

**ELECTROMAGNETIC EMISSIONS
TEST REPORT
FCC CLASS B COMPLIANCE**

ON

**TATUNG CO.
COLOR MONITOR
MODEL C7TZ**

**REPORT PREPARED BY
TATUNG CO.
22 CHUNGSHAN NORTH RD., 3RD SEC.,
TAIPEI, TAIWAN, R. O. C.
TEL: (02)2592-5252**

**REPORT NUMBER : TTEMC - 98019
DATE OF TEST : Aug. 1, 1998
DATE OF REPORT : Aug. 1, 1998**

TEST REPORT CERTIFICATION

APPLICANT : TATUNG CO.

MANUFACTURER : TATUNG CO.

EUT DESCRIPTION : Color Monitor

(A) MODEL NO. : C7TZ

(B) SERIAL NO. : — — —

(C) POWER SUPPLY : 120 V AC 60 Hz

MEASUREMENT PROCEDURE USED :

FCC RULES AND REGULATIONS PART 15 SUBPART B CLASS

B JUNE 1989 AND ANSI C63.4 / 1992

The device described above was tested by TATUNG CO. to determine the maximum emission levels emanating from the device.

The maximum emission levels were compared to the FCC PART 15B Class B limits both radiated and conducted emissions.

The measurement results are contained in this test report and TATUNG CO. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the FCC official limits.

Date of test : Aug. 1 , 1998

Prepared by : (Wu Wan Ling) Wu Wan Ling

Test engineer : (Chen Yow Chang) Chen Yow - Chang

Approved & Authorized Signer : (C. Y. CHANG) C.Y. Chang

1. GENERAL INFORMATION

1.1 Description of EUT

Description	Color Monitor
Model Number	C7TZ
Manufacturer	Tatung Co. 22 Chungshan N. Rd., 3rd, Sec., Taipei, Taiwan 10451, R.O.C.
Applicant	Tatung Co.
FCC ID	BJMC7TZ
Date of Test	Aug.1 ,1998
Signal Cable	Shielded,undetachable
Power Cord	Shielded,detachable

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

1024 × 768 mode (69KHz, 1024×768 Noninterlaced)

800 × 600 mode (48KHz)

640 × 480 mode (31.5KHz)

1.2 Description of Configuration

1.2.1 Host Personal Computer

Model Number	VL5/166 SERIES 5MT
Serial Number	SG72402090
Manufacturer	HP
Power Supply Type	Switching
Power Cord	Shielded,detachable

1.2.2 MOUSE

Model Number	M-S34
Serial Number	LZA72359677
FCC ID	DZL211029
Manufacturer	HP
Data Cable	Shielded, undetachable

1.2.3 KEYBOARD

Model Number	EO3633YLTW3-C
FCC ID	CIGE03633
Manufacturer	HP
Data Cable	Shielded, undetachable

1.2.4 PRINTER

Model Number	EN3211
Serial Number	508A0086962
FCC ID	BDB9F2EN3211
Manufacturer	OK IDATA
Power Supply	Within Mother Board
Power Cord	Unshielded, undetachable
Data Cable	Shielded, detachable

1.2.5 MODEM

Model Number	1200AT
Serial Number	AT122290
FCC ID	EF56A5 1200AT
Manufacturer	TEAM TECHNOLOGY, INC.
Power Supply Type	Linear
Data Cable	Shielded, detachable
Power Cord	Unshielded

1.2.6 VGA DISPLAY CARD

Model Number	DSV3365E
Serial Number	E601404314
Power Supply Type	DC
FCC ID	LUT-DSV3365

1.3 Description of Test Site

Site description	May 8, 1990 On file with Federal Communication Commission FCC Engineering Laboratory 7435 Oakland Mills Road Columbia, MD 21046
Name of Firm	TATUNG CO.
Site Location	393, SEC. 1, Chung Cheng Rd., San-Hsia County, Taipei, Taiwan R.O.C.

