



FCC TEST REPORT

REPORT NO.: F910423A01

MODEL NO.: NL1503

RECEIVED: April 23, 2002

TESTED: April 25 ~ 26, 2002

APPLICANT: NPG Display LTD., Taiwan Branch

ADDRESS: 2FL-1, No. 8, Tunhua N. Rd., Taipei,
Taiwan, R.O.C.

ISSUED BY: Advance Data Technology Corporation

LAB LOCATION: 47 14th Lin, Chiapau Tsun, Linko, Taipei,
Taiwan, R.O.C.

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0528
ILAC MRA



Lab Code: 200102-0

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1 CERTIFICATION

PRODUCT: LCD MONITOR
BRAND NAME: NEC, Mitsubishi
MODEL NO: NL1503
TEST ITEM: ENGINEERING SAMPLE
APPLICANT: NPG Display LTD., Taiwan Branch
STANDARDS: FCC Part 15, Subpart B, Class B
CISPR 22: 1997, Class B
ANSI C63.4-1992

We, **Advance Data Technology Corporation**, hereby certify that one sample of the designation has been tested in our facility on April 25 ~ 26, 2002. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions herein specified.

TESTED BY: Kent Chen, DATE: 05/08/2002
(Kent Chen)

CHECKED BY: Emily Lai, DATE: 05/08/2002
(Emily Lai)

APPROVED BY: Fred Chen, DATE: 05/08/2002
(Fred Chen, Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Remarks
FCC Part 15, Subpart B, Class B / CISPR 22: 1997, Class B	Conducted Test	PASS	Meets Class B Limit Minimum passing margin is -7.06 dB at 0.269 MHz
	Radiated Test	PASS	Meets Class B Limit Minimum passing margin is -2.30 dB at 231.00 MHz

NOTE: For conducted emission test, the test limit used is according to FCC Part 15.107. In this part, conducted emission test for telecom port is not mentioned and therefore this item is not tested.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	LCD MONITOR
MODEL NO.	NL1503
POWER SUPPLY	Switching Input:100-240V, 1A, 50-60Hz Power Cord: Non-shielded, 3 pin, AC (1.8m)
DATA CABLE	Shielded (1.8m) with two cores

NOTE: The EUT is a LCD MONITOR with resolution up to 1024x768.

For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

3.2 DESCRIPTION OF TEST MODES

The EUT was pre-tested under the following resolution and horizontal synchronization speed mode:

- ◆ 1024 x 768 (75Hz/60kHz)
- ◆ 800 x 600 (75Hz/48kHz)
- ◆ 640 x 480 (60Hz/31kHz)

The worst emission level was found when the EUT was tested under 1024 x 768 (75Hz/60kHz) resolution, therefore the test data of this mode is recorded in the report.

3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Personal Computer	HP	Brio BA410	SG12106031	FCC DoC Approved
2	PRINTER	EPSON	LQ-300+	DCGY017063	FCC DoC Approved
3	MODEM	ACEEX	1414	980020508	IFAXDM1414
4	PS/2 KEYBOARD	BTC	5121W	A00801373	E5XKB5121WTH01 10
5	PS2/MOUSE	LOGITECH	M-S61	HCA12605710	JNZ211403

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A
2	1.2m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core
3	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.
4	1.6 m foil shielded wire, terminated with PS/2 connector via metallic frame, w/o core.
5	1.8 mNon shielded wire, terminated with PS/2 connector via drain wire, w/o core.

NOTE: All power cords of the above support units are non shielded (1.8m).

4 EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

NOTES: (1) The lower limit shall apply at the transition frequencies.

- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESHS30	828109/007	July 4, 2002
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	839135/006	July 3, 2002
* ROHDE & SCHWARZ 4-wire ISN	ENY41	838119/028	Dec. 2, 2002
* ROHDE & SCHWARZ 2-wire ISN	ENY22	837497/016	Dec. 2, 2002
EMCO-L.I.S.N. (for peripheral)	3825/2	9204-1964	July 3, 2002
Software	Cond-V2.0M	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C02.01	July 5, 2002
HP Terminator (For EMCO LISN)	11593A	E1-01-298	Feb. 20, 2003
HP Terminator (For EMCO LISN)	11593A	E1-01-299	Feb. 20, 2003
Shielded Room	Site 2	ADT-C02	NA
VCCI Site Registration No.	Site 2	C-240	NA

NOTE:

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. “*”: These equipment are used for conducted telecom port test only (if tested).

