

FCC TEST REPORT

for

CISPR PUB. 22 Class B

Equipment : 15"Monitor

Model No. : LE500

FCC ID : H4ILE500

Filing Type : Original Grant

Applicant : **Lite-On Technology Corp.**
5F, 16, Sec. 4, Nanking E. Rd.,
Taipei, 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 : 15"Monitor
Model No. : LE500
FCC ID : H4ILE500
Applicant : **Lite-On Technology Corp.**
5F, 16, Sec. 4, Nanking E. Rd.,
Taipei, 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 Aug. 3, 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

Lite-On Technology Corp.
5F, 16, Sec. 4, Nanking E. Rd., Taipei,
Taiwan, R.O.C.

1.2. Manufacturer

Same as 1.1.

1.3. Basic Description of Equipment under Test

Equipment	: 15"Monitor
Model No.	: LE500
Trade Name	: Gateway
VGA Cable	: Shielded, 1.8m
Power Supply Type	: Switching
Power Cord	: Non-Shielded, 1.8m, 3 pin

1.4. Feature of Equipment under Test

Picture Tube	15-inch (13.8-inch Visual image area), slotted mask, 90 degrees deflection, dot type black matrix, medium short persistence phosphor, dark tint, non-glare/ anti-static screen, mini-neck gun 0.28 mm dot pitch
Scanning Frequency	VGA, Super VGA, 1024x768@60/70/75/85 Hz
Maximum Resolution	1024 dots (H) x 768 lines (V) @85Hz refresh rate
Display Area	262 mm (H) x 196 mm (V) typical
Display Characters	80 char. x 60 rows on a 10 x 10 matrix
Display Colors Analog Input	Unlimited Colors
Synchronizatin Signals	Separate Sync: horizontal/vertical, TTL, positive or negative
Synchronization Frequencies	Horizontal : 30 to 69 kHz Vertical : 55 to 120 Hz
Signal Connectors	15-pin, D-shell connector
Video Signals	Analog : 0.7 Vp-p, RGB positive
Power Input	70 Watts (maximum) AC rated voltage, 100VAC to 240VAC
Misconvergence	Center Area : ≤ 0.3 mm; Corner Area : ≤ 0.4 mm
User Controls	Power On/Off, Contrast, Brightness, Horizontal Size, Horizontal Position, Vertical Size, Vertical Position, Pincushion, Trapezoid, Rotation, Color temperature, Language, Display Frequency, Degauss, Recall, H. Moire, V. Moire
Service Controls	PWB-1484 : R-bias (VR910), G-bias (VR940), B-bias (VR970) PWB-1486 : power voltage adjust (VR801), high voltage adjust (VR802), focus, ABL adjust (VR401)
Preset Modes	10 (see Table 2-2. Timing Chart)
Environmental Considerations	Operation temperature : 10°C to 35°C ambient Operation Humidity : 20% to 90% ambient Storage temperature : -40°C to 65°C ambient Storage Humidity : 10% to 90% (non-condensing) Altitude : up to 10000m above sea level

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 Gateway Keyboard, Gateway Mouse, HP Printer, ACEEX Modem and EUT were connected to the Gateway PC for EMI test.
- c. The Following display resolution were investigated during the compliance test:
 - 1. Horizontal frequency (640x480 to 1,024 x 768, 31.5 KHz to 69 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. 1,024 x 768 (non-interlanced 69 KHz), refresh rate 85 Hz.

3. 1,024 x

768 (non-interlaced 60 KHz), refresh rate 75 Hz.

e. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 1000MHz.