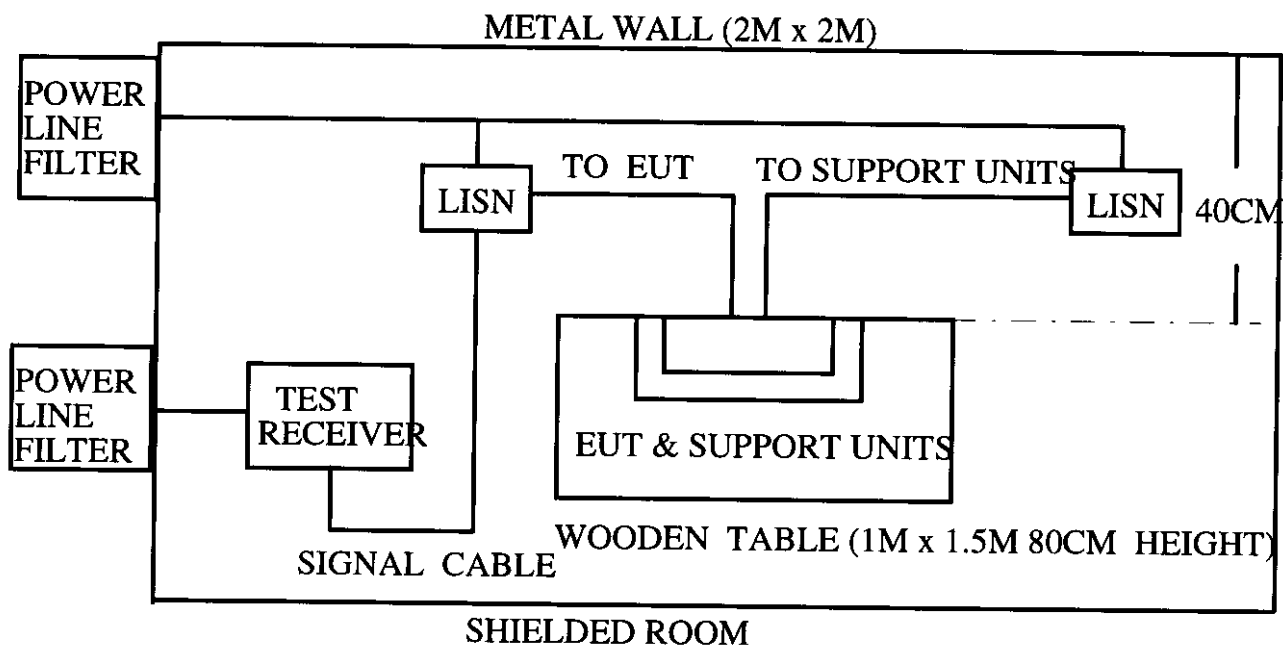
2. POWER LINE CONDUCTED TEST

2.1 Test Equipments

The following test equipments are used during the power line conducted tests :

Equipments Type & Manufacturer	Model No.	Date of Calibration
Spectrum Analyzer (HP)	8568B	September,1997
Quasi-Peak Adapter (HP)	85650A	September,1997
L.I.S.N. (EMCO)	3825/2	September,1997
Printer (HP)	2227B	N/A
Plotter (HP)	7440A	September,1997
Rohde & Schwarz Test Receiver	ESH3	September,1997
Shielded Room (7.2 m × 5.4 m × 2.45 m)	— — —	N/A

2.2 Block Diagram of Test Setup



2.3 CLASS B Conducted Powerline Emission Limit

Frequency MHz	Maximum RF Line Voltage	
	μV	dB μV
0.45 – 30	250	48

REMARKS : RF LINE VOLTAGE (db μV) = 20 log RF LINE VOLTAGE (μV)

2.4 EUT Configuration on Measurement

The equipments in Item 1.2 are installed on RF LINE VOLTAGE measurement to meet the Commission requirement and operating in a manner which tends to maximize its emission characteristics in a normal application.

2.5 Operating Condition of EUT

2.5.1 Setup the EUT and peripheral devices as shown on 2.2.

2.5.2 Turn on the power of all equipments.

2.5.3 Set the VGA display card on 1024×768 mode (69KHz).

2.5.4 PC reads test program from hard disk and run it.

2.5.5 PC sends "H" character to monitor and the screen will display and fill with "H" pattern.

2.5.6 PC sends "H" character to printer, the printer will print "H" pattern on paper.

2.5.7 PC sends "H" character to modem.

2.5.8 Repeat the above procedures from 2.5.4 to 2.5.7.

2.5.9 Change the mode of VGA display card to 800×600 mode (48KHz) and repeat steps 2.5.4 to 2.5.8.

2.5.10 Change the mode of VGA display card on Standard VGA mode (31.5KHz) and repeat steps 2.5.4 to 2.5.8.

2.6 Test Procedure

The test is performed in a shielded room. The EUT is placed on a wooden table which is 80cm height at a distance of 40cm in front of an earthed metal wall of the shielded room.

The EUT is connected to the power mains through a line impedance stabilization network(L.I.S.N.). This provides a 50 ohm coupling impedance for the measuring equipment. Both sides of A. C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables must be changed according to ANSI C 63.4 / 1992 on conducted measurement.

The bandwidth of the Quasi-Peak Adapter (HP 85650A) is set at 10 kHz.

The frequency range from 450 kHz to 30 MHz is checked.

2.7.1 Line Conducted RF Voltage Measurement Results

The frequency spectrum from 0.45 MHz to 30 MHz is investigated.
 All emissions not reported below are too low against the FCC Class B limit.

