

# **FCC TEST REPORT**

for

**CISPR PUB. 22 Class B**

Equipment : CARDEXpert TM64(VANTA)  
Model No. : P/N:VZD-01  
FCC ID : ICUVGA-GWVZD  
Filing Type : Original Grant  
Applicant : **GAINWARD CO., LTD.**  
12F., No. 96, Hsin Tai Wu Rd., Sec. 1,  
Hsi-Chih, Taipei Hsien, Taiwan, R.O.C.

- The test result refers exclusively to the test presented test model / sample.
- Without the written authorization of the test lab., the Test Report may not be copied.
- **Certificate or Test Report must not be used by the applicant to claim the product in this test report endorsement by NVLAP or any agency of U.S. government.**

***SPORTON International Inc.***

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

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# **CERTIFICATE OF COMPLIANCE**

**for**

## **CISPR PUB. 22 Class B**

Equipment : CARDEXpert TM64(VANTA)  
Model No. : P/N:VZD-01  
FCC ID : ICUVGA-GWVZD  
Applicant : **GAINWARD CO., LTD.**  
12F., No. 96, Hsin Tai Wu Rd., Sec. 1,  
Hsi-Chih, Taipei Hsien, Taiwan, R.O.C.

**I HEREBY CERTIFY THAT :**

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 - 1992** and the energy emitted by this equipment was **passed CISPR PUB. 22** both radiated and conducted emission class B limits. Testing was carried out on Oct. 27, 1999 at **SPORTON International Inc.** LAB. in Nei Hwu.

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W. L. Huang  
General Manager

***SPORTON International Inc.***

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

## **1. General Description of Equipment under Test**

### **1.1. Applicant**

GAINWARD CO., LTD.  
12F., No. 96, Hsin Tai Wu Rd., Sec. 1,  
Hsi-Chih, Taipei Hsien, Taiwan, R.O.C.

### **1.2. Manufacturer**

Same as 1.1.

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

Equipment : CARDEXpert TM64 (VANTA)  
Model No. : P/N:VZD-01  
FCC ID : ICUVGA-GWVZD  
Trade Name : CARDEXpert  
Data Cable : Shielded  
S-video cable : Non-Shielded, 1.8m  
AV-video cable : Non-Shielded, 1.2m  
Power Supply Type : From PC  
Power Cord : N/A

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

- nVIDIA RIVA TNT TwiN-Textel 32-bit Graphics Engine.
- 24-bit Z-buffer, 8-bit Stencil Buffer
- High Performance 128-bit 2D/GUI/DirectDraw Acceleration
- 128-bit Wide Framebuffer Interface Supports up to 16MB SGRAM/SDRAM
- 250 MHz Palette-DAC Supports up to 1600x1200@85Hz
- NTSC and PALD Digital Output Port External Digital TV Encoders Support (optional)
- Variable Length Burst DMA Bus Mastering for Data transfers over 450MB/s Throughput.
- 66MHz AGP clock rate and AGP 2X mode

## **2. Test Configuration of Equipment under Test**

### **2.1. Test Manner**

- a. The EUT has been associated with personal computer and peripherals pursuant to ANSI C63.4-1992 and configuration operated in a manner which tended to maximize its emission characteristics in a typical application.
- b. The HITACHI Monitor, DELL Keyboard, PRIMAX PS/2 Mouse, HP Printer, ACEEX Modem, SONY TV, VIEW SONIC LCD Monitor and EUT were connected to the FIC PC for EMI test.
- c. The Following display resolution were investigated during the compliance test:
  - 1. Horizontal frequency (640x480 to 1,600x1,200, 31.5 KHz to 106 KHz)
  - 2. Vertical frequency (60 Hz to 85 Hz)
- d. According to the above tests, we listed the following display modes as the worst cases:
  - 1. 1,600x1,200 (non-interlanced 106 KHz), refresh rate 85 Hz, CRT mode.
  - 2. 1,280x1,024 (non-interlanced 91 KHz), refresh rate 85 Hz, CRT mode.
  - 3. 1,024x768, LCD mode.
  - 4. 640x480, TV mode.
- e. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 2,000 MHz.

### **2.2. Description of Test System**

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

FCC ID	: N/A
Model No.	: P2L97
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0037
Data Cable	: Shielded, 360 degree via metal backshells
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

#### Support Unit 2. -- Monitor (HITACHI)

FCC ID	: M9U9705C97BMD
Model No.	: CM803ET
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0181
Data Cable	: Shielded, 360 degree via metal backshells, 2.0m

## Support Unit 3. -- Keyboard (DELL)

Model No. : AT101W  
Serial No. : SP00186  
Data Cable : Shielded, 360 degree via metal backshells, 2.0m

## Support Unit 4. -- PS/2 Mouse (PRIMAX)

FCC ID : EMJMUSJQ  
Model No. : MUS9J  
Serial No. : SP0045  
Data Cable : Non-shielded, 1.75m