3.1. Description of Test System

Support Unit 1. -- Keyboard (GATEWAY)

FCC ID	: N/A
Model No.	: 7002192
Serial No.	: SP00186
Data Cable	: Non-Shielded, 1.4m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 2. -- Mouse (GATEWAY)

FCC ID	: N/A
Model No.	: X04-72168
Serial No.	: SP00184
Data Cable	: Non-Shielded, 1.4m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 3. -- 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

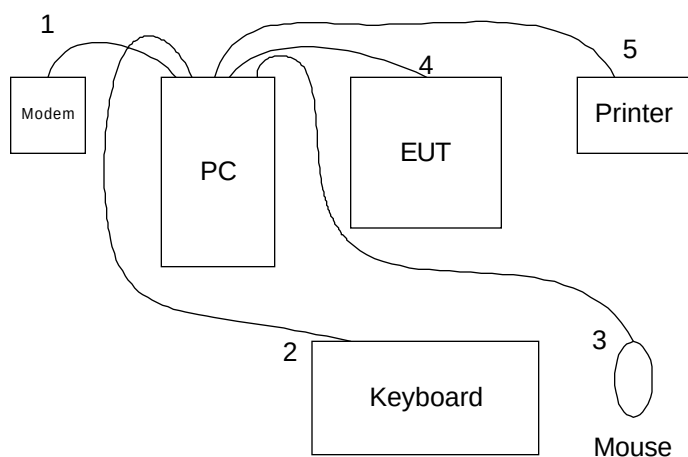
Support Unit 4. -- Modem (ACEEX)

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 5. -- Personal Computer (GATEWAY)

FCC ID	: N/A
Model No.	: MICRO ATX FMN ESSENTIAL 433C
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.

3.2. Connection Diagram of Test System



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

4. Test Software

An executive program, GATEWAY / PC EXERCISE under WIN 98, 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.

5. General Information of Test

5.1. 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

5.2. Standard for Methods of Measurement

ANSI C63.4-1992

5.3. Test in Compliance with

CISPR PUB. 22 Class B

5.4. Frequency Range Investigated

- a. Conduction: from 150 kHz to 30 MHz
- b. Radiation : from 30 MHz to 1,000 MHz

5.5. Test Distance

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

6. 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.

