0.175 | Pk | 50.3 | 0.3 | 50.6 | 64.7 | -14.1 | 54.7 | -4.1 |
| 0.265 | Pk | 43.9 | 0.4 | 44.3 | 61.3 | -17 | 51.3 | -7.0 |
| 0.307 | Pk | 43.4 | 0.4 | 43.8 | 60.1 | -16.3 | 50.1 | -6.3 |
| 0.565 | Pk | 36.5 | 0.5 | 37.0 | 56.0 | -19.0 | 46.0 | -9.0 |
| 1.804 | Pk | 39.1 | 0.8 | 39.9 | 56.0 | -16.1 | 46.0 | -6.1 |
| 9.850 | Pk | 30.6 | 1.8 | 32.4 | 60.0 | -27.6 | 50.0 | -17.6 |
| 29.800 | Pk | 33.1 | 4.8 | 37.9 | 60.0 | -22.1 | 50.0 | -12.1 |

⁽¹⁾Pk = Peak; QP = Quasi-Peak; Av = Average

TEST PERSONNEL:

Signature: _____

Date: 6/20/98

Typed/Printed Name: K. Franck Schuppis

TABLE 2: CONDUCTED EMISSIONS: 1024 x 768 @ 85Hz (MONITOR TO LISN)**NEUTRAL SIDE (Line 1)**

| EMISSION FREQUENCY (MHz) | TEST DETECTOR (1) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB) | EMISSION LEVEL (dBuV) | EN55022/ CISPR22 QP LIMIT (dBuV) | EN55022/ CISPR22 QP MARGIN (dBuV) | EN55022/ CISPR22 AV LIMIT (dBuV) | EN55022/ CISPR22 AV MARGIN (dBuV) |
|--------------------------------|-------------------------|-------------------------------|--------------------------------------|-----------------------------|--|---|--|---|
| 0.150 | Pk | 54.4 | 0.2 | 54.6 | 66.0 | -11.4 | 56.0 | -1.4 |
| 0.150 | Qp | 48.0 | 0.2 | 48.2 | 66.0 | -17.8 | 56.0 | -7.8 |
| 0.150 | Av | 36.5 | 0.2 | 36.7 | 66.0 | -29.3 | 56.0 | -19.3 |
| 0.207 | Av | 44.0 | 0.3 | 44.3 | 63.3 | -19.0 | 53.3 | -9.0 |
| 0.212 | Pk | 52.1 | 0.3 | 52.4 | 63.1 | -10.7 | 53.1 | -0.7 |
| 0.281 | Pk | 42.6 | 0.3 | 42.9 | 60.8 | -17.9 | 50.8 | -7.9 |
| 0.343 | Av | 41.6 | 0.3 | 41.9 | 59.1 | -17.2 | 49.1 | -7.2 |
| 0.349 | Qp | 44.0 | 0.3 | 44.3 | 59.0 | -14.7 | 49.0 | -4.7 |
| 0.350 | Pk | 44.8 | 0.3 | 45.1 | 59.0 | -13.9 | 49.0 | -3.9 |
| 0.555 | Pk | 41.3 | 0.4 | 41.7 | 56.0 | -14.3 | 46.0 | -4.3 |
| 1.780 | Pk | 43.2 | 0.8 | 44.0 | 56.0 | -12.0 | 46.0 | -2.0 |
| 1.785 | Av | 38.9 | 0.8 | 39.7 | 56.0 | -16.3 | 46.0 | -6.3 |
| 1.790 | Qp | 41.6 | 0.8 | 42.4 | 56.0 | -13.6 | 46.0 | -3.6 |
| 15.760 | Pk | 37.3 | 2.9 | 40.2 | 60.0 | -19.8 | 50.0 | -9.8 |

