



EMC

TEST REPORT

REPORT NO. : F88072806

MODEL NO. : R-5, 10 15 30

DATE OF TEST : July 29, 1999

PREPARED FOR: ROYAL INFORMATION ELECTRONICS CO., LTD.

ADDRESS : NO. 3, LANE 11, TZU-CHANG ST., TU-CHENG IND.
DISTRICT TAIPEI HSIEN, TAIWAN, R.O.C.

PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION



Accredited Laboratory

11F, NO.1, SEC.4, NAN-KING EAST RD.,
TAIPEI, TAIWAN, R.O.C.

This test report consists of 15 pages in total. It may be duplicated completely for legal use with the allowance of the applicant. It shall not be reproduced except in full, without the written approval of our laboratory. It should not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. government. The test result in the report only applies to the tested sample.



TABLE OF CONTENTS

1. CERTIFICATION	3
2. GENERAL INFORMATION	4
2.1 GENERAL DESCRIPTION OF EUT	4
2.2 DESCRIPTION OF SUPPORT UNITS	5
2.3 TEST METHODOLOGY AND CONFIGURATION	5
3. TEST INSTRUMENTS	6
3.1 TEST INSTRUMENTS (EMISSION)	6
3.2 LIMITS OF CONDUCTED AND RADIATED EMISSION	7
4. TEST RESULTS (EMISSION)	8
4.1 RADIO DISTURBANCE	8
4.2 EUT OPERATION CONDITION	8
4.3 TEST DATA OF CONDUCTED EMISSION	9
4.4 TEST DATA OF RADIATED EMISSION	11
5. PHOTOGRAPHS OF THE TEST CONFIGURATION WITH MINIMUM MARGIN	13
6. APPENDIX - INFORMATION OF THE TESTING LABORATORY	15



1.

CERTIFICATION

Issue Date: Aug. 2, 1999

Product : LCD MONITOR
Trade Name : RIC, Belinea
Model No. : R-5, 10 15 30
Applicant : ROYAL INFORMATION ELECTRONICS CO., LTD.
Standard : FCC Part 15, Subpart B, Class B
ANSI C63.4-1992
CISPR 22: 1993+A1: 1995+A2: 1996, Class B

We hereby certify that one sample of the designation has been tested in our facility on July 29, 1999. The test record, data evaluation and Equipment Under Test (EUT) configurations represent herein are true and accurate representation of the measurements of the sample's EMC characteristics under the conditions herein specified.

The test results show that the EUT as described in this report is in compliance with the Class B limits of conducted and radiated emission of applicable standards.

TESTED BY : Bruce Lu , DATE: 8/2/99
(Bruce Lu)

CHECKED BY : Yemmy Soong , DATE: 8/2/99
(Yemmy Soong)

APPROVED BY : Mike Su , DATE: 8/2/99
(Mike Su)

ADVANCE DATA TECHNOLOGY CORPORATION**NVLAP[®]**

Accredited Laboratory



2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	LCD MONITOR
Model No.	:	R-5, 10 15 30
Power Supply Type	:	Switching
Power Cord	:	Nonshielded (1.8m)
Data Cable	:	Shielded (1.8m)

Note: The EUT has two model names which are identical to each other except for their model and brand names only, as the following:

- ◆ Model: R-5, brand: RIC
- ◆ Model: 10 15 30, brand: Belinea

From the above model names, Model: R-5 was selected as the representative for the test and its data is recorded in this report.

The EUT is a 15" LCD MONITOR with resolution up to 1024 x 768.

There are two ferrite cores on the video cable outside the monitor.

For more detailed features description, please refer to Manufacturer's Specification or User's Manual.



2.2 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 are used to form representative test configuration during the tests.

No.	Product	Brand	Model No.	FCC ID	I/O Cable
1	PERSONAL COMPUTER	HP	VL Series 4 5/100	B94VECTRA500T	Nonshielded Power (1.8m)
2	KEYBOARD	FORWARD	FDA-104GA	F4ZDA-104G	Shielded signal (1.4m)
3	PRINTER	HP	2225C+	DSI6XU2225	Shielded Signal (2.2m) Nonshielded Power (1.5m)
4	MODEM	ACEEX	1414	IFAXDM1414	Shielded signal (1.5m) Nonshielded Power (1.2m)
5	MOUSE	DEXIN	A2P800A	NIYA2P800A	Shielded signal (1.5m)
6	VGA CARD	GORDIA	DSV3365	LUT-DSV3365	NA

2.3 TEST METHODOLOGY AND CONFIGURATION

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 m on an open area test site.

