FCC ID: HSUTRLC-787

EMC

TEST REPORT

REPORT NO. : F89062207
MODEL NO. : C-787, C-771, 10 30 45, 10 30 25
DATE OF TEST : July 6, 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

Accredited Laboratory

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TAIPEI, TAIWAN, R.O.C.

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1. CERTIFICATION

Issue Date: July 14, 2000

Product	:	17" COLOR MONITOR
Trade Name	:	RIC, Belinea
Model No.	:	C-787, C-771, 10 30 45, 10 30 25
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 6, 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 : Alan Chang , DATE: 7/14/2000
(Alan Chang)

CHECKED BY : Sharon Hsiung , DATE: 7/14/2000
(Sharon Hsiung)

APPROVED BY : Mike Su , DATE: 7/14/2000
(Mike Su)

ADVANCE DATA TECHNOLOGY CORPORATION

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	17” COLOR MONITOR
Model No.	:	C-787, C-771, 10 30 45, 10 30 25
Power Supply Type	:	Switching
Power Cord	:	Nonshielded (1.8m)
Data Cable	:	Shielded (1.8m)

Note: The EUT is a 17” COLOR MONITOR with resolution up to 1280 x 1024.

The EUT has the four model names which differ in the following:

MODEL	BRAND	HIGHEST HORIZONTAL FREQ.
C-787	RIC	80.4 kHz
C-771	RIC	69 kHz
10 30 45	BELINEA	80.4 kHz
10 30 25	BELINEA	69 kHz

From the above models, model: C-787 and C-771 were chosen as representative models for the test.

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	NTI	PII-333T	FCC DoC Approved	Nonshielded Power (1.8m)
2	KEYBOARD	FORWARD	FDA-104GA	F4ZDA-104G	Shielded signal (1.4m)
3	PRINTER	HP	2225C+	DSI6XU2225	Shielded Signal (1.2m) Nonshielded Power (2.2m)
4	MODEM	ACEEX	1414	IFAXDM1414	Shielded signal (1.2m) Nonshielded Power (2.2m)
5	MOUSE	LOGITECH	M-S43	DZL211106	Shielded signal (1.5m)
6	VGA CARD	GAINWARD	CD-GX2A44T	ICUVGA-GW710	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 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	ESH3	893495/006	July 7, 2000
ROHDE & SCHWARZ Spectrum Monitor	EZM	893787/013	July 8, 2000
ROHDE & SCHWARZ Artificial Mains Network	ESH2-Z5	892107/003	July 13, 2000
EMCO L.I.S.N.	3825/2	9504-2359	July 13, 2000
Shielded Room	Site 3	ADT-C03	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, 2000
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) (for model: C-787) 30 - 1000 MHz (Radiated Emission) (for model: C-771)
Input Voltage	:	120 Vac, 60 Hz
Temperature	:	29 ℃
Humidity	:	65 %
Atmospheric Pressure	:	989 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -4.4 dB at 0.321 MHz Minimum passing margin of radiated emission: -2.4 dB at 109.25 MHz

Note: The EUT has two model no. C-787 & C-771 which were pre-tested under the following resolution & horizontal speed mode:

C-787:
- 1280x1024(80.4 kHz)
- 1024x768 (69.0 kHz)
- 640 x 480 (31.5 kHz)

C-771:
- 1280x1024(64.0 kHz)
- 1024x768 (69.0 kHz)
- 680 x 480 (31.5 kHz)

The worst emission levels were found under 1280 x 1024 (80.4 kHz) for model C-787 & 1280 x 1024 (64.0 kHz) for model C-771 and therefore test data of these two modes were 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 (A)

EUT: **17" COLOR MONITOR** MODEL: **C-787**

MODE: **1280 x 1024 (80.4 kHz)** dB Bandwidth: 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.
0.157	0.2	50.9	-	51.1	-	65.6	55.6	-14.5	-
0.321	0.2	51.8	41.7	52.0	41.9	59.7	49.7	-7.7	-7.8
0.721	0.3	31.9	-	32.2	-	56.0	46.0	-23.8	-
4.232	0.5	35.4	-	35.9	-	56.0	46.0	-20.1	-
9.879	0.9	35.7	-	36.6	-	60.0	50.0	-23.4	-
22.485	1.4	46.3	-	47.7	-	60.0	50.0	-12.3	-

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.

TEST DATA OF CONDUCTED EMISSION (A)

EUT: **17" COLOR MONITOR** MODEL: **C-787**

MODE: **1280 x 1024 (80.4 kHz)** 6 dB Bandwidth: 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.
0.157	0.2	53.2	-	53.4	-	65.6	55.6	-12.2	-
0.321	0.2	52.5	45.1	52.7	45.3	59.7	49.7	-7.0	-4.4
0.721	0.3	34.1	-	34.4	-	56.0	46.0	-21.6	-
4.232	0.4	38.3	-	38.7	-	56.0	46.0	-17.3	-
9.879	0.6	36.4	-	37.0	-	60.0	50.0	-23.0	-
22.485	1.1	46.2	-	47.3	-	60.0	50.0	-12.7	-

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 CONDUCTED EMISSION (B)

