

FCC TEST REPORT

for

CISPR PUB. 22 Class B

Equipment : CARDEXpert GeForce 256

Model No. : VZH-00

FCC ID : ICUVGA-GWVZHA

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.

Table of Contents

<u>CERTIFICATE OF COMPLIANCE</u>	3
<u>1. General Description of Equipment under Test</u>	4
<u>1.1. Applicant</u>	4
<u>1.2. Manufacturer</u>	4
<u>1.3. Basic Description of Equipment under Test</u>	4
<u>1.4. Feature of Equipment under Test</u>	4
<u>2. Test Configuration of Equipment under Test</u>	5
<u>2.1. Test Manner</u>	5
<u>2.2. Description of Test System</u>	5
<u>2.3. Connection Diagram of Test System</u>	7
<u>3. Test Software</u>	8
<u>4. General Information of Test</u>	9
<u>4.1. Test Facility</u>	9
<u>4.2. Standard for Methods of Measurement</u>	9
<u>4.3. Test in Compliance with</u>	9
<u>4.4. Frequency Range Investigated</u>	9
<u>4.5. Test Distance</u>	9
<u>5. Test of Conducted Powerline</u>	10
<u>5.1. Major Measuring Instruments</u>	10
<u>5.2. Test Procedures</u>	11
<u>5.3. Typical Test Setup Layout of Conducted Powerline</u>	12
<u>5.4. Test Result of AC Powerline Conducted Emission</u>	13
<u>5.5. Photographs of Conducted Powerline Test Configuration</u>	16
<u>6. Test of Radiated Emission</u>	20
<u>6.1. Major Measuring Instruments</u>	20
<u>6.2. Test Procedures</u>	21
<u>6.3. Typical Test Setup Layout of Radiated Emission</u>	22
<u>6.4. Test Result of Radiated Emission</u>	23
<u>6.5. Photographs of Radiated Emission Test Configuration</u>	26
<u>7. Antenna Factor & Cable Loss</u>	28
<u>8. List of Measuring Equipment Used</u>	29

CERTIFICATE OF COMPLIANCE

for

CISPR PUB. 22 Class B

Equipment : CARDEXpert GeForce 256

Model No. : VZH-00

FCC ID : ICUVGA-GWVZHA

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 Mar. 8, 2000 at **SPORTON International Inc.** LAB. in Lin Kou.



Lenore Chang
President

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 GeForce 256
Model No.	: VZH-00
Trade Name	: CARDEXpert
FCC ID	: ICUVGA-GWVZHA
VGA Cable	: Shielded, 1.8m
TV Cable	: Non-Shielded, 1.5m
Power Supply Type	: From PC
Power Cord	: N/A

1.4. Feature of Equipment under Test

- NVIDIA 256Bit High Performance GeForce256 GPU.
- Integrated Transform and Lighting (T&L).
- Support TV out and DVI Interface for LCD Panel (Optional).
- Support 32/64MB SDR/DDR Video Memory (Optional).
- 350MHz RAMDAC, Max. Resolution support 1600 x 1200.
- Single-Chip GPU (Graphics Processing Unit).
- 15 million polygons per second.
- 480 million pixels per second.
- Independent Pipelined QuadEngine.
- AGP 4X with Fast Writes.
- High-Quality HDTV Processor.
- 256-Bit 2D Rendering Engine.

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 PS/2 Keyboard, PRIMAX PS/2 Mouse, HP Printer, ACEEX Modem, PANASONIC TV 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 1600x1200, 31.5 KHz to 116 KHz)
 2. Vertical frequency (60 Hz to 120 Hz)
- d. According to the above tests, we listed the following display modes as the worst cases:
 1. TV MODE: 800x600, 38 KHz/ 60 Hz.
 2. CRT MODE: (1) 1600x900, 116 KHz/ 120 Hz.
CRT MODE: (2) 1600x1200, 106 KHz/ 85 Hz.
- e. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 2000MHz.