Please refer to the photos of test configuration in Item 5.



3. TEST INSTRUMENTS

3.1 TEST INSTRUMENTS (EMISSION)

CONDUCTED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ Test Receiver	ESH3	893495/006	July 7, 2000
ROHDE & SCHWARZ Spectrum Monitor	EZM	893787/013	July 8, 2000
ROHDE & SCHWARZ Artificial Mains Network	ESH3-Z5	839135/006	July 7, 2000
EMCO-L.I.S.N.	3825/2	9204-1964	July 7, 2000
Shielded Room	Site 2	ADT-C02	NA

Note: 1. The measurement uncertainty is less than $\pm 2.6\text{dB}$, which is calculated as per 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.

RADIATED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
HP Spectrum Analyzer	8590L	3544A01042	April 15, 2000
HP Preamplifier	8447D	2944A08313	Sept. 24, 1999
HP Preamplifier	8347A	3307A01088	Sept. 9, 1999
ROHDE & SCHWARZ TEST RECEIVER	ESVS 30	841977/008	Oct. 1, 1999
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 25, 1999
EMCO Double Ridged Guide Antenna	3115	9312-4192	April 5, 2000
CHASE BILOG Antenna	CBL6111A	1647	July 3, 2000
EMCO Turn Table	1016	1722	NA
EMCO Tower	1051	1825	NA
Open Field Test Site	Site 4	ADT-R04	June 11, 2000

Note: 1. The measurement uncertainty is less than $\pm 3\text{dB}$, which is calculated as per 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.



3.2 LIMITS OF CONDUCTED AND RADIATED EMISSION

LIMIT OF RADIATED EMISSION OF CISPR 22

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

* Detector Function: Quasi-Peak

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.

LIMIT OF CONDUCTED EMISSION OF CISPR 22

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

- Note: (1) The lower limit shall apply at the transition frequencies.
 (2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz
 (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. TEST RESULTS (EMISSION)

4.1 RADIO DISTURBANCE

Frequency Range : 0.15 - 30 MHz (Conducted Emission)
30 - 1000 MHz (Radiated Emission)
Input Voltage : 120 Vac, 60 Hz
Temperature : 25 °C
Humidity : 62 %
Atmospheric Pressure : 989 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -15.5 dB at 0.159 MHz Minimum passing margin of radiated emission: -2.3 dB at 34.95 MHz

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

- ♦ 1024 x 768 (69 kHz)
- ♦ 800 x 600 (54 kHz)
- ♦ 640 x 480 (31.5 kHz)

The worst emission levels were found under 1024 x 768 (69 kHz) and therefore test data of this mode is recorded.

4.2 EUT OPERATION CONDITION

1. Turn on the power of all equipment.
2. PC reads a test program to enable all functions.
3. PC reads and writes messages from FDD and HDD.
4. PC sends "H" messages to monitor (EUT) and monitor display "H" patterns on screen.
5. PC sends "H" messages to modem.
6. PC sends "H" messages to printer, and the printer prints them on paper.
7. Repeat steps 3-7.



4.3 TEST DATA OF CONDUCTED EMISSION

EUT: LCD MONITORMODEL: R-5MODE: 1024x768 (69 kHz)6 dB Bandwidth: 10 kHzPHASE: LINE (L)

Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.159	0.2	49.8	-	50.0	-	65.5	55.5	-15.5	-
0.372	0.2	40.7	-	40.9	-	58.5	48.5	-17.6	-
0.745	0.2	38.6	-	38.8	-	56.0	46.0	-17.2	-
3.733	0.3	35.9	-	36.2	-	56.0	46.0	-19.8	-
10.241	0.7	41.7	-	42.4	-	60.0	50.0	-17.6	-
16.373	1.0	30.7	-	31.7	-	60.0	50.0	-28.3	-