HOT SIDE (Line 2)

| EMISSION FREQUENCY (MHz) | TEST DETECTOR (1) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB) | EMISSION LEVEL (dBuV) | EN55022/ CISPR22 QP LIMIT (dBuV) | EN55022/ CISPR22 QP MARGIN (dBuV) | EN55022/ CISPR22 AV LIMIT (dBuV) | EN55022/ CISPR22 AV MARGIN (dBuV) |
|--------------------------------|-------------------------|-------------------------------|--------------------------------------|-----------------------------|--|---|--|---|
| 0.206 | Av | 47.4 | 0.4 | 47.8 | 63.4 | -15.6 | 53.4 | -5.6 |
| 0.212 | Pk | 53.2 | 0.4 | 53.6 | 63.1 | -9.5 | 53.1 | 0.5 |
| 0.212 | Qp | 50.4 | 0.4 | 50.8 | 63.1 | -12.3 | 53.1 | -2.3 |
| 0.280 | Pk | 46.1 | 0.4 | 46.5 | 60.8 | -14.3 | 50.8 | -4.3 |
| 0.344 | Av | 44.3 | 0.4 | 44.7 | 59.1 | -14.4 | 49.1 | -4.4 |
| 0.351 | Pk | 46.1 | 0.4 | 46.5 | 58.9 | -12.4 | 48.9 | -2.4 |
| 0.351 | Qp | 45.0 | 0.4 | 45.4 | 58.9 | -13.5 | 48.9 | -3.5 |
| 0.550 | Pk | 38.8 | 0.5 | 39.3 | 56.0 | -16.7 | 46.0 | -6.7 |
| 1.780 | Pk | 42.3 | 0.8 | 43.1 | 56.0 | -12.9 | 46.0 | -2.9 |
| 1.785 | Av | 39.3 | 0.8 | 40.1 | 56.0 | -15.9 | 46.0 | -5.9 |
| 1.790 | Qp | 41.7 | 0.8 | 42.5 | 56.0 | -13.5 | 46.0 | -3.5 |
| 9.685 | Pk | 32.3 | 1.8 | 34.1 | 60.0 | -25.9 | 50.0 | -15.9 |
| 15.720 | Pk | 36.2 | 2.7 | 38.9 | 60.0 | -21.1 | 50.0 | -11.1 |

⁽¹⁾Pk = Peak; QP = Quasi-Peak; Av = Average**TEST PERSONNEL:**Signature: 

Date: 6/20/98

Typed/Printed Name: K. Franck Schuppius

TABLE 3: CONDUCTED EMISSIONS: 1280 X 1024 @ 60Hz (MONITOR TO LISN)**NEUTRAL SIDE (Line 1)**

| EMISSION FREQUENCY (MHz) | TEST DETECTOR (1) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB) | EMISSION LEVEL (dBuV) | EN55022/ CISPR22 QP LIMIT (dBuV) | EN55022/ CISPR22 QP MARGIN (dBuV) | EN55022/ CISPR22 AV LIMIT (dBuV) | EN55022/ CISPR22 AV MARGIN (dBuV) |
|--------------------------------|-------------------------|-------------------------------|--------------------------------------|-----------------------------|--|---|--|---|
| 0.197 | Pk | 47.6 | 0.5 | 48.1 | 63.7 | -15.6 | 53.7 | -5.6 |
| 0.262 | Pk | 44.4 | 0.5 | 44.9 | 61.4 | -16.5 | 51.4 | -6.5 |
| 0.327 | Pk | 43.6 | 0.6 | 59.5 | -15.3 | -15.3 | 49.5 | -5.3 |
| 0.391 | Pk | 38.7 | 0.6 | 39.3 | 58.0 | -18.7 | 48.0 | -8.7 |
| 0.453 | Pk | 34.4 | 0.7 | 35.1 | 56.8 | -21.7 | 46.8 | -11.7 |
| 1.788 | Pk | 40.9 | 1.1 | 42.0 | 56.0 | -14.0 | 46.0 | -4.0 |
| 1.788 | Qp | 39.4 | 1.1 | 40.5 | 56.0 | -15.5 | 46.0 | -5.5 |
| 1.788 | Av | 37.6 | 1.1 | 38.7 | 56.0 | -17.3 | 46.0 | -7.3 |

