EMC

TEST REPORT

REPORT NO. : F89081112
MODEL NO. : C-986
DATE OF TEST : Aug. 16, 2000

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

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

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1. CERTIFICATION

Issue Date: Aug. 24, 2000

Product	:	19" COLOR MONITOR
Trade Name	:	RIC
Model No.	:	C-986
Applicant	:	ROYAL INFORMATION ELECTRONICS CO., LTD.
Standard	:	FCC Part 15, Subpart B, Class B CISPR 22: 1993+A1: 1995+A2: 1996, Class B ANSI C63.4-1992

We hereby certify that one sample of the designation has been tested in our facility on Aug. 16, 2000. 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 : Kent Chen , DATE: 8/24/2000
(Kent Chen)

CHECKED BY : Yemmy Soong , DATE: 8/24/2000
(Yemmy Soong)

APPROVED BY : Mike Su , DATE: 8/24/2000
(Mike Su)

ADVANCE DATA TECHNOLOGY CORPORATION

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	19" COLOR MONITOR
Model No.	:	C-986
Power Supply Type	:	Switching
Power Cord	:	Nonshielded (1.8m, 3-pin)
Data Cable	:	Shielded (1.8m)

Note: The EUT is a 19" COLOR MONITOR with resolution up to 1600 x 1200.

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.	Serial No.	FCC ID
1	PERSONAL COMPUTER	NTI	PI I-450T	P201140	FCC DoC APPROVED
2	PRINTER	HP	2225C+	2949S63865	DSI6XU2225
3	PS/2 KEYBOARD	FORWARD	FDA-104GA	FDKB8110127	F4ZDA-104G
4	MODEM	ACEEX	1414	980020506	IFAXDM1414
5	MOUSE	LOGITECH	M-S43	LZE00703197	DZL211106
6	VGA CARD	CARDEX	CD-GX2A44T	GHF11901	ICUVGA-GW710

No.	Signal cable description
1	NA
2	1.2m braid shielded wire, terminated with DB25 and Centronic connector via metallic frame, w/o core.
3	1.5 m foil shielded wire, terminated with PS/2 connector via metallic frame, w/o core.
4	1.2 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.
5	1.5 m foil shielded wire, terminated with PS2 connector via drain wire, w/o core.
6	NA

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

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 3/10 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	ESHS30	828109/007	July 6, 2001
ROHDE & SCHWARZ Artificial Mains Network	ESH3-Z5	839135/006	July 9, 2001
ROHDE & SCHWARZ 4-wire ISN	ENY41	835154/007	Apr. 26, 2001
EMCO-L.I.S.N.	3825/2	9204-1964	July 9, 2001
Shielded Room	Site 2	ADT-C02	NA

Note: 1. The measurement uncertainty is less than +/- 2.6dB, 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 6, 2001
HP Preamplifier	8447D	2944A08313	Sept. 19, 2000
HP Preamplifier	8347A	3307A01088	Aug. 30, 2000
HP Preamplifier	8449B	3008A01201	Dec. 14, 2000
ROHDE & SCHWARZ TEST RECEIVER	ESVS 30	841977/008	Oct. 5, 2000
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 23, 2000
ROHDE & SCHWARZ TEST RECEIVER	ESMI	839013/007 839379/002	Aug. 30, 2000
EMCO Double Ridged Guide Antenna	3115	9312-4192	March 29, 2001
CHASE BILOG Antenna	CBL6111A	1647	July 3, 2001
EMCO Turn Table	1016	1722	NA
EMCO Tower	1051	1825	NA
Open Field Test Site	Site 4	ADT-R04	June 9, 2001

Note: 1. The measurement uncertainty is less than +/- 3dB, 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) * dBuV/m	Class B (at 10m) * 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 - 2000 MHz (Radiated Emission)
Input Voltage	:	120 Vac, 60 Hz
Temperature	:	27 degree C
Humidity	:	75 %
Atmospheric Pressure	:	998 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -10.3 dB at 22.510 MHz Minimum passing margin of radiated emission: -3.4 dB at 56.18 MHz

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

- 1600x1200 (75 kHz)
- 1280x1024 (80 kHz)
- 640x480 (31.5 kHz)

The worst emission levels were found under 1280x1024 (80 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: **19" COLOR MONITOR** MODEL: **C-986**

MODE: **1280 x 1024 (80 kHz)**

6 dB Band Width: 10 kHz PHASE: LINE (L)

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.
0.160	0.2	52.6	-	52.8	-	65.4	55.4	-12.6	-
0.240	0.2	42.1	-	42.3	-	62.1	52.1	-19.8	-
0.720	0.2	34.4	-	34.6	-	56.3	46.3	-21.7	-
4.004	0.4	39.0	-	39.4	-	56.8	46.8	-17.4	-
6.886	0.5	33.0	-	33.5	-	60.0	50.0	-26.5	-
22.510	1.1	48.5	-	49.6	-	60.0	50.0	-10.4	-

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.