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

dBuV

Mkr 0.166766MHZ 51.4dBuV

110

100

80

60

40

20

0

0.15

0.2

0.4

0.6

0.8

1

2

4

6

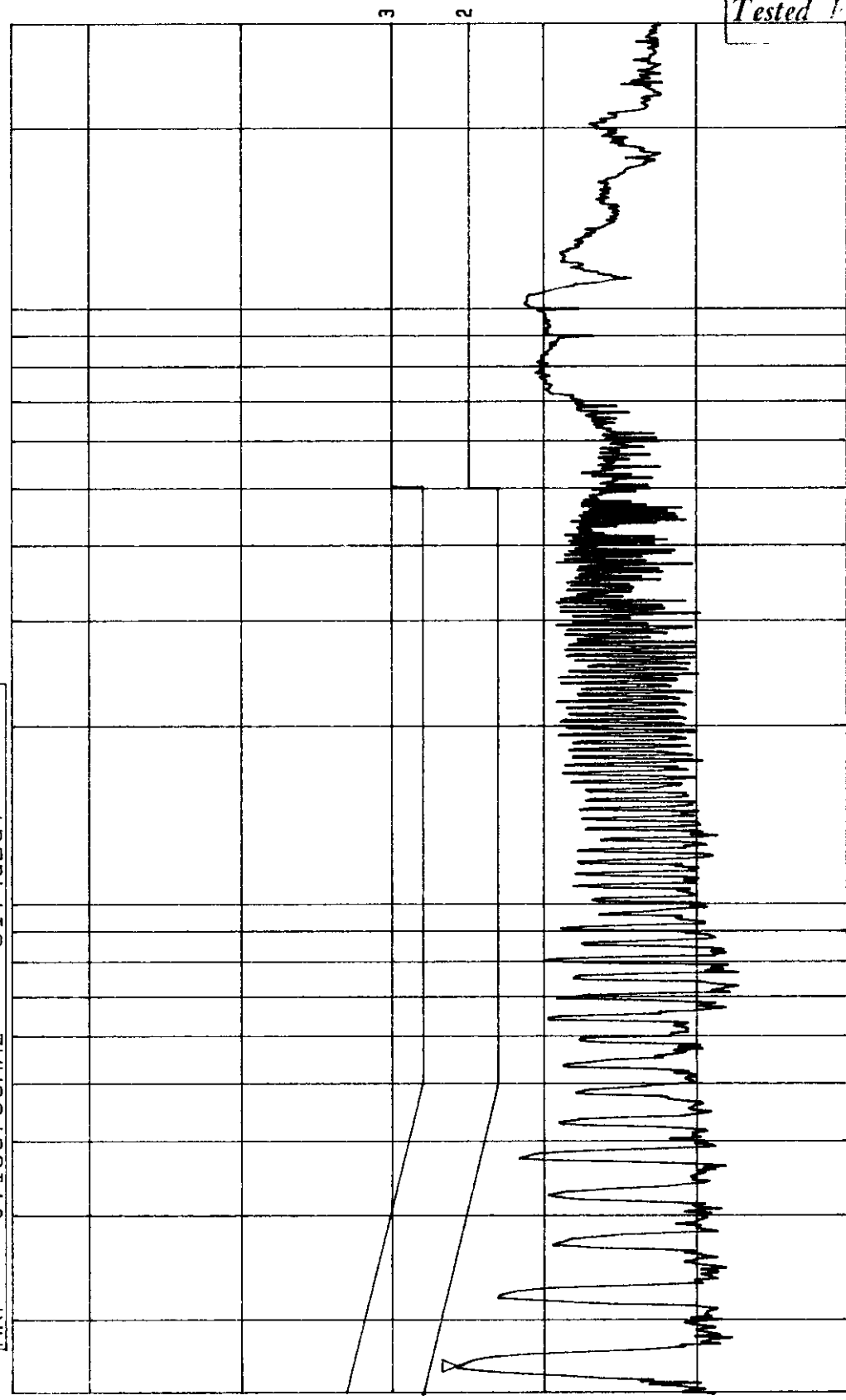
8

10

20

30

MHZ



Report No. F88072806

Page 9-1

Tested by Bruce Lu

--- Date 29.JUL.'99 Time 19:25:14
CISPR 22 CLASS B CONDUCTION TEST (PEAK VALUE)
MODEL: R-5 1024X768 85Hz/69K FULL SYSTEM

ADT CORP.