HOT SIDE (Line 2)

| EMISSION FREQUENCY (MHz) | TEST DETECTOR (1) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB) | EMISSION LEVEL (dBuV) | EN55022/ CISPR22 QP LIMIT (dBuV) | EN55022/ CISPR22 QP MARGIN (dBuV) | EN55022/ CISPR22 AV LIMIT (dBuV) | EN55022/ CISPR22 AV MARGIN (dBuV) |
|--------------------------------|-------------------------|-------------------------------|--------------------------------------|-----------------------------|--|---|--|---|
| 0.198 | Pk | 46.1 | 0.8 | 46.9 | 63.7 | -16.8 | 53.7 | -6.8 |
| 0.264 | Pk | 37.8 | 0.7 | 38.5 | 61.3 | -22.8 | 51.3 | -12.8 |
| 0.326 | Pk | 42.7 | 0.6 | 43.3 | 59.6 | -16.3 | 49.6 | -6.3 |
| 0.393 | Pk | 42.0 | 0.6 | 42.6 | 58.0 | -15.4 | 48.0 | -5.4 |
| 0.455 | Pk | 33.8 | 0.6 | 34.4 | 56.8 | -22.4 | 46.8 | -12.4 |
| 24.785 | Pk | 40.4 | 3.4 | 43.8 | 60.0 | -16.2 | 50.0 | -6.2 |

⁽¹⁾ Pk = Peak; QP = Quasi-Peak; Av = Average**TEST PERSONNEL:**

Signature: _____



Date: 6/20/98

Typed/Printed Name: K. Franck Schuppius

TABLE 4: CONDUCTED EMISSIONS: 640 X 480 @ 85Hz (PC TO LISN)**NEUTRAL SIDE (Line 1)**

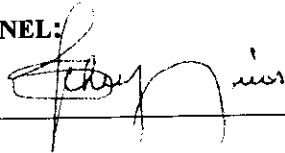
| EMISSION FREQUENCY (MHz) | TEST DETECTOR (1) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB) | EMISSION LEVEL (dBuV) | EN55022/ CISPR22 QP LIMIT (dBuV) | EN55022/ CISPR22 QP MARGIN (dBuV) | EN55022/ CISPR22 AV LIMIT (dBuV) | EN55022/ CISPR22 AV MARGIN (dBuV) |
|--------------------------------|-------------------------|-------------------------------|--------------------------------------|-----------------------------|--|---|--|---|
| 0.211 | Pk | 48.6 | 0.3 | 48.9 | 63.2 | -14.3 | 53.2 | -4.3 |
| 0.315 | Pk | 43.4 | 0.3 | 43.7 | 59.8 | -16.1 | 49.8 | -6.1 |
| 0.419 | Pk | 34.5 | 0.4 | 34.9 | 57.5 | -22.6 | 47.5 | -12.6 |
| 0.624 | Pk | 37.2 | 0.4 | 37.6 | 56.0 | -18.4 | 46.0 | -8.4 |
| 2.260 | Pk | 31.0 | 0.9 | 31.9 | 56.0 | -24.1 | 46.0 | -14.1 |
| 12.680 | Pk | 27.1 | 2.4 | 29.5 | 60.0 | -30.5 | 50.0 | -20.5 |

HOT SIDE (Line 2)

| EMISSION FREQUENCY (MHz) | TEST DETECTOR (1) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB) | EMISSION LEVEL (dBuV) | EN55022/ CISPR22 QP LIMIT (dBuV) | EN55022/ CISPR22 QP MARGIN (dBuV) | EN55022/ CISPR22 AV LIMIT (dBuV) | EN55022/ CISPR22 AV MARGIN (dBuV) |
|--------------------------------|-------------------------|-------------------------------|--------------------------------------|-----------------------------|--|---|--|---|
| 0.215 | Pk | 48.3 | 0.4 | 48.7 | 63 | -14.3 | 53 | -4.3 |
| 0.315 | Pk | 42.8 | 0.4 | 43.2 | 59.8 | -16.6 | 49.8 | -6.6 |
| 0.419 | Pk | 35.6 | 0.4 | 36.0 | 57.5 | -21.5 | 47.5 | -11.5 |
| 0.623 | Pk | 34.0 | 0.4 | 34.4 | 56.0 | -21.6 | 46.0 | -11.6 |
| 0.726 | Pk | 33.1 | 0.4 | 33.5 | 56.0 | -22.5 | 46.0 | -12.5 |
| 1.144 | Pk | 33.2 | 0.6 | 33.8 | 56.0 | -22.2 | 46.0 | -12.2 |
| 11.220 | Pk | 28.4 | 1.9 | 30.3 | 60.0 | -29.7 | 50.0 | -19.7 |