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
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	: N/A
Model No.	: CM814
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0039
Data Cable	: Shielded, 360 degree via metal backshells,1.8m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 3. -- PS/2 Keyboard (DELL)

FCC ID : GYUM92SK
Model No. : AT101(DE8M)
Serial No. : SP0054
Data Cable : Shielded, 360 degree via metal backshells,1.9m

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

FCC ID : EMJMUJQ
Model No. : MUS9J
Serial No. : SP0045
Data Cable : Shielded, 360 degree via metal backshells,1.7m

Support Unit 5. -- Printer (HP)

FCC ID : B94C2642X
Model No. : DeskJet 400
Power Supply Type : Linear
Power Cord : Non-Shielded
Serial No. : SP0048
Data Cable : Braided-Shielded, 360 degree via metal backshells,1.35m

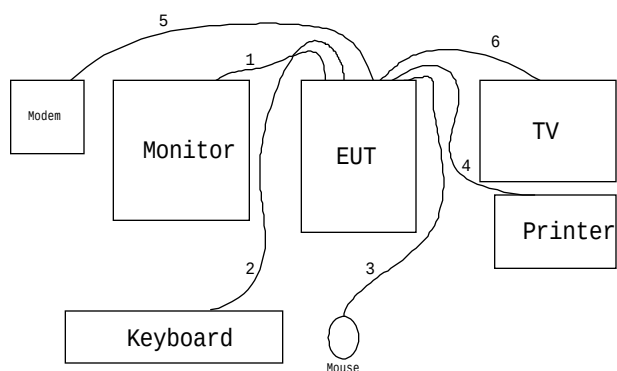
Support Unit 6. -- Modem (ACEEX)

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, 1.15m

Support Unit 7. -- TV (Panasonic)

FCC ID : N/A
Model No. : WV-CM1450
Power Supply Type : From PC
Serial No. : SP0114
TV Cable : Non-Shielded, 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 EUT to the support unit 2.
2. The I/O cable is connected to the support unit 3.
3. The I/O cable is connected to the support unit 4.
4. The I/O cable is connected to the support unit 5.
5. The I/O cable is connected to the support unit 6.
6. The I/O cable is connected from EUT to the support unit 7.

3. Test Software

Two executive programs, EMITEST.EXE & WINFCC.EXE under WIN 98, which generate a complete line of continuously repeating “ H “ pattern were used as the test software.

The programs were 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. 30-2, Lin 6, Diing-Fwu Tsuen, Lin-Kou-Hsiang,
Taipei Hsien, Taiwan, R.O.C.

TEL : 886-2-2601-1640

FAX : 886-2-2601-1695

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.