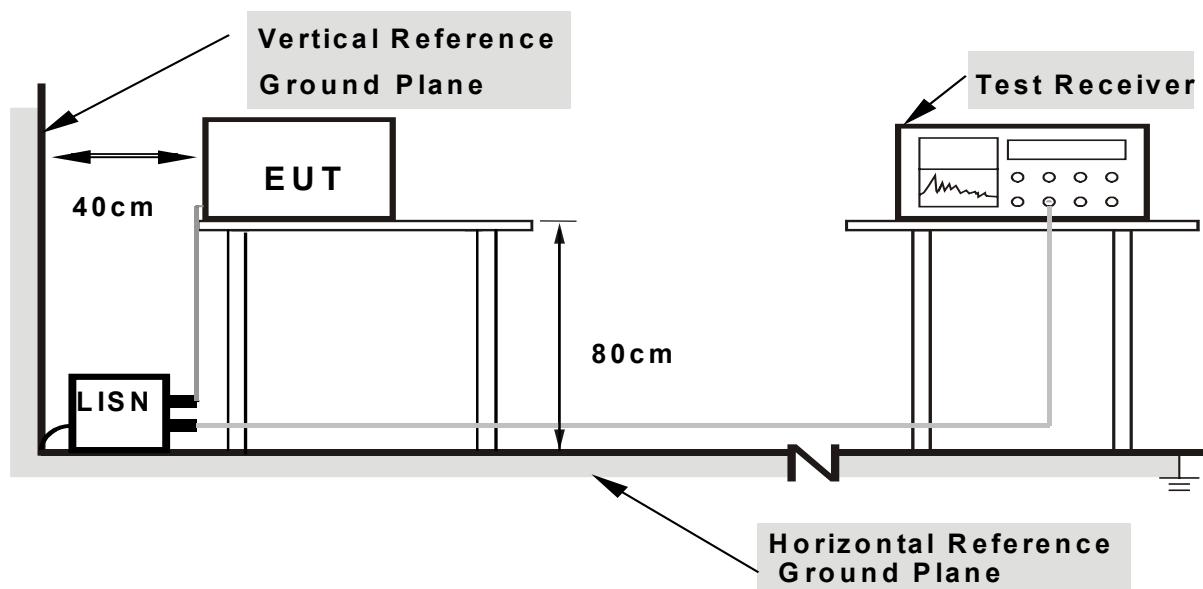
4.1.3 TEST PROCEDURE

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITIONS

- a. Turned on the power of all equipment.
- b. PC ran a test program to enable all functions.
- c. PC read and wrote messages from FDD and HDD.
- d. PC sent "H" messages to LCD monitor (EUT) and LCD monitor displayed "H" patterns on screen.
- e. PC sent "H" messages to modem.
- f. PC sent "H" messages to printer, and the printer printed them on paper.
- g. Steps c-g were repeated.

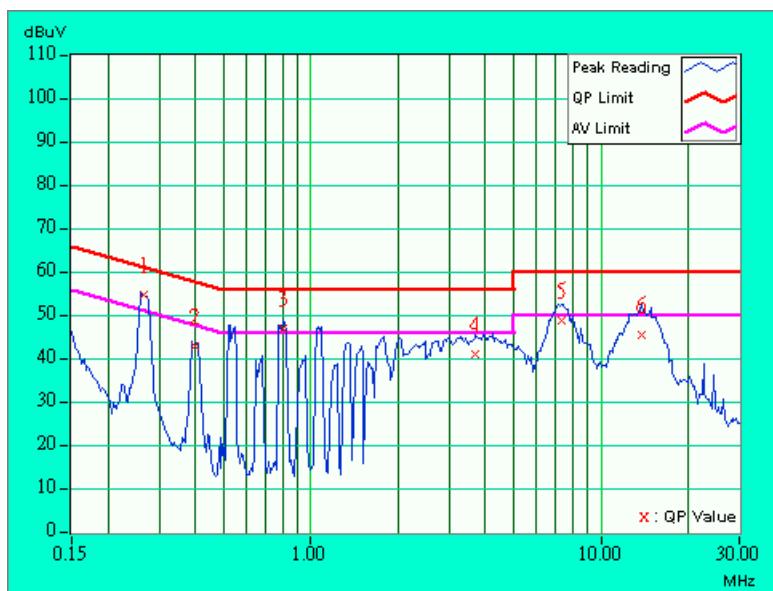
4.1.7 TEST RESULTS

EUT	LCD MONITOR	MODEL	NL1503
		6dB BANDWIDTH	9 kHz
INPUT POWER	120Vac, 60 Hz	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	25 deg. C, 70 % RH, 1005 hPa	TESTED BY: Kent Chen	