LISN: L



TEST DATA OF CONDUCTED EMISSION

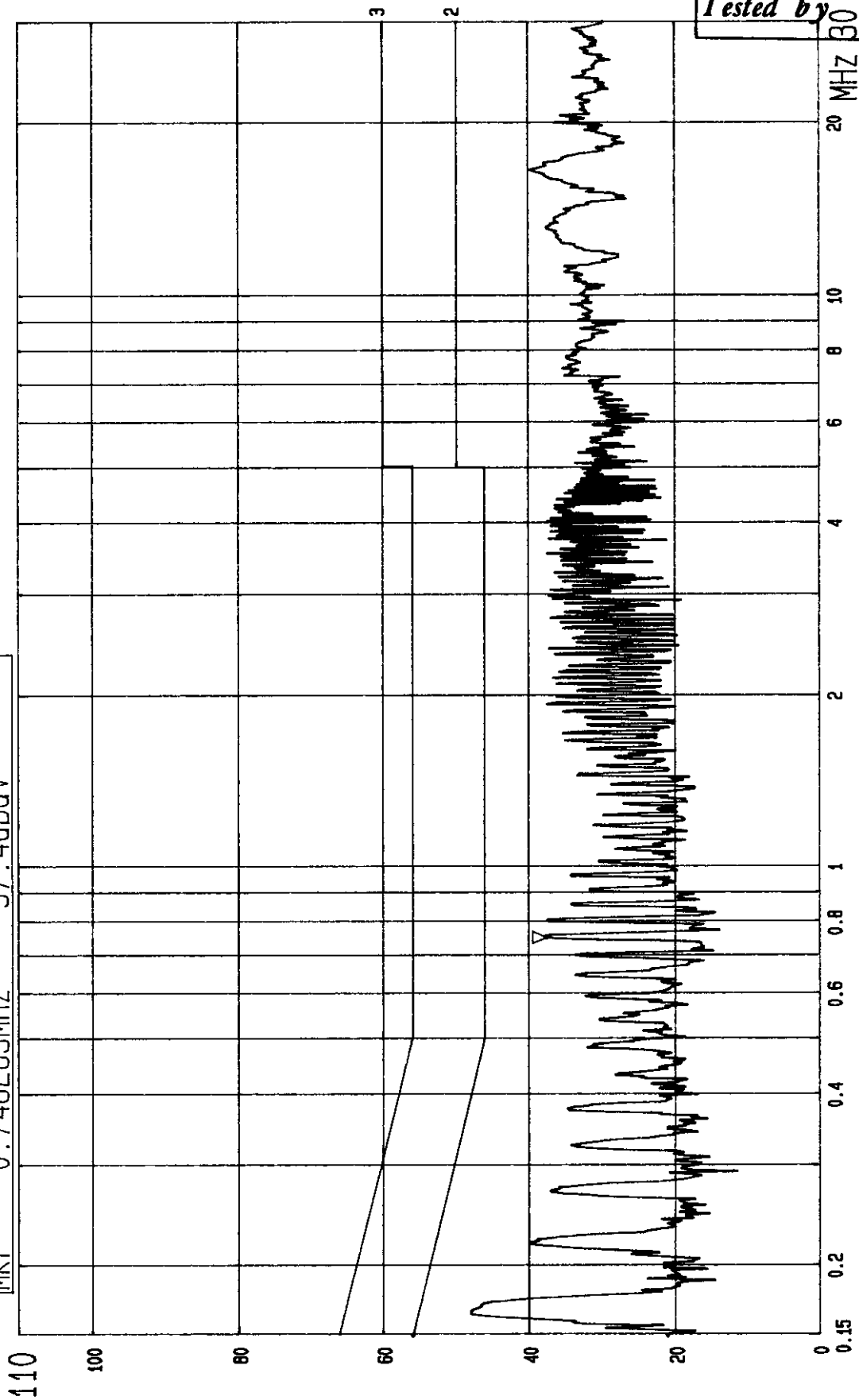
EUT: LCD MONITORMODEL: R-5MODE: 1024x768 (69 kHz)6 dB Bandwidth: 10 kHzPHASE: NEUTRAL (N)

Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.159	0.2	45.8	-	46.0	-	65.5	55.5	-19.5	-
0.372	0.2	31.8	-	32.0	-	58.5	48.5	-26.5	-
0.745	0.2	39.7	-	39.9	-	56.0	46.0	-16.1	-
3.733	0.3	35.5	-	35.8	-	56.0	46.0	-20.2	-
10.241	0.6	30.0	-	30.6	-	60.0	50.0	-29.4	-
16.373	0.8	36.6	-	37.4	-	60.0	50.0	-22.6	-

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

dBuV

Mkr 0.748285MHZ 37.4dBuV



Report No. F88072806

Page

10-1

Tested by

Bruce Lu

--- Date 29.JUL.'99 Time 19:22:34

CISPR 22 CLASS B CONDUCTION TEST (PEAK VALUE)

MODEL: R-5 1024X768 85Hz/69K FULL SYSTEM

ADT CORP.