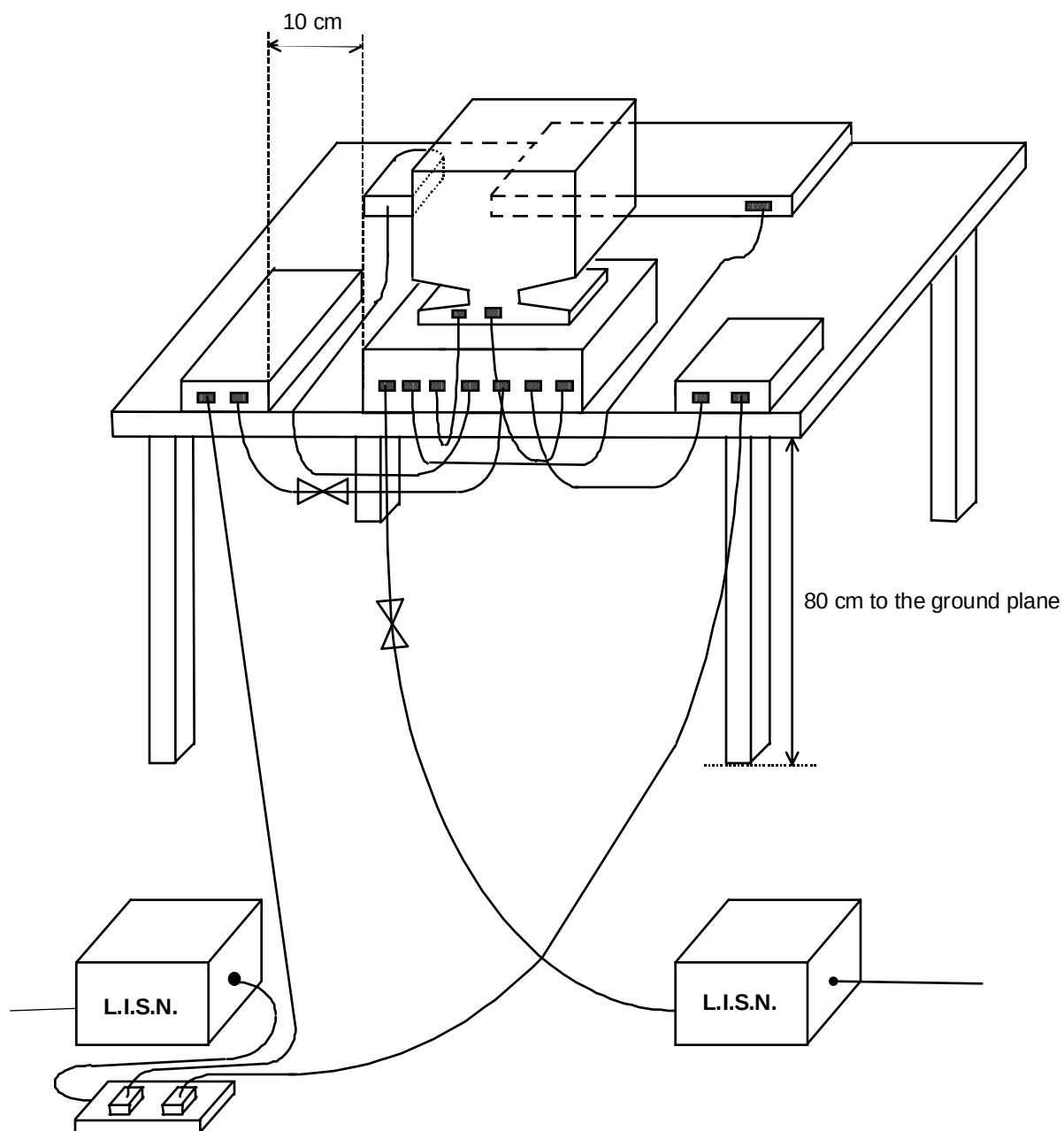
5.1. Major Measuring Instruments

Test Receiver	HP 8591EM
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 1: TV MODE: 800 x 600 60Hz/38K

- Temperature : 21°C
- Relative Humidity : 64 %
- Test Date : Mar. 8, 2000

The Conducted Emission test was passed at minimum margin

LINE 0.584 MHz / 42.20 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)
0.214	L	47.70	47.10	242.66	226.46	63.03	53.03	1417.93	448.39	-15.3	-5.9
0.276	L	46.10	44.20	201.84	162.18	60.93	50.93	1113.32	352.06	-14.8	-6.7
0.584	L	43.20	42.20	144.54	128.83	56.00	46.00	630.96	199.53	-12.8	-3.8
3.871	L	40.30	32.70	103.51	43.15	56.00	46.00	630.96	199.53	-15.7	-13.3
0.215	N	47.80	47.20	245.47	229.09	63.01	53.01	1414.77	447.39	-15.2	-5.8
0.584	N	43.00	42.10	141.25	127.35	56.00	46.00	630.96	199.53	-13.0	-3.9

Test Engineer :

Aldrich Hong
Aldrich Hong

5.4.2. Test mode 2: CRT MODE: (1) 1600 x 900 120Hz/116K

- Temperature : 21°C
- Relative Humidity : 64 %
- Test Date : Mar. 8, 2000

The Conducted Emission test was passed at minimum margin

LINE 0.582 MHz / 42.30 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)
0.214	L	47.80	47.20	245.47	229.09	63.04	53.04	1418.56	448.59	-15.2	-5.8
0.275	L	46.20	44.00	204.17	158.49	60.96	50.96	1116.80	353.16	-14.8	-7.0
0.582	L	43.30	42.30	146.22	130.32	56.00	46.00	630.96	199.53	-12.7	-3.7
0.214	N	47.70	47.10	242.66	226.46	63.04	53.04	1419.19	448.79	-15.3	-5.9
0.275	N	46.30	44.20	206.54	162.18	60.96	50.96	1116.80	353.16	-14.7	-6.8
0.582	N	43.20	42.20	144.54	128.83	56.00	46.00	630.96	199.53	-12.8	-3.8

Test Engineer :

Aldrich Hong

5.4.3. Test mode 2: (2) 1600 x 1200 85Hz/106K

- Temperature : 21°C
- Relative Humidity : 64 %
- Test Date : Mar. 8, 2000

The Conducted Emission test was passed at minimum margin

LINE 0.583 MHz / 42.30 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)
0.215	L	47.90	47.20	248.31	229.09	63.03	53.03	1416.67	447.99	-15.1	-5.8
0.276	L	46.30	44.20	206.54	162.18	60.94	50.94	1113.70	352.18	-14.6	-6.7
0.583	L	43.30	42.30	146.22	130.32	56.00	46.00	630.96	199.53	-12.7	-3.7
0.215	N	47.70	47.10	242.66	226.46	63.03	53.03	1416.67	447.99	-15.3	-5.9
0.276	N	46.50	44.40	211.35	165.96	60.94	50.94	1113.70	352.18	-14.4	-6.5
0.583	N	43.20	42.20	144.54	128.83	56.00	46.00	630.96	199.53	-12.8	-3.8

Test Engineer :

Aldrich Hong

5.5. Photographs of Counducted Powerline Test Configuration

- The photographs show the configuration that generates the maximum emission.