## Support Unit 5. -- Printer (HP)

FCC ID : DSI6XU2225  
Model No. : 2225C  
Power Supply Type : Linear  
Power Cord : Non-Shielded  
Serial No. : SP0014  
Data Cable : Shielded, 360 degree via metal backshells, 1.35m

## Support Unit 6. -- Modem (ACEEX)

FCC ID : IFAXDM1414  
Model No. : DM1414  
Power Supply Type : Linear  
Power Cord : Non-Shielded  
Serial No. : SP0015  
Data Cable : Shielded, 360 degree via metal backshells, 1.2m

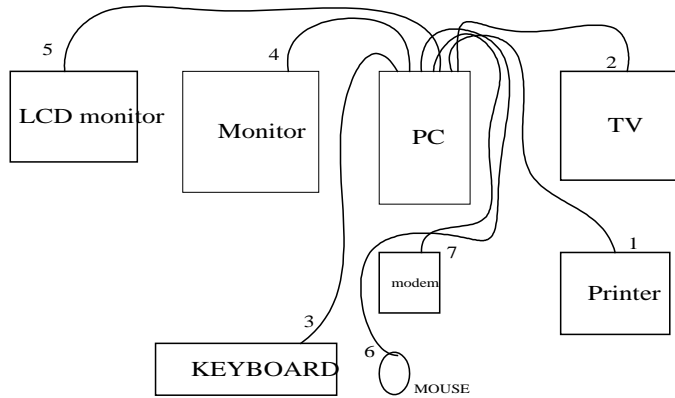
## Support Unit 7. -- TV (SONY)

Model No. : PVM-14N2E  
Power Supply Type : Switching  
Serial No. : SP0097  
Power Cord : Non-Shielded  
S-video cable : Non-Shielded, 1.8m  
AV-video cable : Non-Shielded, 1.2m

## Support Unit 8. -- LCD Monitor (ViewSonic)

FCC ID : N/A  
Model No. : VPD150  
Serial No. : SP0201  
Power Supply Type : Switching  
Power Cord : Non-Shielded  
Data Cable : Shielded, 360 degree via metal backshells, 1.5m  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

**2.3. Connection Diagram of Test System**



1. The I/O cable is connected from PC to the support unit 5.
2. The I/O cable is connected from EUT to the support unit 7.
3. The I/O cable is connected from PC to the support unit 3.
4. The I/O cable is connected from EUT to the support unit 2.
5. The I/O cable is connected from EUT to the support unit 8.
6. The I/O cable is connected from PC to the support unit 4.
7. The I/O cable is connected from PC to the support unit 6.

### **3. Test Software**

An executive program, WINFCC.EXE, which generates a complete line of continuously repeating "H" pattern was used as the test software.

The program was executed as follows :

- a. Turn on the power of all equipment.
- b. The PC reads the test program from the floppy disk drive and runs it.
- c. The PC sends "H" messages to the monitor, and the monitor displays "H" patterns on the screen.
- d. The PC sends "H" messages to the printer, then the printer prints them on the paper.
- e. The PC sends "H" messages to the modem.
- f. The PC sends "H" messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
- g. Repeat the steps from b to f.



## **4. General Information of Test**

### **4.1. Test Facility**

This test was carried out by SPORTON International Inc.

Test Site Location : No. 3, Lane 238, Kang Lo Street, Nei Hwu District,  
Taipei 11424, Taiwan, R.O.C.

TEL : 886-2-2631-9739

FAX : 886-2-2631-9740

### **4.2. Standard for Methods of Measurement**

ANSI C63.4-1992

### **4.3. Test in Compliance with**

CISPR PUB. 22 Class B

### **4.4. Frequency Range Investigated**

- a. Conduction: from 150 kHz to 30 MHz
- b. Radiation : from 30 MHz to 2,000 MHz

### **4.5. Test Distance**

The test distance of radiated emission from antenna to EUT is 10 M.

## **5. Test of Conducted Powerline**

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 115 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-1992 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 5.3. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