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
	0.264	0.10	53.90	42.37	54.00	42.47	61.30	51.30	-7.30	-8.83
1	0.399	0.10	42.20	-	42.30	-	57.88	47.88	-15.58	-
2	0.798	0.10	46.31	31.97	46.41	32.07	56.00	46.00	-9.59	-13.93
3	3.703	0.27	40.38	-	40.65	-	56.00	46.00	-15.35	-
4	7.309	0.41	48.04	-	48.45	-	60.00	50.00	-11.55	-
5	13.883	0.73	44.94	-	45.67	-	60.00	50.00	-14.33	-

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.

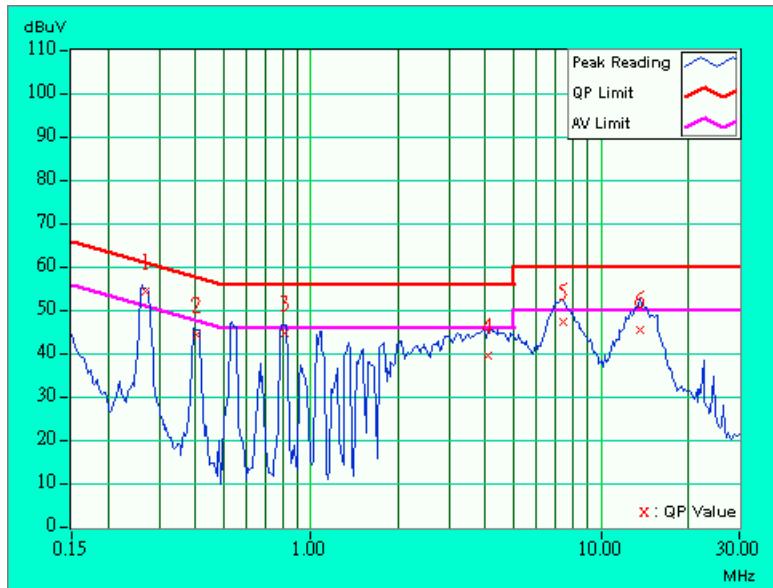


EUT	LCD MONITOR	MODEL	NL1503
		6dB BANDWIDTH	9 kHz
INPUT POWER	120Vac, 60 Hz	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	25 deg. C, 70 % RH, 1005 hPa	TESTED BY: Kent Chen	

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.269	0.10	53.98	42.63	54.08	42.73	61.14	51.14	-7.06	-8.41
2	0.404	0.10	43.89	-	43.99	-	57.78	47.78	-13.79	-
3	0.812	0.10	44.33	-	44.43	-	56.00	46.00	-11.57	-
4	4.107	0.30	39.09	-	39.39	-	56.00	46.00	-16.61	-
5	7.385	0.36	47.05	-	47.41	-	60.00	50.00	-12.59	-
6	13.562	0.54	45.02	-	45.56	-	60.00	50.00	-14.44	-

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT FOR FREQUENCY BELOW 1000 MHz

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 10m)
	dBuV/m	dBuV/m
30 – 230	40	30
230 - 1000	47	37

LIMIT OF RADIATED EMISSION OF FCC PART 15, SUBPART B FOR FREQUENCY ABOVE 1000 MHz

FREQUENCY (MHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80.0	60.0	74.0	54.0

Note: (1) The lower limit shall apply at the transition frequencies.

(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).