TV MODE

FRONT VIEW



REAR VIEW



SIDE VIEW



CRT 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

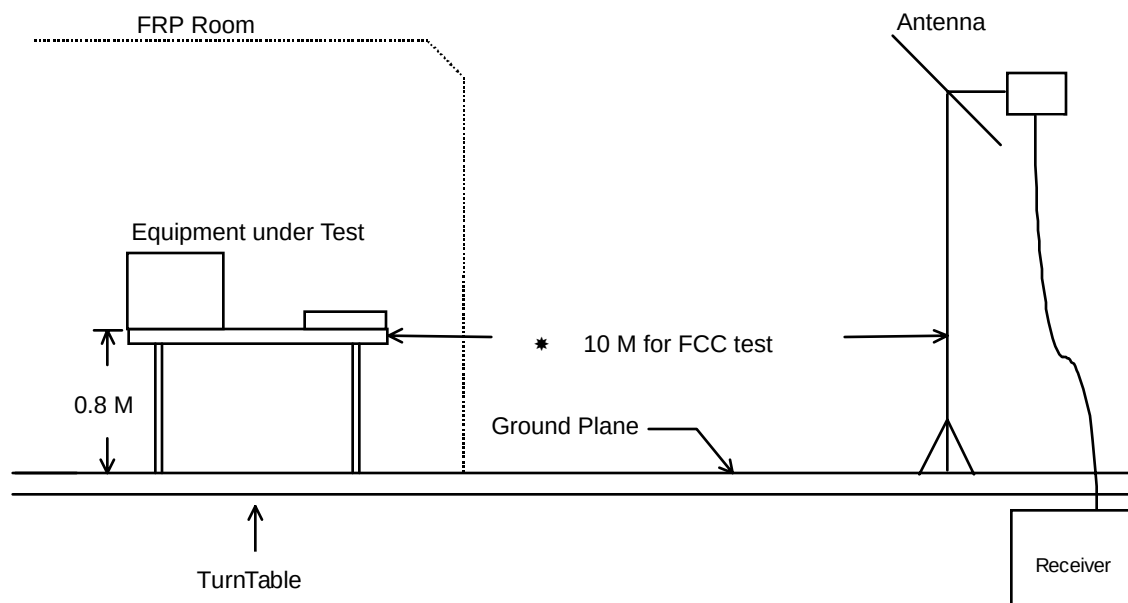
- Spectrum Analyzer (ADVANTEST R3261C)

Attenuation	0 dB
Start Frequency	30 MHz
Stop Frequency	1000 MHz
Resolution Bandwidth	1 MHz
Video Bandwidth	1 MHz
Signal Input	9 KHz to 2.6 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 1: TV MODE: 800 x 600 60Hz/38K

- Test Distance : 10 M
- Temperature : 23°C
- Relative Humidity : 68 %
- Test Date : Mar. 7, 2000
- 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

137.400 MHz / 25.70 dBuV (HORIZONTAL) Antenna Height 4 Meter, Turntable Degree 300 °.

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)			
40.700	V	13.32	0.53	10.25	30.00	31.62	24.10	16.03	-5.90
83.300	V	7.33	0.66	16.53	30.00	31.62	24.52	16.83	-5.48
137.800	V	11.38	1.14	11.18	30.00	31.62	23.70	15.31	-6.30
137.400	H	11.38	1.14	13.18	30.00	31.62	25.70	19.28	-4.30
203.200	H	9.20	1.39	14.61	30.00	31.62	25.20	18.20	-4.80
222.400	H	10.49	1.67	10.81	30.00	31.62	22.97	14.08	-7.03

Test Engineer :

Bruce Huang

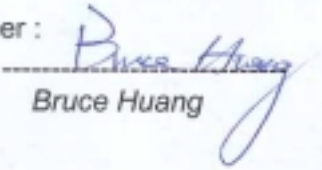
6.4.2. Test mode 2: CRT MODE: (1) 1600 x 900 120Hz/116K

- Test Distance : 10 M
- Temperature : 23°C
- Relative Humidity : 68 %
- Test Date : Mar. 7, 2000
- 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