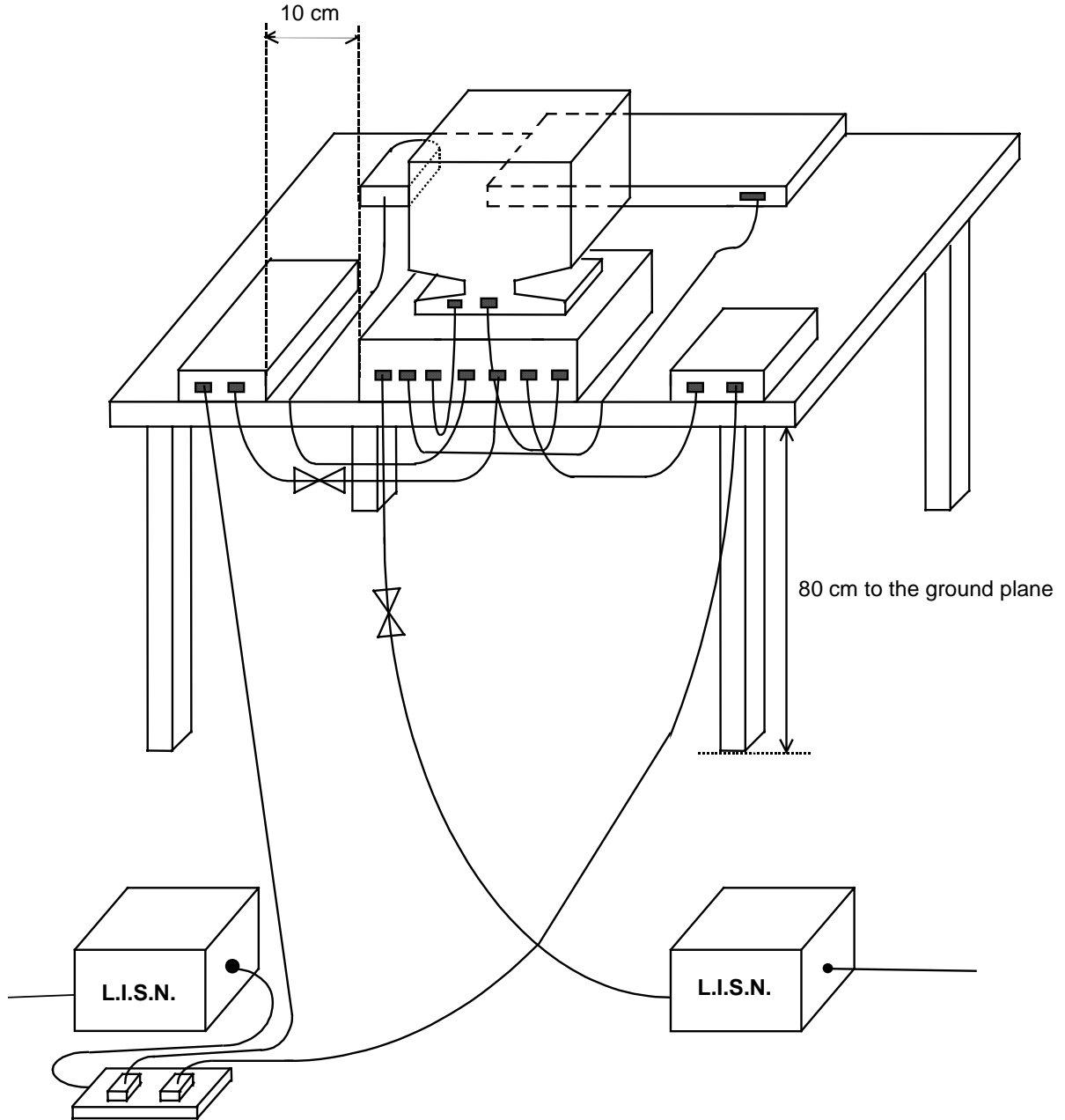
### **5.1. Major Measuring Instruments**

- Test Receiver ( R&S ESH3 )
  - Attenuation 0 dB
  - Start Frequency 0.15 MHz
  - Stop Frequency 30 MHz
  - Step MHz 0.007 MHz
  - IF Bandwidth 9 KHz

**5.2. Test Procedures**

- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. All the support units are connect to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- f. Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 150 kHz to 30 MHz was searched.
- h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- i. If the emission level of the EUT in peak mode was 6 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 6 dB margin will be retested one by one using the quasi-peak method and reported.

5.3. Typical Test Setup Layout of Conducted Powerline



**5.4. Test Result of AC Powerline Conducted Emission**

5.4.1. Test mode : VANTA Chipset 1600x1200 85Hz/106K (CRT mode)

- Temperature : 28°C
- Relative Humidity : 59 %
- Test Date : Oct. 27, 1999

**The Conducted Emission test was passed at minimum margin**

**LINE 0.160 MHz / 48.20 dBuV.**

Freq. (MHz)	Line or Neutral	Meter Reading				Limits				Margin	
		Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dB)	A.V. (dB)
0.160	L	51.00	48.20	354.81	257.04	65.46	55.46	1875.85	593.20	-14.5	-7.3
0.270	L	49.40	42.10	295.12	127.35	61.12	51.12	1137.36	359.66	-11.7	-9.0
0.420	L	45.70	38.60	192.75	85.11	57.45	47.45	745.43	235.73	-11.7	-8.8
0.170	N	50.20	46.70	323.59	216.27	64.96	54.96	1770.19	559.78	-14.8	-8.3
0.250	N	47.20	42.10	229.09	127.35	61.76	51.76	1224.22	387.13	-14.6	-9.7
0.350	N	44.70	38.30	171.79	82.22	58.96	48.96	887.41	280.62	-14.3	-10.7