TEST DATA OF CONDUCTED EMISSION

EUT: **19" COLOR MONITOR** MODEL: **C-986**

MODE: **1280 x 1024 (80 kHz)**

6 dB Band Width: 10 kHz PHASE: NEUTRAL (N)

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.
0.160	0.2	51.5	-	51.7	-	65.4	55.4	-13.7	-
0.240	0.2	43.6	-	43.8	-	62.1	52.1	-18.3	-
0.720	0.2	28.2	-	28.4	-	56.3	46.3	-27.9	-
4.004	0.4	38.1	-	38.5	-	56.8	46.8	-18.3	-
6.886	0.4	32.8	-	33.2	-	60.0	50.0	-26.8	-
22.510	1.0	48.7	-	49.7	-	60.0	50.0	-10.3	-

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.

4.4 TEST DATA OF RADIATED EMISSION

EUT: **19" COLOR MONITOR** MODEL: **C-986**

MODE: **1280 x 1024 (80 kHz)** ANT. POLARITY: Horizontal

DETECTOR FUNCTION AND BANDWIDTH: Quasi peak, 120 kHz (30-1000 MHz)
Peak, 1 MHz (1000 MHz-2000 MHz)

FREQUENCY RANGE: 30-1000 MHz MEASURED DISTANCE: 10 M

FREQUENCY RANGE: 1000-2000 MHz MEASURED DISTANCE: 3 M

Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
85.43	10.0	8.5	18.5	30.0	-11.5	400	106
112.15	12.6	9.9	22.5	30.0	-7.5	400	264
157.16	11.8	12.1	23.9	30.0	-6.1	400	131
168.24	11.1	14.0	25.1	30.0	-4.9	400	244
179.40	10.7	15.2	25.9	30.0	-4.1	400	98
190.77	10.6	14.5	25.1	30.0	-4.9	400	72
201.78	10.6	13.3	23.9	30.0	-6.1	400	257
224.48	12.2	9.0	21.2	30.0	-8.8	400	108
235.61	13.0	14.7	27.7	37.0	-9.3	400	239
246.66	13.8	10.9	24.7	37.0	-12.3	394	64

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: **19" COLOR MONITOR** MODEL: **C-986**

MODE: **1280 x 1024 (80 kHz)** ANT. POLARITY: Vertical

DETECTOR FUNCTION AND BANDWIDTH: Quasi peak, 120 kHz (30-1000 MHz)
Peak, 1 MHz (1000 MHz-2000 MHz)