(3) All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
HP Spectrum Analyzer	8590L	3544A00941	Dec.10, 2002
HP Pre-Amplifier	8447D	2944A08312	Aug. 19, 2002
* HP Preamplifier	8449B	3008A01201	Dec. 06, 2002
* HP Preamplifier	8449B	3008A01292	Aug. 21, 2002
* R&S Receiver	ESI7	100033	May 30, 2002
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 23, 2002
* ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Jan. 27, 2003
* CHASE BILOG Antenna	CBL6111A	1500	Aug. 30, 2002
* SCHWARZBECK Horn Antenna	BBHA9120-D1	D130	July 6, 2002
* EMCO Horn Antenna	3115	9312-4192	April 9, 2003
* EMCO Turn Table	1060-04	1196	NA
* EMCO Tower	1051	1264	NA
* Software	AS61D4	NA	NA
* ANRITSU RF Switches	MP59B	M06089	Aug. 30, 2002
* TIMES RF cable	LMR-600	CABLE-ST1-01	Aug. 30, 2002
Open Field Test Site	Site 1	ADT-R01	June 15, 2002
VCCI Site Registration No.	Site 1	R-236	NA

NOTE:

1. The measurement uncertainty is less than +/- 3.0dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.
3. ** = These equipment are used for the final measurement.
4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4.2.3 TEST PROCEDURE

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

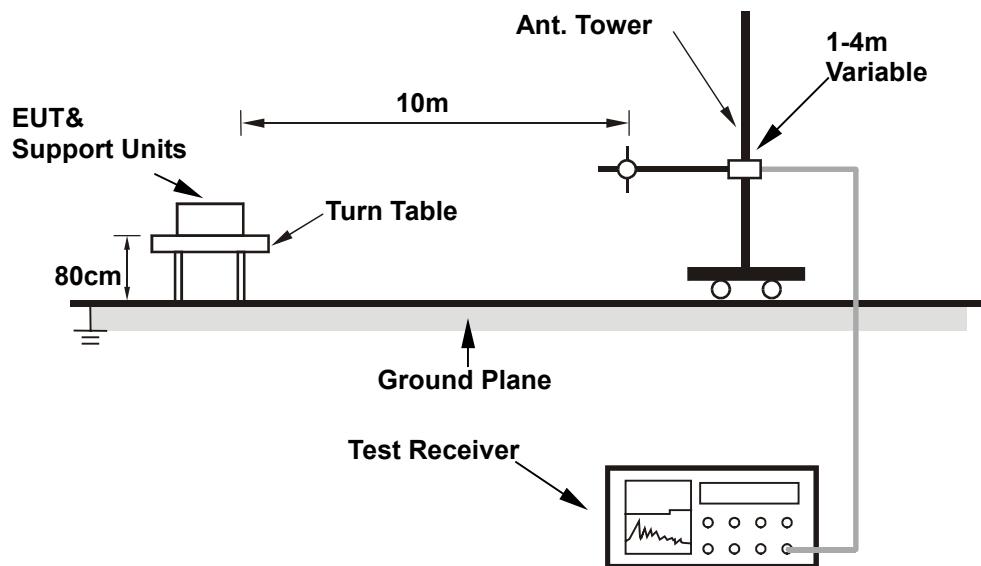
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 300 Hz for Average detection (AV) at frequency above 1GHz.
3. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the interference antenna.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

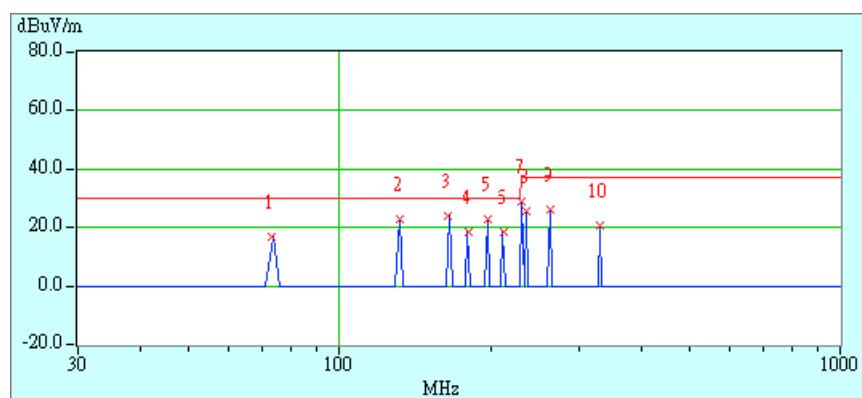
4.2.7 TEST RESULTS

EUT		LCD MONITOR		MODEL		NL1503	
				FREQUENCY RANGE		30-1000 MHz	
INPUT POWER		120Vac, 60 Hz		DETECTOR FUNCTION & BANDWIDTH		Quasi-Peak, 120kHz	
ENVIRONMENTAL CONDITIONS		25 deg. C, 65 % RH, 1004 hPa		TESTED BY: Kent Chen			