Test Engineer : \_\_\_\_\_  
 Samuel Chang

5.4.2. Test mode : VANTA Chipset 1280x1024 85Hz/91K (CRT mode)

- Temperature : 28°C
- Relative Humidity : 59 %
- Test Date : Oct. 27, 1999

**The Conducted Emission test was passed at minimum margin**

**NEUTRAL 0.340 MHz / 34.10 dBuV.**

Freq. (MHz)	Line or Neutral	Meter Reading				Limits				Margin	
		Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dB)	A.V. (dB)
0.170	L	49.10	32.70	285.10	43.15	64.96	54.96	1770.19	559.78	-15.9	-22.3
0.250	L	38.20	31.10	81.28	35.89	61.76	51.76	1224.22	387.13	-23.6	-20.7
0.350	L	39.50	33.70	94.41	48.42	58.96	48.96	887.41	280.62	-19.5	-15.3
0.160	N	50.10	40.20	319.89	102.33	65.46	55.46	1875.85	593.20	-15.4	-15.3
0.250	N	41.70	35.10	121.62	56.89	61.76	51.76	1224.22	387.13	-20.1	-16.7
0.340	N	39.80	34.10	97.72	50.70	59.20	49.20	912.35	288.51	-19.4	-15.1

Test Engineer : \_\_\_\_\_  
 Samuel Chang

5.4.3. Test mode : VANTA Chipset 1024x768 (LCD mode)

- Temperature : 28°C
- Relative Humidity : 59 %
- Test Date : Oct. 27, 1999

**The Conducted Emission test was passed at minimum margin**

**NEUTRAL 0.160 MHz / 47.70 dBuV.**

Freq. (MHz)	Line or Neutral	Meter Reading				Limits				Margin	
		Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dB)	A.V. (dB)
0.170	L	50.80	47.10	346.74	226.46	64.96	54.96	1770.19	559.78	-14.2	-7.9
0.240	L	39.90	32.50	98.86	42.17	62.10	52.10	1272.95	402.54	-22.2	-19.6
0.370	L	41.50	35.70	118.85	60.95	58.50	48.50	841.49	266.10	-17.0	-12.8
0.160	N	51.10	47.70	358.92	242.66	65.46	55.46	1875.85	593.20	-14.4	-7.8
0.250	N	39.20	31.10	91.20	35.89	61.76	51.76	1224.22	387.13	-22.6	-20.7
0.350	N	40.10	32.50	101.16	42.17	58.96	48.96	887.41	280.62	-18.9	-16.5

Test Engineer : \_\_\_\_\_  
 Samuel Chang

5.4.4. Test mode : VANTA Chipset 640x480 (TV mode)

- Temperature : 28°C
- Relative Humidity : 59 %
- Test Date : Oct. 27, 1999

**The Conducted Emission test was passed at minimum margin**

**NEUTRAL 0.160 MHz / 47.50 dBuV.**

Freq. (MHz)	Line or Neutral	Meter Reading				Limits				Margin	
		Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dB)	A.V. (dB)
0.160	L	51.30	46.30	367.28	206.54	65.46	55.46	1875.85	593.20	-14.2	-9.2
0.250	L	47.70	41.40	242.66	117.49	61.76	51.76	1224.22	387.13	-14.1	-10.4
0.350	L	39.30	36.40	92.26	66.07	58.96	48.96	887.41	280.62	-19.7	-12.6
0.160	N	50.30	47.50	327.34	237.14	65.46	55.46	1875.85	593.20	-15.2	-8.0
0.250	N	49.10	42.30	285.10	130.32	61.76	51.76	1224.22	387.13	-12.7	-9.5
0.340	N	41.80	38.60	123.03	85.11	59.20	49.20	912.35	288.51	-17.4	-10.6

Test Engineer : \_\_\_\_\_  
 Samuel Chang



5.4.5. Test mode : TNT2 M64 Chipset 1600x1200 85Hz/106K (CRT mode)

- Temperature : 28°C
- Relative Humidity : 59 %
- Test Date : Oct. 27, 1999

**The Conducted Emission test was passed at minimum margin**

**NEUTRAL 0.170 MHz / 46.70 dBuV.**

Freq. (MHz)	Line or Neutral	Meter Reading				Limits				Margin	
		Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dB)	A.V. (dB)
0.160	L	49.80	47.20	309.03	229.09	65.46	55.46	1875.85	593.20	-15.7	-8.3
0.210	L	45.10	41.70	179.89	121.62	63.21	53.21	1446.32	457.37	-18.1	-11.5
0.270	L	40.50	38.50	105.93	84.14	61.12	51.12	1137.36	359.66	-20.6	-12.6
0.170	N	49.50	46.70	298.54	216.27	64.96	54.96	1770.19	559.78	-15.5	-8.3
0.220	N	45.40	42.10	186.21	127.35	62.82	52.82	1383.40	437.47	-17.4	-10.7
0.260	N	40.70	37.80	108.39	77.62	61.43	51.43	1179.15	372.88	-20.7	-13.6