⁽¹⁾Pk = Peak; QP = Quasi-Peak; Av = Average**TEST PERSONNEL:**

Signature: _____



Date: 6/20/98

Typed/Printed Name: K. Franck Schuppius

TABLE 5: CONDUCTED EMISSIONS: 1024 x 768 @ 85Hz (PC TO LISN)**NEUTRAL SIDE (Line 1)**

| EMISSION FREQUENCY (MHz) | TEST DETECTOR (1) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB) | EMISSION LEVEL (dBuV) | EN55022/ CISPR22 QP LIMIT (dBuV) | EN55022/ CISPR22 QP MARGIN (dBuV) | EN55022/ CISPR22 AV LIMIT (dBuV) | EN55022/ CISPR22 AV MARGIN (dBuV) |
|--------------------------------|-------------------------|-------------------------------|--------------------------------------|-----------------------------|--|---|--|---|
| 0.212 | Pk | 49.5 | 0.3 | 49.8 | 63.1 | -13.3 | 53.1 | -3.3 |
| 0.212 | Qp | 49.0 | 0.3 | 49.3 | 63.1 | -13.8 | 53.1 | -3.8 |
| 0.212 | Av | 28.9 | 0.3 | 29.2 | 63.1 | -33.9 | 53.1 | -23.9 |
| 0.315 | Pk | 43.4 | 0.3 | 43.7 | 59.8 | -16.1 | 49.8 | -6.1 |
| 0.419 | Pk | 36.4 | 0.4 | 36.8 | 57.5 | -20.7 | 47.5 | -10.7 |
| 0.621 | Pk | 36.6 | 0.4 | 37.0 | 56.0 | -19.0 | 46.0 | -9.0 |
| 3.184 | Pk | 29.8 | 1.1 | 30.9 | 56.0 | -25.1 | 46.0 | -15.1 |
| 11.060 | Pk | 27.2 | 1.9 | 29.1 | 60.0 | -30.9 | 50.0 | -20.9 |

HOT SIDE (Line 2)

| EMISSION FREQUENCY (MHz) | TEST DETECTOR (1) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB) | EMISSION LEVEL (dBuV) | EN55022/ CISPR22 QP LIMIT (dBuV) | EN55022/ CISPR22 QP MARGIN (dBuV) | EN55022/ CISPR22 AV LIMIT (dBuV) | EN55022/ CISPR22 AV MARGIN (dBuV) |
|--------------------------------|-------------------------|-------------------------------|--------------------------------------|-----------------------------|--|---|--|---|
| 0.209 | Pk | 48.8 | 0.4 | 49.2 | 63.2 | -14.0 | 53.2 | -4.0 |
| 0.314 | Pk | 42.8 | 0.4 | 43.2 | 59.9 | -16.7 | 49.9 | -6.7 |
| 0.419 | Pk | 37.0 | 0.4 | 37.4 | 57.5 | -20.1 | 47.5 | -10.1 |
| 0.624 | Pk | 34.0 | 0.4 | 34.4 | 56.0 | -21.6 | 46.0 | -11.6 |
| 1.128 | Pk | 33.3 | 0.6 | 33.9 | 56.0 | -22.1 | 46.0 | -12.1 |
| 5.750 | Pk | 30.1 | 1.6 | 31.7 | 60.0 | -28.3 | 50.0 | -18.3 |
| 11.740 | Pk | 29.0 | 2.0 | 31.0 | 60.0 | -29.0 | 50.0 | -19.0 |