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 10 M											
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Gain (dB)	Correction Factor (dB/m)
1	72.90	16.7 QP	30.00	-13.30	4.00H	104	8.60	6.41	1.69	0.00	-8.10
2	132.03	22.6 QP	30.00	-7.40	4.00H	336	9.76	11.20	1.66	0.00	-12.87
3	165.01	24.1 QP	30.00	-5.90	4.00H	51	12.87	9.52	1.76	0.00	-11.29
4	181.12	18.3 QP	30.00	-11.70	4.00H	293	8.01	8.56	1.72	0.00	-10.29
5	197.99	22.6 QP	30.00	-7.40	4.00H	59	12.01	8.72	1.91	0.00	-10.65
6	212.65	18.6 QP	30.00	-11.40	2.72H	309	7.24	9.42	2.00	0.00	-11.41
7	231.00	29.1 QP	37.00	-7.90	3.58H	87	16.55	10.50	2.10	0.00	-12.60
8	236.21	25.7 QP	37.00	-11.30	3.47H	105	12.84	10.77	2.12	0.00	-12.89
9	264.00	25.9 QP	37.00	-11.10	1.86H	270	11.96	11.77	2.16	0.00	-13.93
10	330.00	20.8 QP	37.00	-16.20	2.57H	339	4.99	13.26	2.51	0.00	-15.77

REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) – Correction Factor(dB)
2. Correction Factor(dB/m) = Pre-Amplifier Gain (dB) - Antenna Factor (dB/m) - Cable Factor (dB)
3. Pre-Amplifier Gain (dB) = 0, when the test receiver is used to read the value and because it did not use the Pre-Amplifier.
4. The other emission levels were very low against the limit.
5. Margin value = Emission level – Limit value.

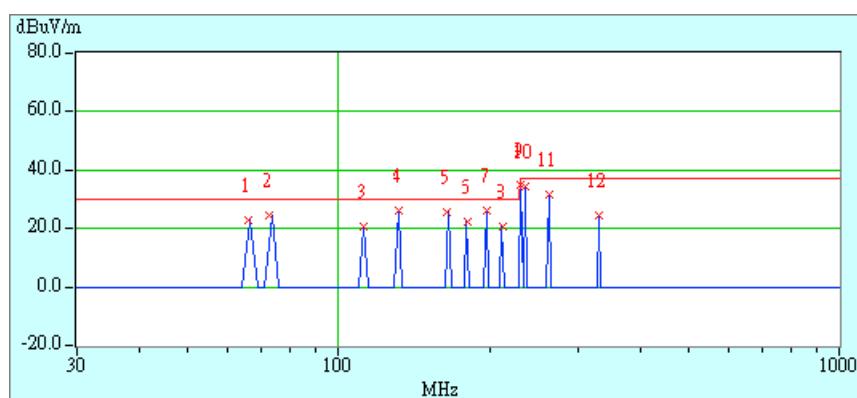


EUT		LCD MONITOR		MODEL	NL1503		
				FREQUENCY RANGE	30-1000 MHz		
INPUT POWER		120Vac, 60 Hz		DETECTOR FUNCTION & BANDWIDTH	Quasi-Peak, 120kHz		
ENVIRONMENTAL CONDITIONS		25 deg. C, 65 % RH, 1004 hPa		TESTED BY: Kent Chen			