Test Engineer : \_\_\_\_\_  
 Samuel Chang

5.4.6. Test mode : TNT2 M64 Chipset 1280x1024 85Hz/91K (CRT mode)

- Temperature : 28°C
- Relative Humidity : 59 %
- Test Date : Oct. 27, 1999

**The Conducted Emission test was passed at minimum margin**

**LINE 0.170 MHz / 45.70 dBuV.**

Freq. (MHz)	Line or Neutral	Meter Reading				Limits				Margin	
		Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dB)	A.V. (dB)
0.170	L	50.10	45.70	319.89	192.75	64.96	54.96	1770.19	559.78	-14.9	-9.3
0.250	L	40.80	37.60	109.65	75.86	61.76	51.76	1224.22	387.13	-21.0	-14.2
0.350	L	37.80	32.50	77.62	42.17	58.96	48.96	887.41	280.62	-21.2	-16.5
0.160	N	49.70	42.60	305.49	134.90	65.46	55.46	1875.85	593.20	-15.8	-12.9
0.260	N	38.60	35.50	85.11	59.57	61.43	51.43	1179.15	372.88	-22.8	-15.9
0.350	N	32.50	28.90	42.17	27.86	58.96	48.96	887.41	280.62	-26.5	-20.1

Test Engineer : \_\_\_\_\_  
 Samuel Chang

5.4.7. Test mode : TNT2 M64 Chipset 1024x768 (LCD mode)

- Temperature : 28°C
- Relative Humidity : 59 %
- Test Date : Oct. 27, 1999

**The Conducted Emission test was passed at minimum margin**

**LINE 0.160 MHz / 47.20 dBuV.**

Freq. (MHz)	Line or Neutral	Meter Reading				Limits				Margin	
		Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dB)	A.V. (dB)
0.160	L	50.50	47.20	334.97	229.09	65.46	55.46	1875.85	593.20	-15.0	-8.3
0.250	L	39.20	31.60	91.20	38.02	61.76	51.76	1224.22	387.13	-22.6	-20.2
0.360	L	37.10	27.50	71.61	23.71	58.73	48.73	863.82	273.16	-21.6	-21.2
0.160	N	49.70	41.10	305.49	113.50	65.46	55.46	1875.85	593.20	-15.8	-14.4
0.260	N	38.80	38.40	87.10	83.18	61.43	51.43	1179.15	372.88	-22.6	-13.0
0.350	N	40.20	39.50	102.33	94.41	58.96	48.96	887.41	280.62	-18.8	-9.5

Test Engineer : \_\_\_\_\_  
Samuel Chang

5.4.8. Test mode : TNT2 M64 Chipset 640x480 (TV mode)

- Temperature : 28°C
- Relative Humidity : 59 %
- Test Date : Oct. 27, 1999

**The Conducted Emission test was passed at minimum margin**

**LINE 0.170 MHz / 42.70 dBuV.**

Freq. (MHz)	Line or Neutral	Meter Reading				Limits				Margin	
		Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dB)	A.V. (dB)
0.170	L	49.50	42.70	298.54	136.46	64.96	54.96	1770.19	559.78	-15.5	-12.3
0.250	L	41.60	39.40	120.23	93.33	61.76	51.76	1224.22	387.13	-20.2	-12.4
0.270	L	38.50	36.10	84.14	63.83	61.12	51.12	1137.36	359.66	-22.6	-15.0
0.160	N	48.10	43.20	254.10	144.54	65.46	55.46	1875.85	593.20	-17.4	-12.3
0.250	N	40.70	38.20	108.39	81.28	61.76	51.76	1224.22	387.13	-21.1	-13.6
0.360	N	37.80	31.60	77.62	38.02	58.73	48.73	863.82	273.16	-20.9	-17.1

Test Engineer : \_\_\_\_\_  
 Samuel Chang

**5.5. Photographs of Counducted Powerline Test Configuration**

- The photographs show the configuration that generates the maximum emission.  
VANTA Chipset CRT mode

FRONT VIEW



REAR VIEW



SIDE VIEW



VANTA Chipset LCD mode

FRONT VIEW



REAR VIEW



SIDE VIEW





VANTA Chipset TV mode

FRONT VIEW



REAR VIEW



SIDE VIEW



TNT2 M64 Chipset CRT mode

FRONT VIEW



REAR VIEW



SIDE VIEW



TNT2 M64 Chipset LCD mode

FRONT VIEW



REAR VIEW



SIDE VIEW





TNT2 M64 Chipset TV mode

FRONT VIEW



REAR VIEW



SIDE VIEW





## 6. Test of Radiated Emission

Radiated emissions from 30 MHz to 2,000 MHz were measured with a bandwidth of 120 kHz according to the methods defines in ANSI C63.4-1992. The EUT was placed on a nonmetallic stand in the open-field site, 0.8 meter above the ground plane, as shown in section 6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