EUT: **17" COLOR MONITOR** MODEL: **C-771**

MODE: **1280 x 1024 (64.0 kHz)** dB Bandwidth: 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.
0.192	0.2	43.1	-	43.3	-	63.9	53.9	-20.6	-
0.321	0.2	36.6	-	36.8	-	59.7	49.7	-22.9	-
0.771	0.3	29.4	-	29.7	-	56.0	46.0	-26.3	-
3.789	0.5	30.7	-	31.2	-	56.0	46.0	-24.8	-
10.406	0.9	34.2	-	35.1	-	60.0	50.0	-24.9	-
23.953	1.4	42.9	-	44.3	-	60.0	50.0	-15.7	-

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 (B)

EUT: **17" COLOR MONITOR** MODEL: **C-771**

MODE: **1280 x 1024 (64.0 kHz)** 6 dB Bandwidth: 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.
0.192	0.2	46.8	-	47.0	-	63.9	53.9	-16.9	-
0.321	0.2	39.2	-	39.4	-	59.7	49.7	-20.3	-
0.771	0.3	30.6	-	30.9	-	56.0	46.0	-25.1	-
3.789	0.4	32.5	-	32.9	-	56.0	46.0	-23.1	-
10.406	0.6	34.6	-	35.2	-	60.0	50.0	-24.8	-
23.953	1.1	42.1	-	43.2	-	60.0	50.0	-16.8	-

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.

4.5 TEST DATA OF RADIATED EMISSION (A)

EUT: **17" COLOR MONITOR** MODEL: **C-787**

MODE: **1280 x 1024 (80.4 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)
56.19	8.2	16.2	24.4	30.0	-5.6	400	2
86.22	9.9	14.0	23.9	30.0	-6.1	346	297
112.14	12.4	8.8	21.2	30.0	-8.8	400	81
168.09	12.3	11.7	24.0	30.0	-6.0	400	278
179.31	11.9	11.3	23.2	30.0	-6.8	400	76
190.69	11.5	11.4	22.9	30.0	-7.1	400	303
201.89	11.3	12.4	23.7	30.0	-6.3	400	41
212.99	12.1	13.8	25.9	30.0	-4.1	400	277
224.55	13.0	12.2	25.2	30.0	-4.8	400	94
235.48	13.9	16.1	30.0	37.0	-7.0	280	291
246.65	14.8	16.8	31.6	37.0	-5.4	282	117
269.14	15.6	17.3	32.9	37.0	-4.1	275	87

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 (A)

EUT: **17" COLOR MONITOR** MODEL: **C-787**

MODE: **1280 x 1024 (80.4 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)
56.12	8.3	16.9	25.2	30.0	-4.8	183	22
78.05	8.9	16.4	25.3	30.0	-4.7	183	82
83.80	9.7	15.8	25.5	30.0	-4.5	183	114
109.03	12.2	13.7	25.9	30.0	-4.1	100	2
112.09	12.4	13.9	26.3	30.0	-3.7	100	351
122.03	13.1	12.1	25.2	30.0	-4.8	100	358
131.98	13.6	13.4	27.0	30.0	-3.0	100	2
168.14	12.3	13.1	25.4	30.0	-4.6	100	140
179.37	11.9	11.4	23.3	30.0	-6.7	100	354
201.83	11.2	13.0	24.2	30.0	-5.8	100	54
212.99	12.1	14.9	27.0	30.0	-3.0	100	61
235.49	13.9	18.2	32.1	37.0	-4.9	100	10
246.45	14.8	15.8	30.6	37.0	-6.4	100	312

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

4.6 TEST DATA OF RADIATED EMISSION (B)

EUT: **17" COLOR MONITOR** MODEL: **C-771**

MODE: **1280 x 1024 (64.0 kHz)** ANT. POLARITY: Horizontal

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz MEASURED 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)
70.42	7.0	14.9	21.9	30.0	-8.1	390	293
79.52	9.3	15.1	24.4	30.0	-5.6	400	358
123.70	13.2	12.6	25.8	30.0	-4.2	400	358
153.58	13.0	7.0	20.0	30.0	-10.0	400	52
162.77	12.5	13.2	25.7	30.0	-4.3	400	289
171.92	12.2	12.4	24.6	30.0	-5.4	400	249
180.68	11.9	9.4	21.3	30.0	-8.7	400	97
189.69	11.5	10.0	21.5	30.0	-8.5	343	95
198.68	11.1	10.1	21.2	30.0	-8.8	400	94
216.80	12.4	12.5	24.9	30.0	-5.1	400	272

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 (B)

EUT: **17" COLOR MONITOR** MODEL: **C-771**

MODE: **1280 x 1024 (64.0 kHz)** ANT. POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz MEASURED 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)
43.55	13.9	9.9	23.8	30.0	-6.2	100	210
78.50	9.1	17.8	26.9	30.0	-3.1	240	9
109.25	12.2	15.4	27.6	30.0	-2.4	100	2
125.94	13.3	12.1	25.4	30.0	-4.6	100	157
144.44	13.6	9.8	23.4	30.0	-6.6	100	96
153.54	13.0	12.1	25.1	30.0	-4.9	100	346
162.78	12.5	13.5	26.0	30.0	-4.0	100	9
171.89	12.2	13.9	26.1	30.0	-3.9	100	2
180.59	11.9	8.3	20.2	30.0	-9.8	100	5
216.74	12.4	9.7	22.1	30.0	-7.9	100	135

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:

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