446.400 MHz / 33.21 dBuV (VERTICAL) Antenna Height 1.7 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)			
59.900	V	6.39	0.67	16.04	30.00	31.62	23.10	14.29	-6.90
63.900	V	6.15	0.67	17.29	30.00	31.62	24.11	16.05	-5.89
446.400	V	16.21	2.47	14.53	37.00	70.79	33.21	45.76	-3.79
127.700	H	11.83	1.00	10.42	30.00	31.62	23.25	14.54	-6.75
216.000	H	10.08	1.61	11.57	30.00	31.62	23.26	14.55	-6.74
446.400	H	16.21	2.47	10.69	37.00	70.79	29.37	29.41	-7.63

Test Engineer : 
Bruce Huang

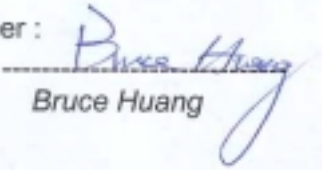
6.4.3. Test mode 2: (2) 1600 x 1200 85Hz/106K

- Test Distance : 10 M
- Temperature : 23°C
- Relative Humidity : 68 %
- Test Date : Mar. 7, 2000
- 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

171.900 MHz / 25.61 dBuV (HORIZONTAL) Antenna Height 4 Meter, Turntable Degree 240 °.

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)			
171.900	V	8.78	1.20	14.80	30.00	31.62	24.78	17.34	-5.22
202.400	V	9.13	1.38	14.36	30.00	31.62	24.87	17.52	-5.13
597.600	V	17.91	3.15	9.93	37.00	70.79	30.99	35.44	-6.01
171.900	H	8.78	1.20	15.63	30.00	31.62	25.61	19.08	-4.39
200.400	H	9.00	1.35	14.86	30.00	31.62	25.21	18.22	-4.79
434.400	H	16.04	2.40	11.58	37.00	70.79	30.02	31.70	-6.98

Test Engineer : 
Bruce Huang

6.5. Photographs of Radiated Emission Test Configuration

- The photographs show the configuration that generates the maximum emission.

TV MODE

FRONT VIEW



REAR VIEW



CRT MODE

FRONT VIEW



REAR VIEW



7. Antenna Factor & Cable Loss

Frequency (Mhz)	Antenna Factor (dB)	Cable Loss (dB)
30	17.3	0.3
35	15.5	0.5
40	13.9	0.5
45	10.4	0.6
50	8.3	0.5
55	7.4	0.7
60	6.4	0.7
65	6.1	0.7
70	5.8	0.8
75	6.2	0.8
80	6.8	0.7
85	7.7	0.7
90	8.6	1.2
95	10.0	1.0
100	11.3	1.0
110	11.8	0.9
120	12.3	1.0
130	11.7	1.0
140	11.3	1.2
150	10.6	1.2
160	9.6	1.2
170	8.8	1.2
180	9.1	1.3
190	9.0	1.3
200	8.9	1.3
220	10.4	1.7
240	11.7	1.7
260	12.8	1.7
280	13.5	1.8
300	14.2	1.7
320	14.3	1.9
340	14.4	2.1
360	14.6	2.2
380	15.1	2.2
400	15.5	2.2
450	16.3	2.5
500	16.6	2.5
550	17.7	2.8
600	17.9	3.2
650	17.8	3.2
700	16.9	3.3
750	17.4	3.8
800	18.2	3.5
850	18.6	3.8
900	20.1	3.7
950	19.8	3.8
1000	19.3	4.0
2000	21.4	5.6

LKOP6

8. List of Measuring Equipment Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver (site 2)	HP	8591EM	3710A01187	9 KHz - 18 GHz	Sep. 06. 1999	Conduction
LISN (Support Unit) (site 2)	Telemeter	NNB-2/16Z	98009	50 ohm / 50 uH	Dec. 06. 1999	Conduction
LISN (EUT) (site 2)	Telemeter	NNB-2/16Z	98087	50 ohm / 50 uH	Dec. 06. 1999	Conduction
Spectrum Analyzer (Site 6)	ADVANTEST	R3261A	71720760	9 KHz – 2.6GHz	Mar. 05, 1999	Radiation
Amplifier (Site 6)	HP	87405D	3207A01437	10MHz – 3.0GHz	Jun. 25, 1999	Radiation
Bilog Antenna (Site 6)	CHASE	CBL6112A	2442	30MHz -2GHz	Jan. 18, 2000	Radiation
Half-wave dipole antenna (Site 6)	EMCO	3121C	9705-1285	28 M - 1GHz	May 18, 1999	Radiation
Turn Table (site 6)	EMCO	2080	9711-2021	0 ~ 360 degree	N/A	Radiation
Antenna Mast (site 6)	EMCO	2075	9711-2115	1 m- 4 m	N/A	Radiation