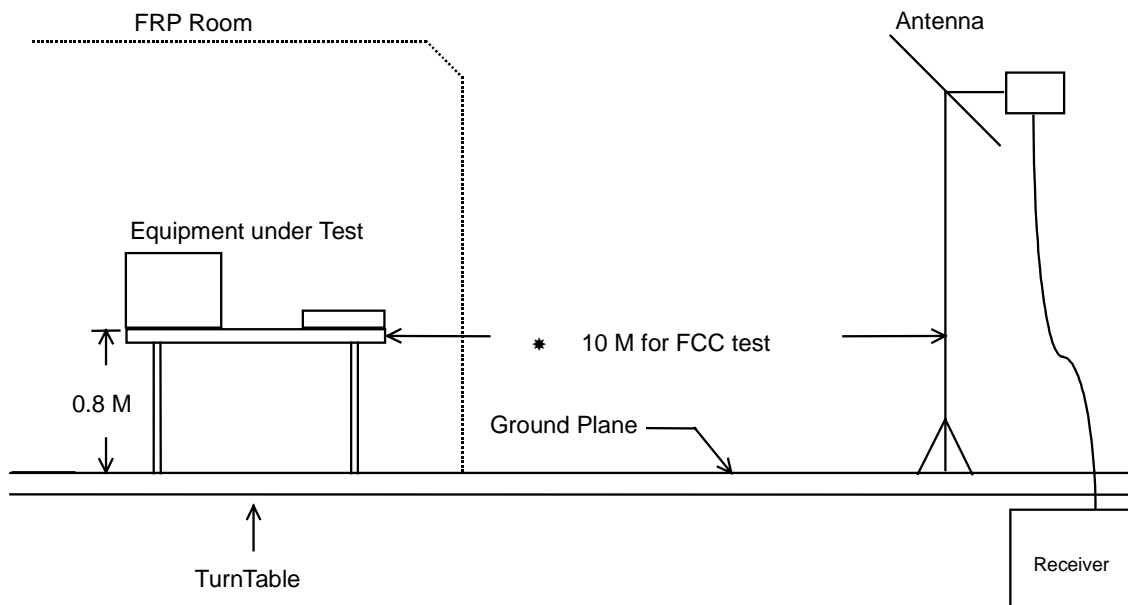
### 6.1. Major Measuring Instruments

- Amplifier ( HP 87405A )
  - Attenuation 0 dB
  - RF Gain 20 dB
  - Signal Input 10 MHz to 3 GHz
  
- Spectrum Analyzer ( HP 8594A )
  - Attenuation 0 dB
  - Start Frequency 30 MHz
  - Stop Frequency 2000 MHz
  - Resolution Bandwidth 1 MHz
  - Video Bandwidth 1 MHz
  - Signal Input 9 KHz to 2.9 GHz

**6.2. Test Procedures**

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 10 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 6 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 6 dB margin will be repeated one by one using the quasi-peak method and reported.

### 6.3. Typical Test Setup Layout of Radiated Emission



**6.4. Test Result of Radiated Emission**

6.4.1. Test mode : VANTA Chipset 1600x1200 85Hz/106K (CRT mode)

- Test Distance : 10 M
- Temperature : 31°C
- Relative Humidity : 62 %
- Test Date : Oct. 20, 1999
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**400.962 MHz / 33.10 dBuV (VERTICAL) Antenna Height 4 Meter, Turntable Degree 180 °.**

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV/m)	Level (uV/m)	Margin (dB)
					(dBuV/m)	(uV/m)			
57.507	H	5.82	1.08	11.35	30.00	31.62	18.25	8.18	-11.75
117.365	H	12.08	1.83	6.06	30.00	31.62	19.97	9.97	-10.03
137.433	H	10.61	1.66	9.06	30.00	31.62	21.33	11.65	-8.67
400.962	H	15.47	3.20	11.03	37.00	70.79	29.70	30.55	-7.30
57.507	V	5.82	1.08	15.15	30.00	31.62	22.05	12.66	-7.95
400.962	V	15.47	3.20	14.43	37.00	70.79	33.10	45.19	-3.90

Test Engineer : \_\_\_\_\_

Samuel Chang

6.4.2. Test mode : VANTA Chipset 1280x1024 85Hz/91K (CRT mode)

- Test Distance : 10 M
- Temperature : 31°C
- Relative Humidity : 62 %
- Test Date : Oct. 20, 1999
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**429.688 MHz / 31.44 dBuV (VERTICAL) Antenna Height 4 Meter, Turntable Degree 180 °.**

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV/m)	Level (uV/m)	Margin (dB)
					(dBuV/m)	(uV/m)			
143.142	H	10.53	1.75	8.52	30.00	31.62	20.80	10.96	-9.20
334.313	H	14.14	3.20	11.91	37.00	70.79	29.25	29.01	-7.75
429.870	H	16.22	3.26	9.54	37.00	70.79	29.02	28.25	-7.98
240.362	V	12.02	2.41	14.89	37.00	70.79	29.32	29.24	-7.68
334.313	V	14.14	3.20	10.91	37.00	70.79	28.25	25.85	-8.75
429.688	V	16.22	3.26	11.96	37.00	70.79	31.44	37.33	-5.56

Test Engineer : \_\_\_\_\_  
 Samuel Chang

6.4.3. Test mode : VANTA Chipset 1024x768 (LCD mode)

- Test Distance : 10 M
- Temperature : 31°C
- Relative Humidity : 62 %
- Test Date : Oct. 22, 1999
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**601.712 MHz / 33.07 dBuV (HORIZONTAL) Antenna Height 4 Meter, Turntable Degree 265 °.**