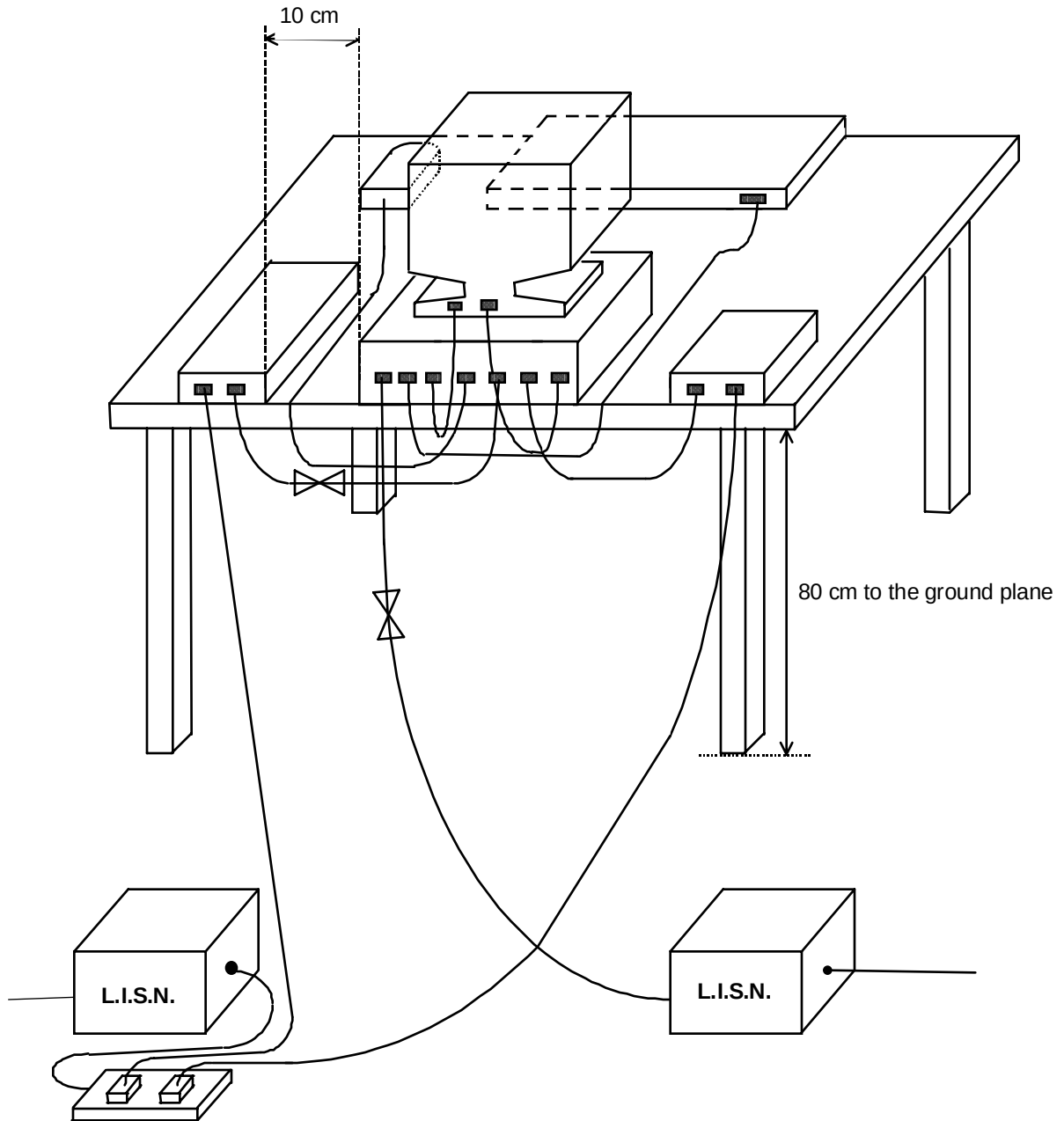
6.1. Major Measuring Instruments

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

6.2. 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.

6.3. Typical Test Setup Layout of Conducted Powerline



6.4. Test Result of AC Powerline Conducted Emission

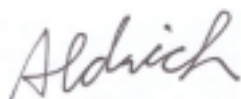
6.4.1. Test mode : 1024*768/75Hz/60K

- Temperature : 25°C
- Relative Humidity : 49 %

The Conducted Emission test was passed at minimum margin

LINE 0.180 MHz / 41.70 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)
0.180	L	48.70	41.70	272.27	121.62	64.47	54.47	1672.63	528.93	-15.8	-12.8
0.902	L	37.50	30.90	74.99	35.08	56.00	46.00	630.96	199.53	-18.5	-15.1
19.168	L	37.60	33.70	75.86	48.42	60.00	50.00	1000.00	316.23	-22.4	-16.3
23.674	L	41.10	33.80	113.50	48.98	60.00	50.00	1000.00	316.23	-18.9	-16.2
19.168	N	38.80	34.40	87.10	52.48	60.00	50.00	1000.00	316.23	-21.2	-15.6
23.674	N	42.30	34.60	130.32	53.70	60.00	50.00	1000.00	316.23	-17.7	-15.4



Test Engineer : _____
Aldrich Hong

6.4.2. Test mode : 1024*768/85Hz/69K

- Temperature : 25°C
- Relative Humidity : 49 %

The Conducted Emission test was passed at minimum margin

NEUTRAL 18.926 MHz / 42.00 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)
0.207	L	48.70	42.70	272.27	136.46	63.32	53.32	1465.61	463.47	-14.6	-10.6
18.926	L	44.80	41.50	173.78	118.85	60.00	50.00	1000.00	316.23	-15.2	-8.5
26.908	L	40.00	38.90	100.00	88.10	60.00	50.00	1000.00	316.23	-20.0	-11.1
0.620	N	42.90	34.10	139.64	50.70	56.00	46.00	630.96	199.53	-13.1	-11.9
18.926	N	46.00	42.00	199.53	125.89	60.00	50.00	1000.00	316.23	-14.0	-8.0
28.148	N	41.50	39.30	118.85	92.26	60.00	50.00	1000.00	316.23	-18.5	-10.7



Test Engineer : _____
Aldrich Hong

6.5. Photographs of Conducted Powerline Test Configuration

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

FRONT VIEW



REAR VIEW



SIDE VIEW



7. Test of Radiated Emission

Radiated emissions from 30 MHz to 1,000 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.