(1) **Pk = Peak; QP = Quasi-Peak; Av = Average****TEST PERSONNEL:**

Signature: _____

Date: 6/20/98

Typed/Printed Name: K. Franck Schuppious

TABLE 6: CONDUCTED EMISSIONS: 1280 x 1024 @ 60Hz (PC TO LISN)**NEUTRAL SIDE (Line 1)**

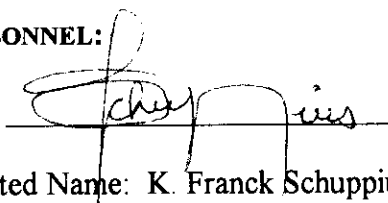
| EMISSION FREQUENCY (MHz) | TEST DETECTOR (1) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB) | EMISSION LEVEL (dBuV) | EN55022/ CISPR22 QP LIMIT (dBuV) | EN55022/ CISPR22 QP MARGIN (dBuV) | EN55022/ CISPR22 AV LIMIT (dBuV) | EN55022/ CISPR22 AV MARGIN (dBuV) |
|--------------------------------|-------------------------|-------------------------------|--------------------------------------|-----------------------------|--|---|--|---|
| 0.201 | Pk | 47.8 | 0.3 | 48.1 | 63.6 | -15.5 | 53.6 | -5.5 |
| 0.308 | Pk | 42.8 | 0.3 | 43.1 | 60.0 | -16.9 | 50.0 | -6.9 |
| 0.410 | Pk | 34.5 | 0.4 | 34.9 | 57.6 | -22.7 | 47.6 | -12.7 |
| 0.615 | Pk | 35.9 | 0.4 | 36.3 | 56.0 | -19.7 | 46.0 | -9.7 |
| 0.721 | Pk | 36.1 | 0.3 | 36.4 | 56.0 | -19.6 | 46.0 | -9.6 |
| 0.823 | Pk | 34.2 | 0.4 | 34.6 | 56.0 | -21.4 | 46.0 | -11.4 |

HOT SIDE (Line 2)

| EMISSION FREQUENCY (MHz) | TEST DETECTOR (1) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB) | EMISSION LEVEL (dBuV) | EN55022/ CISPR22 QP LIMIT (dBuV) | EN55022/ CISPR22 QP MARGIN (dBuV) | EN55022/ CISPR22 AV LIMIT (dBuV) | EN55022/ CISPR22 AV MARGIN (dBuV) |
|--------------------------------|-------------------------|-------------------------------|--------------------------------------|-----------------------------|--|---|--|---|
| 0.203 | Pk | 47.8 | 0.3 | 48.1 | 63.5 | -15.4 | 53.5 | -5.4 |
| 0.308 | Pk | 42.6 | 0.4 | 43.0 | 60.0 | -17.0 | 50.0 | -7.0 |
| 0.412 | Pk | 35.7 | 0.4 | 36.1 | 57.6 | -21.5 | 47.6 | -11.5 |
| 0.618 | Pk | 32.5 | 0.4 | 32.9 | 56.0 | -23.1 | 46.0 | -13.1 |
| 0.723 | Pk | 32.0 | 0.4 | 32.4 | 56.0 | -23.6 | 46.0 | -13.6 |
| 0.826 | Pk | 28.9 | 0.5 | 29.4 | 56.0 | -26.6 | 46.0 | -16.6 |

(1) **Pk = Peak; QP = Quasi-Peak; Av = Average****TEST PERSONNEL:**

Signature:



Date: 6/20/98

Typed/Printed Name: K. Franck Schuppius

7.0 RADIATED EMISSION DATA

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

TABLE 7: RADIATED EMISSIONS: 640 X 480 @ 85Hz

(Temperature: 78°F, Humidity: 70%)

| EMISSION FREQUENCY (MHz) | ANTENNA POLARITY (H/V) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB/m) | EMISSION LEVEL (dBuV/m) | EN55022 / CISPR22 LIMIT (dBuV/m) | EN55022 / CISPR22 MARGIN (dBuV/m) |
|--------------------------------|------------------------------|-------------------------------|--|-------------------------------|---|--|
| 44.540 | H | 42.1 | -22.4 | 19.7 | 30.0 | -10.3 |
| 50.660 | H | 39.7 | -23.7 | 16.0 | 30.0 | -14.0 |
| 81.170 | H | 50.9 | -30.9 | 20.0 | 30.0 | -10.0 |
| 115.50 | V | 41.6 | -25.1 | 16.5 | 30.0 | -13.5 |
| 129.700 | H | 43.3 | -26.1 | 17.2 | 30.0 | -12.8 |
| 148.060 | H | 45.4 | -28.8 | 16.6 | 30.0 | -13.4 |
| 239.860 | H | 42.4 | -23.4 | 19.0 | 37.0 | -18.0 |
| 285.760 | H | 42.3 | -22.6 | 19.7 | 37.0 | -17.3 |
| 371.440 | H | 42.5 | -20.1 | 22.4 | 37.0 | -14.6 |