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV/m)	Level (uV/m)	Margin (dB)
					(dBuV/m)	(uV/m)			
601.712	H	19.01	4.10	9.96	37.00	70.79	33.07	45.03	-3.93
146.602	V	10.52	1.85	12.13	30.00	31.62	24.50	16.79	-5.50
194.523	V	9.45	1.75	14.53	30.00	31.62	25.73	19.34	-4.27
216.272	V	10.43	2.27	11.92	30.00	31.62	24.62	17.02	-5.38
294.163	V	13.18	2.77	17.08	37.00	70.79	33.03	44.82	-3.97
390.523	V	15.29	3.16	13.24	37.00	70.79	31.69	38.41	-5.31

Test Engineer : \_\_\_\_\_  
 Samuel Chang

6.4.4. Test mode : VANTA Chipset 640x480 (TV mode)

- Test Distance : 10 M
- Temperature : 31°C
- Relative Humidity : 62 %
- Test Date : Oct. 20, 1999
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**133.400 MHz / 24.87 dBuV (VERTICAL) Antenna Height 1 Meter, Turntable Degree 150 °.**

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV/m)	Level (uV/m)	Margin (dB)
					(dBuV/m)	(uV/m)			
149.000	H	10.52	1.96	7.61	30.00	31.62	20.09	10.10	-9.91
450.748	H	16.76	3.30	7.38	37.00	70.79	27.44	23.55	-9.56
120.200	V	12.33	1.80	6.20	30.00	31.62	20.33	10.39	-9.67
133.400	V	10.77	1.78	12.32	30.00	31.62	24.87	17.52	-5.13
148.200	V	10.52	1.93	11.42	30.00	31.62	23.87	15.61	-6.13
204.413	V	9.67	1.87	9.24	30.00	31.62	20.78	10.94	-9.22

Test Engineer : \_\_\_\_\_  
 Samuel Chang

6.4.5. Test mode : TNT2 M64 Chipset 1600x1200 85Hz/106K (CRT mode)

- Test Distance : 10 M
- Temperature : 31°C
- Relative Humidity : 62 %
- Test Date : Oct. 20, 1999
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**152.657 MHz / 26.40 dBuV (VERTICAL) Antenna Height 1 Meter, Turntable Degree 320 °.**

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV/m)	Level (uV/m)	Margin (dB)
					(dBuV/m)	(uV/m)			
119.614	H	12.25	1.81	12.11	30.00	31.62	26.17	20.35	-3.83
128.956	H	10.96	1.89	9.86	30.00	31.62	22.71	13.66	-7.29
200.212	H	9.35	1.70	13.86	30.00	31.62	24.91	17.60	-5.09
205.833	H	9.73	1.90	13.67	30.00	31.62	25.30	18.41	-4.70
50.587	V	7.01	1.00	16.67	30.00	31.62	24.68	17.14	-5.32
152.657	V	10.34	2.02	14.04	30.00	31.62	26.40	20.89	-3.60

Test Engineer : \_\_\_\_\_  
 Samuel Chang



6.4.6. Test mode : TNT2 M64 Chipset 1280x1024 85Hz/91K (CRT mode)

- Test Distance : 10 M
- Temperature : 31°C
- Relative Humidity : 62 %
- Test Date : Oct. 20, 1999
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**430.107 MHz / 31.61 dBuV (VERTICAL) Antenna Height 1 Meter, Turntable Degree 262 °.**

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV/m)	Level (uV/m)	Margin (dB)
					(dBuV/m)	(uV/m)			
224.108	H	10.94	2.40	11.24	30.00	31.62	24.58	16.94	-5.42
427.976	H	16.19	3.26	10.55	37.00	70.79	30.00	31.62	-7.00
50.933	V	6.84	1.00	16.75	30.00	31.62	24.59	16.96	-5.41
86.052	V	8.14	1.40	9.98	30.00	31.62	19.52	9.46	-10.48
217.750	V	10.56	2.33	8.99	30.00	31.62	21.88	12.42	-8.12
430.107	V	16.22	2.44	12.95	37.00	70.79	31.61	38.06	-5.39

Test Engineer : \_\_\_\_\_  
 Samuel Chang

## 6.4.7. Test mode : TNT2 M64 Chipset 1024x768 (LCD mode)

- Test Distance : 10 M
- Temperature : 31°C
- Relative Humidity : 62 %
- Test Date : Oct. 27, 1999
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**162.496 MHz / 25.98 dBuV (VERTICAL) Antenna Height 1 Meter, Turntable Degree 269 °.**