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 10 M											
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-Amp. Gain (dB)	Correction Factor (dB/m)
1	66.01	22.7 QP	30.00	-7.30	1.00V	23	15.14	5.82	1.75	0.00	-7.56
2	72.87	24.3 QP	30.00	-5.70	1.00V	274	16.20	6.41	1.69	0.00	-8.10
3	111.74	20.4 QP	30.00	-9.60	1.00V	100	8.05	10.75	1.60	0.00	-12.35
4	132.01	26.4 QP	30.00	-3.60	1.00V	334	13.53	11.20	1.66	0.00	-12.87
5	165.00	25.6 QP	30.00	-4.40	1.00V	347	14.30	9.52	1.76	0.00	-11.29
6	181.14	22.2 QP	30.00	-7.80	1.00V	41	11.91	8.56	1.72	0.00	-10.30
7	198.01	26.1 QP	30.00	-3.90	1.00V	358	15.46	8.72	1.91	0.00	-10.65
8	212.62	20.8 QP	30.00	-9.20	1.00V	340	9.39	9.42	2.00	0.00	-11.41
9	231.00	34.7 QP	37.00	-2.30	1.00V	164	22.10	10.50	2.10	0.00	-12.60
10	236.24	34.5 QP	37.00	-2.50	1.00V	342	21.61	10.77	2.12	0.00	-12.89
11	264.00	31.9 QP	37.00	-5.10	1.00V	16	17.97	11.77	2.16	0.00	-13.94
12	330.02	24.7 QP	37.00	-12.30	1.00V	145	8.93	13.26	2.51	0.00	-15.77

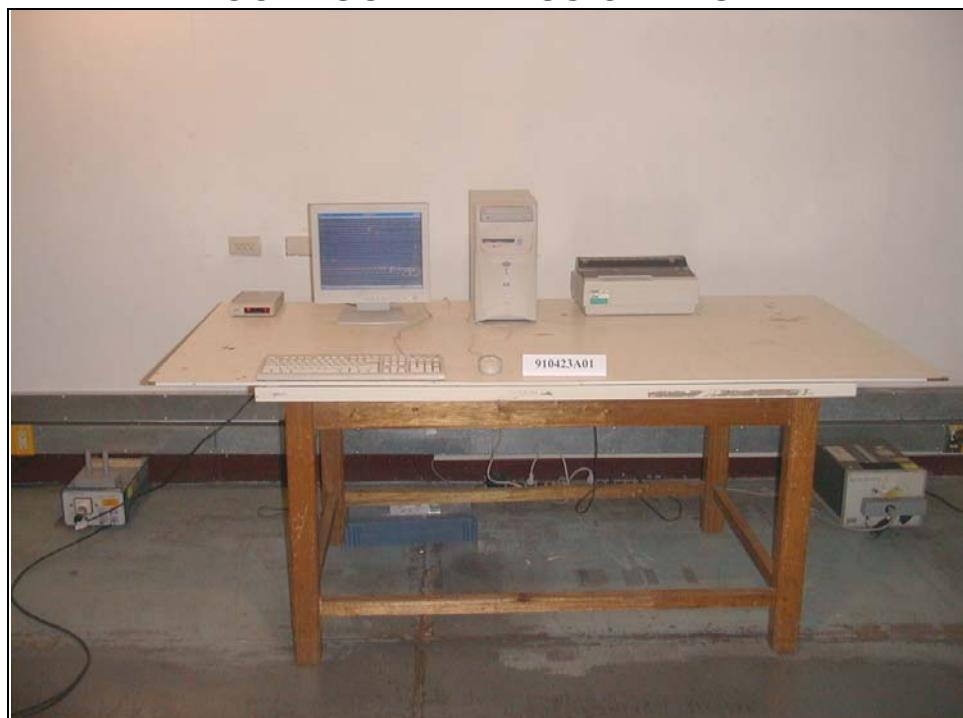
REMARKS:

1. Emission level(dBuV/m)=Raw Value(dBuV) – Correction Factor(dB)
2. Correction Factor(dB/m) = Pre-Amplifier Gain (dB) - Antenna Factor (dB/m) - Cable Factor (dB)
3. Pre-Amplifier Gain (dB) = 0, when the test receiver is used to read the value and because it did not use the Pre-Amplifier.
4. The other emission levels were very low against the limit.
5. Margin value = Emission level – Limit value.



5 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST



RADIATED EMISSION TEST



6 APPENDIX - INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025, Guide 25 or EN 45001:

USA	FCC, NVLAP, UL
Germany	TUV Rheinland
Japan	VCCI
New Zealand	MoC
Norway	NEMKO, DNV
Canada	INDUSTRY CANADA
R.O.C.	CNLA, BSMI

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If you have any comments, please feel free to contact us at the following:

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