LISN: N



4.4 TEST DATA OF RADIATED EMISSION

EUT: LCD MONITORMODEL: R-5MODE: 1024x768 (69 kHz)ANT. POLARITY: HorizontalDETECTOR FUNCTION: Quasi-peak6 dB BANDWIDTH: 120 kHzFREQUENCY RANGE: 30-1000 MHzMEASURED DISTANCE: 10 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
73.44	7.5	10.3	17.8	30.0	-12.2	400	108
110.04	11.9	4.5	16.4	30.0	-13.6	400	249
150.49	12.6	7.9	20.5	30.0	-9.5	400	359
168.78	11.6	9.1	20.7	30.0	-9.3	400	337
170.25	11.5	9.5	21.0	30.0	-9.0	400	206
191.28	10.7	9.0	19.7	30.0	-10.3	400	264
202.54	10.5	14.0	24.5	30.0	-5.5	314	358
216.03	11.5	6.1	17.6	30.0	-12.4	329	163
337.53	16.3	9.7	26.0	37.0	-11.0	226	191
511.12	21.4	11.3	32.7	37.0	-4.3	171	335

- REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB)
+ Reading value (dBuV).
 2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value



TEST DATA OF RADIATED EMISSION

EUT: LCD MONITORMODEL: R-5MODE: 1024x768 (69 kHz)ANT. POLARITY: VerticalDETECTOR FUNCTION: Quasi-peak6 dB BANDWIDTH: 120 kHzFREQUENCY RANGE: 30-1000 MHzMEASURED DISTANCE: 10 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
34.95	18.0	9.7	27.7	30.0	-2.3	100	358
45.92	12.7	14.0	26.7	30.0	-3.3	100	253
56.11	8.0	18.4	26.4	30.0	-3.6	100	261
66.00	6.5	14.0	20.5	30.0	-9.5	248	326
96.55	10.8	15.7	26.5	30.0	-3.5	100	73
132.62	13.0	14.0	27.0	30.0	-3.0	100	219
168.77	11.6	13.4	25.0	30.0	-5.0	100	7
170.25	11.5	16.1	27.6	30.0	-2.4	100	24
191.28	10.7	10.4	21.1	30.0	-8.9	100	7
202.52	10.5	15.3	25.8	30.0	-4.2	100	358
216.04	11.5	14.6	26.1	30.0	-3.9	100	305
222.04	12.0	15.3	27.3	30.0	-2.7	100	281
228.04	12.4	14.7	27.1	30.0	-2.9	100	298
298.41	15.3	14.2	29.5	37.0	-7.5	100	142
337.53	16.3	12.7	29.0	37.0	-8.0	100	258
511.11	21.4	12.2	33.6	37.0	-3.4	347	258

- REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (dBuV).
 2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value



6. APPENDIX - INFORMATION OF THE TESTING LABORATORY

Information of the testing laboratory

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

- | | |
|---------------|--------------------------------------|
| ● USA | FCC, UL, NVLAP |
| ● Germany | TUV Rheinland
TUV Product Service |
| ● Japan | VCCI |
| ● New Zealand | RFS |
| ● Norway | NEMKO, DNV |
| ● U.K. | INCHCAPE, SGS |
| ● R.O.C. | BSMI |

Enclosed please find some certificates of our laboratory obtained from approval agencies. If you have any comments, please feel free to contact us with the following:

Lin Kou EMC Lab.:
Tel: 886-2-26032180
Fax: 886-2-26022943

Hsin Chu EMC Lab:
Tel: 886-35-935343
Fax: 886-35-935342

Lin Kou Safety Lab.:
Tel: 886-2-26093195
Fax: 886-2-26093184

Design Center:
Tel: 886-2-26093195
Fax: 886-2-26093184

E-mail: service@mail.adt.com.tw
<http://www.adt.com.tw>