7.1. Major Measuring Instruments

- Amplifier (HP 8447D)
 - Attenuation 0 dB
 - RF Gain 25 dB
 - Signal Input 0.1 MHz to 1.3 GHz

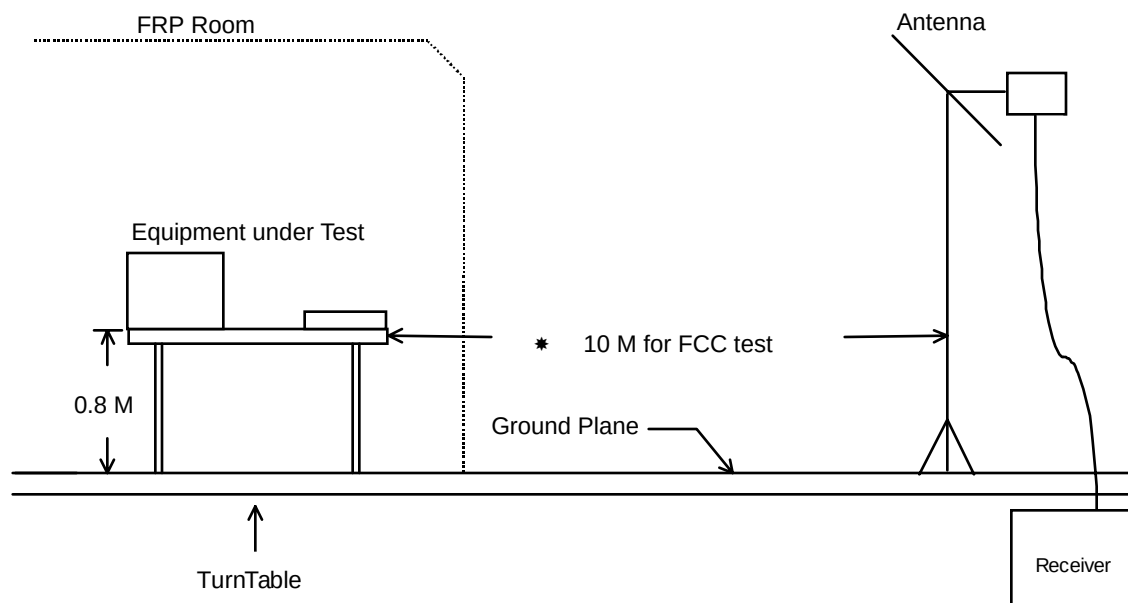
- Spectrum Analyzer (HP 8568B)
 - Attenuation 0 dB
 - Start Frequency 30 MHz
 - Stop Frequency 1000 MHz
 - Resolution Bandwidth 1 MHz
 - Video Bandwidth 1 MHz
 - Signal Input 100 Hz to 1.5 GHz

- Quasi-Peak Adapter (HP 85650A)
 - Resolution Bandwidth 120 KHz
 - Frequency Band 9 KHz to 1 GHz
 - Quasi-Peak Detector ON for Quasi-Peak Mode
OFF for Peak Mode

7.2. 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.

7.3. Typical Test Setup Layout of Radiated Emission



7.4. Test Result of Radiated Emission

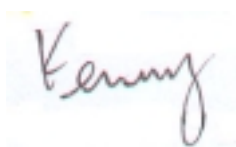
7.4.1. Test mode : 1024*768/75Hz/60K

- Test Distance : 10 M
- Temperature : 30°C
- Relative Humidity : 40 %
- 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