FREQUENCY RANGE: 30-1000 MHz MEASURED DISTANCE: 10 M

FREQUENCY RANGE: 1000-2000 MHz MEASURED DISTANCE: 3 M

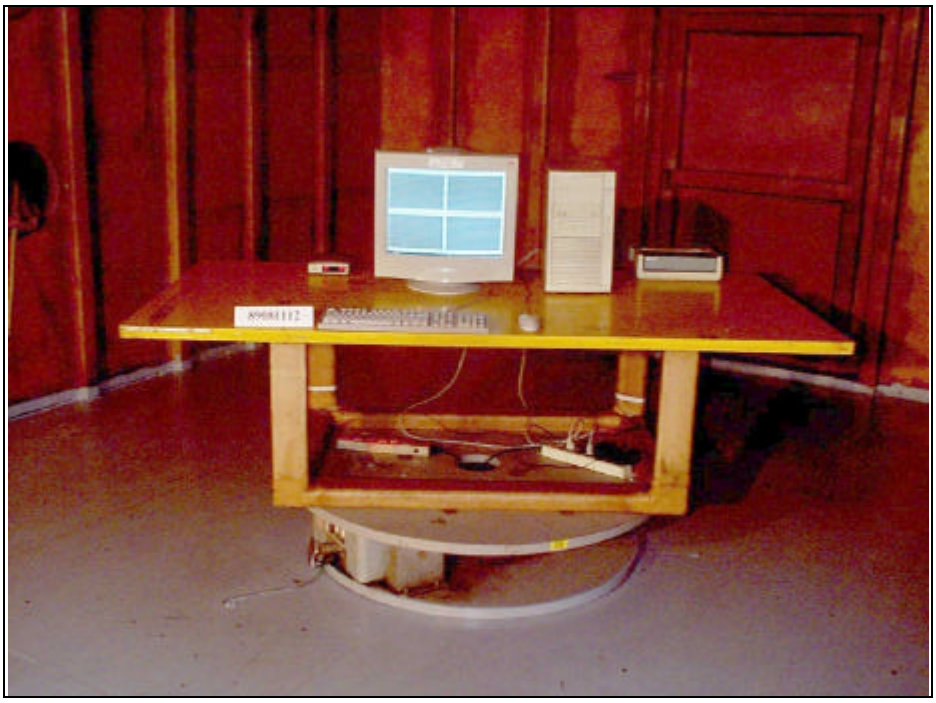
Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
51.92	9.4	15.0	24.4	30.0	-5.6	100	340
56.18	8.0	18.6	26.6	30.0	-3.4	100	73
76.00	8.4	17.9	26.3	30.0	-3.7	100	343
112.21	12.6	12.0	24.6	30.0	-5.4	100	208
140.67	13.6	10.9	24.5	30.0	-5.5	100	26
157.13	11.8	12.2	24.0	30.0	-6.0	100	131
168.30	11.1	12.8	23.9	30.0	-6.1	100	39
213.01	11.4	13.3	24.7	30.0	-5.3	100	264
235.58	13.0	14.8	27.8	37.0	-9.2	100	351
246.63	13.8	12.3	26.1	37.0	-10.9	100	334

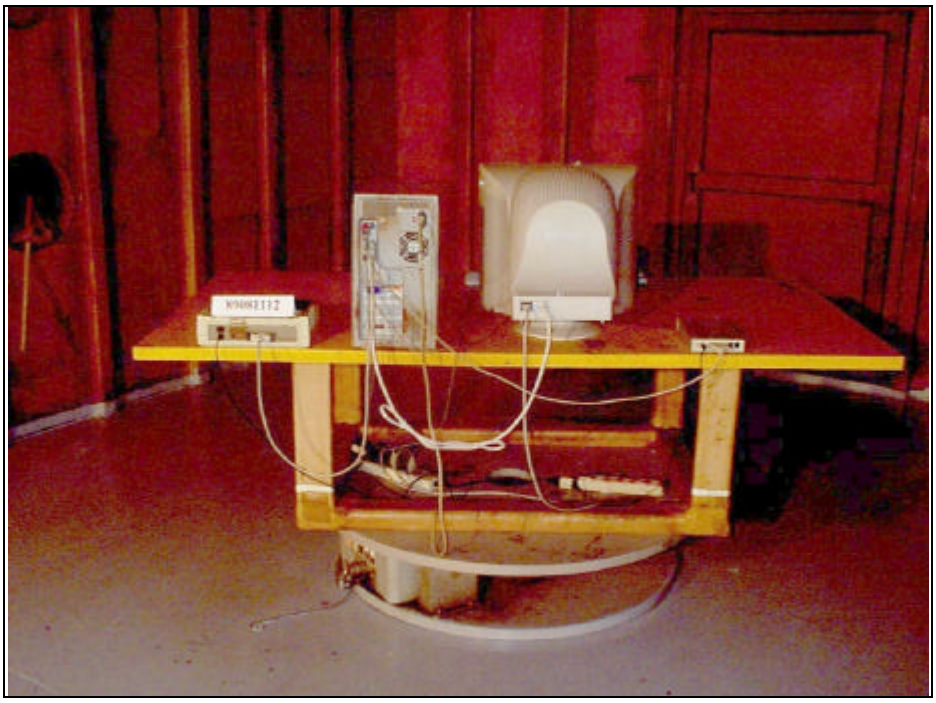
REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB) + Reading value (dBuV).
2. Correction Factor (dB) = Ant. Factor (dB)+Cable loss (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value

5. PHOTOGRAPHS OF THE TEST CONFIGURATION WITH MINIMUM MARGIN

CONDUCTED EMISSION TEST

RADIATED EMISSION TEST





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
• 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