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV/m)	Level (uV/m)	Margin (dB)
					(dBuV/m)	(uV/m)			
129.994	V	10.93	1.90	12.14	30.00	31.62	24.97	17.72	-5.03
162.496	V	9.60	1.95	14.43	30.00	31.62	25.98	19.91	-4.02
178.434	V	9.69	1.93	12.94	30.00	31.62	24.56	16.90	-5.44
194.869	V	9.45	1.75	14.73	30.00	31.62	25.93	19.79	-4.07
201.015	V	9.42	1.73	13.52	30.00	31.62	24.67	17.12	-5.33
228.317	V	11.20	2.40	11.76	30.00	31.62	25.36	18.54	-4.64

Test Engineer : \_\_\_\_\_

Samuel Chang

6.4.8. Test mode : TNT2 M64 Chipset 640x480 (TV mode)

- Test Distance : 10 M
- Temperature : 31°C
- Relative Humidity : 62 %
- Test Date : Oct. 22, 1999
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

**The Radiated Emission test was passed at minimum margin**

**205.833 MHz / 25.87 dBuV (HORIZONTAL) Antenna Height 4 Meter, Turntable Degree 145 °.**

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV/m)	Level (uV/m)	Margin (dB)
					(dBuV/m)	(uV/m)			
59.064	H	5.49	1.16	14.68	30.00	31.62	21.33	11.65	-8.67
131.897	H	10.85	1.84	12.04	30.00	31.62	24.73	17.24	-5.27
205.833	H	9.73	1.90	14.24	30.00	31.62	25.87	19.66	-4.13
217.878	H	10.56	2.33	7.87	30.00	31.62	20.76	10.91	-9.24
133.973	V	10.77	1.78	7.54	30.00	31.62	20.09	10.10	-9.91
147.813	V	10.52	1.89	8.73	30.00	31.62	21.14	11.40	-8.86

Test Engineer : \_\_\_\_\_  
Samuel Chang

**6.5. Photographs of Radiated Emission Test Configuration**

- The photographs show the configuration that generates the maximum emission.  
VANTA Chipset CRT mode

FRONT VIEW



REAR VIEW



VANTA Chipset LCD mode

FRONT VIEW



REAR VIEW



VANTA Chipset TV mode

FRONT VIEW



REAR VIEW



TNT2 M64 Chipset CRT mode

FRONT VIEW



REAR VIEW





TNT2 M64 Chipset LCD mode

FRONT VIEW



REAR VIEW





TNT2 M64 Chipset TV mode

FRONT VIEW



REAR VIEW



**7. Antenna Factor & Cable Loss**

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	17.2	0.7
35	16.2	0.8
40	13.0	0.8
45	10.5	0.9
50	7.0	1.0
55	6.2	1.0
60	5.3	1.2
65	5.2	1.1
70	5.2	1.2
75	5.9	1.2
80	6.8	1.3
85	7.9	1.4
90	9.0	1.4
95	9.8	1.5
100	10.6	1.9
110	11.5	1.9
120	12.3	1.8
130	10.9	1.9
140	10.5	1.6
150	10.5	2.0
160	9.6	2.1
170	9.6	1.6
180	9.7	2.0
190	9.5	1.8
200	9.4	1.7
220	10.7	2.4
240	12.0	2.4
260	12.8	2.6
280	13.0	2.7
300	13.3	2.8
320	13.8	3.1
340	14.3	3.2
360	14.7	3.2
380	15.1	3.1
400	15.5	3.2
450	16.7	3.3
500	17.8	3.3
550	19.2	3.8
600	19.0	4.1
650	18.7	4.0
700	18.5	4.2
750	18.5	4.4
800	16.8	3.8
850	17.0	4.8
900	19.0	4.3
950	19.9	5.5
1000	20.4	5.0
2000	26.4	8.6

NHOP1

**8. List of Measuring Equipment Used**

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Test Receiver	R&S	ESH3	893495/013	9 KHz - 30 MHz	Apr. 19, 1999	Conduction
Spectrum Monitor	R&S	EZM	894987/011	N/A	Apr. 21, 1999	Conduction
LISN (for EUT)	KYORITSU	KNW-407	8-1010-15	50 ohm / 50 $\mu$ H	Nov. 17, 1998	Conduction
LISN (for support device)	EMCO	3810/2	9703-1838	50 ohm / 50 $\mu$ H	Aug. 30, 1999	Conduction
EMI Filter	CORCOM	MRI-2030	N/A	480VAC / 30A	N/A	Conduction
Amplifier (Site 1)	HP	87405A	3207A01437	10MHz -3.0GHz	Jun. 25, 1999	Radiation
Spectrum Analyzer (site 1)	HP	8594A	3051A00172	9KHz -2.9GHz	Apr. 16, 1999	Radiation
Bilog Antenna (site 1)	CHASE	CBL6112A	2302	30MHz - 2GHz	Jan. 29, 1999	Radiation
Half-wave dipole antenna (site 1)	EMCO	3121C	8912-1285	20MHz - 1GHz	May. 18, 1999	Radiation
Turn Table	EMCO	1060-1.211	9507-1805	0 ~ 360 degree	N/A	Radiation
Antenna Mast	EMCO	2075	9806-2160	1 m - 4 m	N/A	Radiation