212.800 MHz / 25.83 dBuV (HORIZONTAL) Antenna Height 2.14 Meter, Turntable Degree 148 °.

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)			
47.271	V	10.85	0.85	13.80	30.00	31.62	25.50	18.84	-4.50
110.712	V	11.38	1.31	11.54	30.00	31.62	24.23	16.27	-5.77
158.763	V	10.59	1.59	11.94	30.00	31.62	24.12	16.07	-5.88
212.800	H	10.78	1.82	13.23	30.00	31.62	25.83	19.57	-4.17
228.800	H	11.94	1.81	11.69	30.00	31.62	25.44	18.71	-4.56
307.200	H	13.84	2.23	16.03	37.00	70.79	32.10	40.27	-4.90



Test Engineer : _____

KEN HUANG

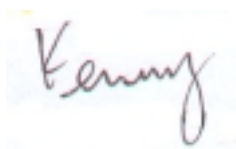
7.4.2. Test mode : 1024*768/85Hz/69K

- Test Distance : 10 M
- Temperature : 30°C
- Relative Humidity : 40 %
- 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

302.400 MHz / 33.02 dBuV (HORIZONTAL) Antenna Height 1.98 Meter, Turntable Degree 157 °.

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)			
40.773	V	14.27	0.80	9.30	30.00	31.62	24.37	16.54	-5.63
66.252	V	6.16	1.08	17.43	30.00	31.62	24.67	17.12	-5.33
190.398	H	9.83	1.70	12.56	30.00	31.62	24.09	16.01	-5.91
208.000	H	10.37	1.67	12.23	30.00	31.62	24.27	16.35	-5.73
283.200	H	13.60	2.17	15.46	37.00	70.79	31.23	36.43	-5.77
302.400	H	13.73	2.21	17.08	37.00	70.79	33.02	44.77	-3.98



Test Engineer : _____
KEN HUANG

7.5. Photographs of Radiated Emission Test Configuration

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

FRONT VIEW



REAR VIEW



8. Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	16.6	0.7
35	15.6	0.8
40	14.6	0.8
45	11.6	0.8
50	9.5	0.9
55	8.0	0.8
60	6.5	0.9
65	6.2	1.1
70	6.0	1.0
75	6.4	1.1
80	7.0	1.1
85	7.5	1.1
90	8.0	1.2
95	9.3	1.2
100	10.6	1.2
110	11.3	1.3
120	12.0	1.4
130	12.5	1.3
140	12.9	1.5
150	11.2	1.5
160	10.5	1.6
170	10.0	1.5
180	9.9	1.6
190	9.8	1.7
200	9.7	1.1
220	11.2	1.9
240	12.7	1.8
260	13.5	2.0
280	13.6	2.2
300	13.7	2.2
320	14.1	2.3
340	14.5	2.4
360	15.0	2.5
380	15.4	2.6
400	15.8	2.6
450	17.3	2.9
500	18.8	3.0
550	19.0	3.1
600	19.0	3.2
650	19.1	3.3
700	19.1	3.3
750	20.1	3.5
800	21.1	3.5
850	21.7	3.7
900	22.2	3.9
950	21.1	4.3
1000	20.0	4.1

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9. List of Measuring Equipment Used

• • • •	• • •	• •	• •	• •	• • • •	• •
EMC Receiver (site 2)	HP	8591EM	3710A01187	9 KHz – 1.8 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
Quasi-peak Adapter (site 5)	HP	85650A	2521A00821	9KHz -1 GHz	Nov. 23, 1999	Radiation
Spectrum Analyzer (Site 5)	HP	8568B	2634A03000	100Hz - 1.5GHz	Nov. 23, 1999	Radiation
Amplifier (Site 5)	HP	8447D	2944A09073	0.1MHz -1.3GHz	Nov. 19, 1999	Radiation
Bilog Antenna (Site 5)	CHASE	CBL6112A	2287	30MHz -2GHz	Jan. 04, 2000	Radiation
Half-wave dipole antenna (Site 5)	EMCO	3121C	9705-1285	28 M - 1GHz	May 17, 2000	Radiation
Turn Table (site 5)	EMCO	2080	9711-2021	0 ~ 360 degree	N/A	Radiation
Antenna Mast (site 5)	EMCO	2075	9711-2115	1 m- 4 m	N/A	Radiation