TABLE 8: RADIATED EMISSIONS: 1024 X 768 @ 85 Hz

(Temperature: 78°F, Humidity: 70%)

| EMISSION FREQUENCY (MHz) | ANTENNA POLARITY (H/V) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB/m) | EMISSION LEVEL (dBuV/m) | EN55022 / CISPR22 LIMIT (dBuV/m) | EN55022 / CISPR22 MARGIN (dBuV/m) |
|--------------------------------|------------------------------|-------------------------------|--|-------------------------------|---|--|
| 63.054 | H | 43.6 | -27.9 | 15.7 | 30.0 | -14.3 |
| 110.654 | H | 44.6 | -27.4 | 17.2 | 30.0 | -12.8 |
| 149.681 | H | 51.7 | -29.0 | 22.7 | 30.0 | -7.3 |
| 173.279 | H | 44.0 | -27.1 | 16.9 | 30.0 | -13.1 |
| 220.535 | H | 43.8 | -24.9 | 18.9 | 30.0 | -11.1 |
| 228.423 | H | 45.7 | -24.3 | 21.4 | 30.0 | -8.6 |
| 315.519 | V | 41.5 | -21.5 | 20.0 | 37.0 | -17.0 |

**All readings are quasi-peak, unless stated otherwise. See Appendix A for Radiated Test Methodology.*

TEST PERSONNEL:

Signature: _____

Date: 6/20/98

Typed/Printed Name: K. Franck Schuppius

TABLE 9: RADIATED EMISSIONS: 1280 X 1024 @ 60 HZ

(Temperature: 85°F, Humidity: 55%)

| EMISSION FREQUENCY (MHz) | ANTENNA POLARITY (H/V) | ANALYZER READING (dBuV) | SITE CORRECTION FACTOR (dB/m) | EMISSION LEVEL (dBuV/m) | EN55022 / CISPR22 LIMIT (dBuV/m) | EN55022 / CISPR22 MARGIN (dBuV/m) |
|--------------------------------|------------------------------|-------------------------------|--|-------------------------------|---|--|
| 62.670 | V | 47.2 | -27.0 | 20.2 | 30.0 | -9.8 |
| 125.329 | V | 48.6 | -24.2 | 24.4 | 30.0 | -5.6 |
| 134.265 | V | 47.0 | -25.1 | 21.9 | 30.0 | -8.1 |
| 143.210 | V | 46.2 | -23.2 | 23.0 | 30.0 | -7.0 |
| 170.057 | V | 43.7 | -25.2 | 18.5 | 30.0 | -11.5 |
| 196.902 | H | 43.8 | -23.9 | 19.9 | 30.0 | -10.1 |
| 205.855 | V | 43.7 | -23.7 | 20.0 | 30.0 | -10.0 |
| 214.810 | V | 39.5 | -17.9 | 21.6 | 30.0 | -8.4 |

**All readings are quasi-peak, unless stated otherwise. See Appendix A for Radiated Test Methodology.*

TEST PERSONNEL:

Signature: _____

Date: 6/20/98

Typed/Printed Name: K. Franck Schuppis

7.1 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:

$$FI(\text{dBuV/m}) = SAR(\text{dBuV}) + SCF(\text{dB/m})$$

FI = Field Intensity

SAR = Spectrum Analyzer Reading

SCF = Site Correction Factor

The Site Correction Factor (SCF) used in the above equation is determined empirically, and is expressed in the following equation:

$$SCF(\text{dB/m}) = -PG(\text{dB}) + AF(\text{dB/m}) + CL(\text{dB})$$

SCF = Site Correction Factor

PG = Pre-amplifier Gain

AF = Antenna Factor

CL = Cable Loss

The field intensity in microvolts per meter can then be determined according to the following equation:

$$FI(\text{uV/m}) = 10^{FI(\text{dBuV/m})/20}$$

For example, assume a signal at a frequency of 125 MHz has a received level measured as 49.3 dBuV. The total Site Correction Factor (antenna factor plus cable loss minus preamplifier gain) for 125 MHz is - 11.5 dB/m. The actual radiated field strength is calculated as follows:

$$49.3 \text{ dBuV} - 11.5 \text{ dB} = 37.8 \text{ dBuV/m}$$

$$10^{37.8/20} = 10^{1.89} = 77.6 \text{ uV/m}$$

8.0 PHOTOS OF TESTED EUT

The following photos are attached:

- Figure 3: Front of Monitor
- Figure 4: Back of Monitor
- Figure 5: Left Side of Monitor
- Figure 6: Right Side of Monitor
- Figure 7: Bottom of Monitor
- Figure 8: Case Interior
- Figure 9: Bezel Interior with Button Control Panel, solder side
- Figure 10: Bottom Interior
- Figure 11: Right Interior
- Figure 12: Back Interior (with CRT neck board with shielding) solder side
- Figure 13: Top Interior
- Figure 14: Left Interior
- Figure 15: Back of CRT
- Figure 16: Main Board, component side and CRT Neck board with shielding
- Figure 17: Main Board, component side
- Figure 18: Main Board, chassis
- Figure 19: Main Board, solder side
- Figure 20: CRT Neck Board, component side
- Figure 21: CRT Neck Board, component side with shielding
- Figure 22: Control Panel, component side
- Figure 23: Control Panel, solder side
- Figure 24: CRT Neck Board, solder side

APPENDIX A: Emissions Equipment List

| DESCRIPTION | MANUFACTURER | MODEL NUMBER | SERIAL NUMBER | CAL. LAB |
|----------------------------|---------------------|---------------------|----------------------|-----------------|
| AMPLIFIER | HEWLETT PACKARD | 11975A | 2304A00348 | TEST EQUITY |
| AMPLIFIER (S/A 1) | RHEIN TECH | PR-1040 | N/A | RTL |
| AMPLIFIER (S/A 2) | RHEIN TECH | RTL2 | N/A | RTL |
| AMPLIFIER (S/A 3) | RHEIN TECH | 8447F | 2944A03783 | RTL |
| AMPLIFIER (S/A 4) | RHEIN TECH | 8447D | 2727A05397 | RTL |
| BICONICAL/LOG ANTENNA 1 | ANTENNA RESEARCH | LPB-2520 | 1037 | LIBERTY LABS |
| BICONICAL/LOG ANTENNA 2 | ANTENNA RESEARCH | LPB-2520 | 1036 | LIBERTY LABS |
| FIELD SITE SOURCE | EMCO | 4610 | 9604-1313 | RTL |
| FILTER (ROOM 1) | SOLAR | 8130 | 947305 | RTL |
| FILTER (ROOM 2) | SOLAR | 8130 | 947306 | RTL |
| HARMONIC MIXER 1 | HEWLETT PACKARD | 11970K | 2332A00563 | TELOGY |
| HARMONIC MIXER 2 | HEWLETT PACKARD | 11970A | 2332A01199 | TELOGY |
| HORN ANTENNA 1 | EMCO | 3160-10 | 9606-1033 | EMCO |
| HORN ANTENNA 2 | EMCO | 3160-9 | 9605-1051 | EMCO |
| HORN ANTENNA 3 | EMCO | 3160-7 | 9605-1054 | EMCO |
| HORN ANTENNA 4 | EMCO | 3160-8 | 9605-1044 | EMCO |
| HORN ANTENNA 5 | EMCO | 3160-03 | 9508-1024 | EMCO |
| LISN (ROOM 1/L1) | SOLAR | 7225-1 | | ACUCAL |
| LISN (ROOM 1/L2) | SOLAR | 7225-1 | | ACUCAL |
| LISN (ROOM 2/L1) | SOLAR | 7225-1 | 900078 | ACUCAL |
| LISN (ROOM 2/L2) | SOLAR | 7225-1 | 900077 | ACUCAL |
| PRE-AMPLIFIER | HEWLETT PACKARD | 8449B OPT | 3008A00505 | TELOGY |
| QUASI-PEAK ADAPTER (S/A 1) | HEWLETT PACKARD | 85650A | 3145A01599 | ACUCAL |
| QUASI-PEAK ADAPTER (S/A 2) | HEWLETT PACKARD | 85650A | 2811A01276 | ACUCAL |
| QUASI-PEAK ADAPTER (S/A 3) | HEWLETT PACKARD | 85650A | 2521A00473 | ACUCAL |
| QUASI-PEAK ADAPTER (S/A 4) | HEWLETT PACKARD | 85650A | 2521A01032 | ACUCAL |
| RF PRESELECTOR (S/A 1) | HEWLETT PACKARD | 85685A | 3146A01309 | ACUCAL |
| SIGNAL GENERATOR (HP) | HEWLETT PACKARD | 8660C | 1947A02956 | ACUCAL |
| SIGNAL GENERATOR (WAVETEK) | WAVETEK | 3510B | 4952044 | ACUCAL |
| SPECTRUM ANALYZER 1 | HEWLETT PACKARD | 8566B | 3138A07771 | ACUCAL |
| SPECTRUM ANALYZER 2 | HEWLETT PACKARD | 8567A | 2841A00614 | ACUCAL |
| SPECTRUM ANALYZER 4 | HEWLETT PACKARD | 8567A | 2727A00535 | ACUCAL |
| TUNABLE DIPOLE | EMCO | 3121 | 274 | LIBERTY LABS |

APPENDIX B: Conducted and Radiated Test Methodology

CONDUCTED EMISSIONS MEASUREMENTS

The power line conducted emission measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50 ohm / 50 microhenry Line Impedance Stabilization Network (EUT LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the A.C. line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 400 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 400 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable). The analyzer's 6 dB bandwidth was set to 9 kHz. No video filter less than 10 times the resolution bandwidth was used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from (150/450) kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in this report.

RADIATED EMISSIONS MEASUREMENTS

Before final measurements of radiated emissions were made on the open-field three/ten meter range, the EUT was scanned indoors at one meter and three meter distances if necessary in order to determine its emissions spectrum signature. The physical arrangement of the test system and associated cabling was varied in order to determine the effect on the EUT's emissions in amplitude, direction and frequency. This process was repeated during final radiated emissions measurements on the open-field range, at each frequency, in order to insure that maximum emission amplitudes were attained.

Final radiated emissions measurements were made on the three/ten-meter, open-field test site. The EUT was placed on a nonconductive turntable approximately 0.8 meters above the ground plane. The spectrum was examined from 30 MHz to 1000 MHz using a Hewlett Packard 8566B spectrum analyzer, a Hewlett Packard 85650A quasi-peak adapter, and EMCO log periodic and an Antenna Research bilog antenna. In order to gain sensitivity, an RTL PR-1040 preamplifier was connected in series between the antenna and the input of the spectrum analyzer.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters in order to determine the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations. The spectrum analyzer's 6 dB bandwidth was set to 120 kHz, and the analyzer was operated in the CISPR quasi-peak detection mode. No video filter less than 10 times the resolution bandwidth was used. When the dot clock or CPU clock exceeds 108 MHz, the EUT was tested between 1 to 2 Gigahertz in peak mode with the resolution bandwidth set at 1 MHz as stated in ANSI C63.4. The highest emission amplitudes relative to the appropriate limit were measured and recorded in this report.

Note: Rhein Tech Laboratories, Inc. has implemented procedures to minimize errors that occur from test instruments, calibration, procedures, and test setups. Test instrument and calibration errors are documented from the manufacturer or calibration lab. Other errors have been defined and calculated within the Rhein Tech quality manual, section 6.1. Rhein Tech implements the following procedures to minimize errors that may occur: yearly as daily calibration methods, technician training, and emphasis to employees on avoiding error.