Date of Test : Aug. 1, 1998

Temperature : 35 °C

EUT : Color Monitor : C7TZ

Humidity : 70 %

Working Frequency : 31.5KHz

Display Pattern: 640×480

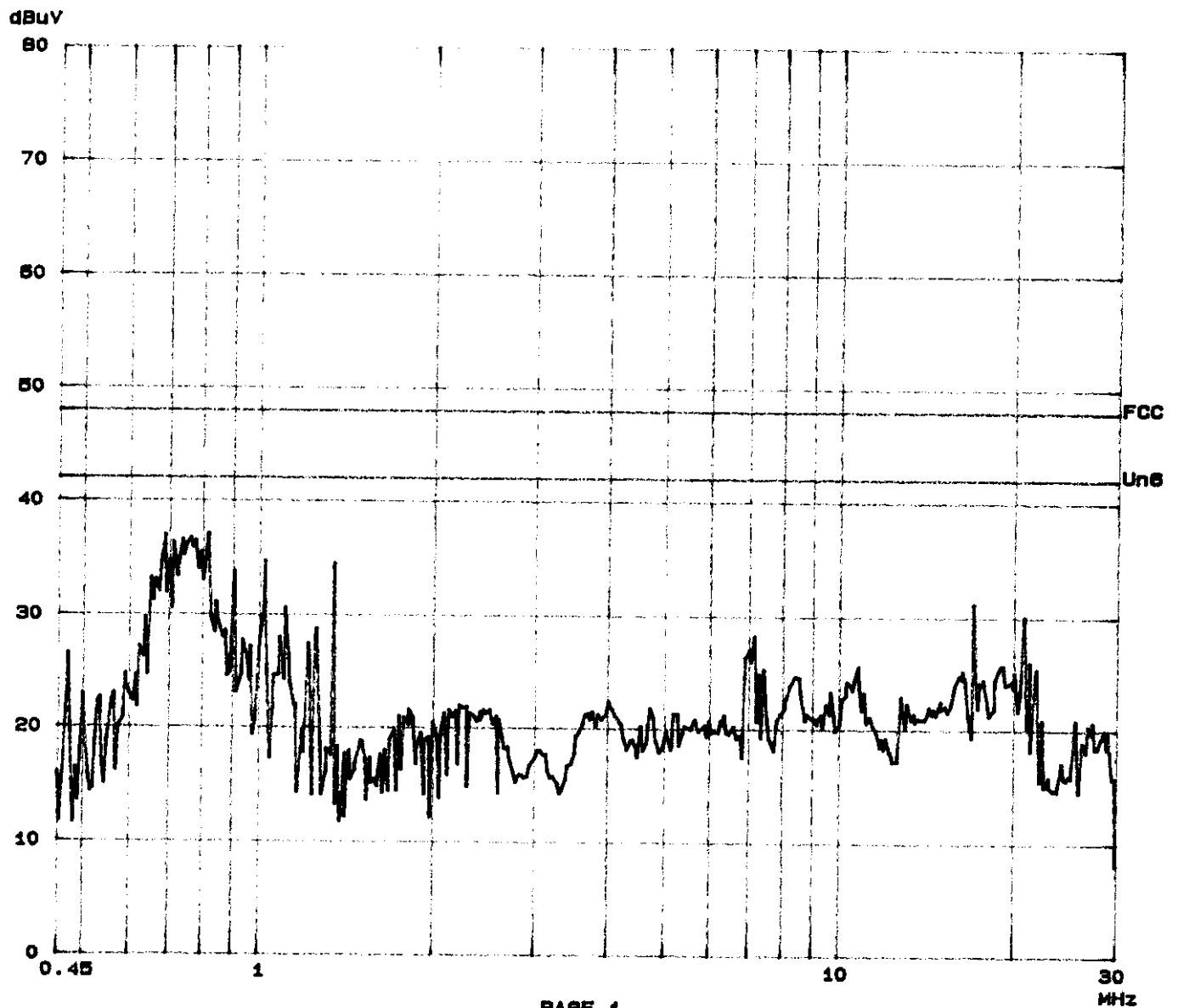
Frequency (MHz)	Reading (dB μ V)		Limits (dB μ V)
	One End & GRD	The Other End & GRD	
	(dB μ V)	(dB μ V)	
0.68	31.2		48
0.81		35.5	48
1.02	33.1	32.3	48
1.26	30.2	30.3	48
8.08	21.4	21.2	48
17.02	33.3	33.3	48
20.05	28.8	28.8	48

REMARKS : 1.All readings are Quasi-peak values.

TATUNG EMC LAB.
FCC CLASS B

01. Aug 98 08:58

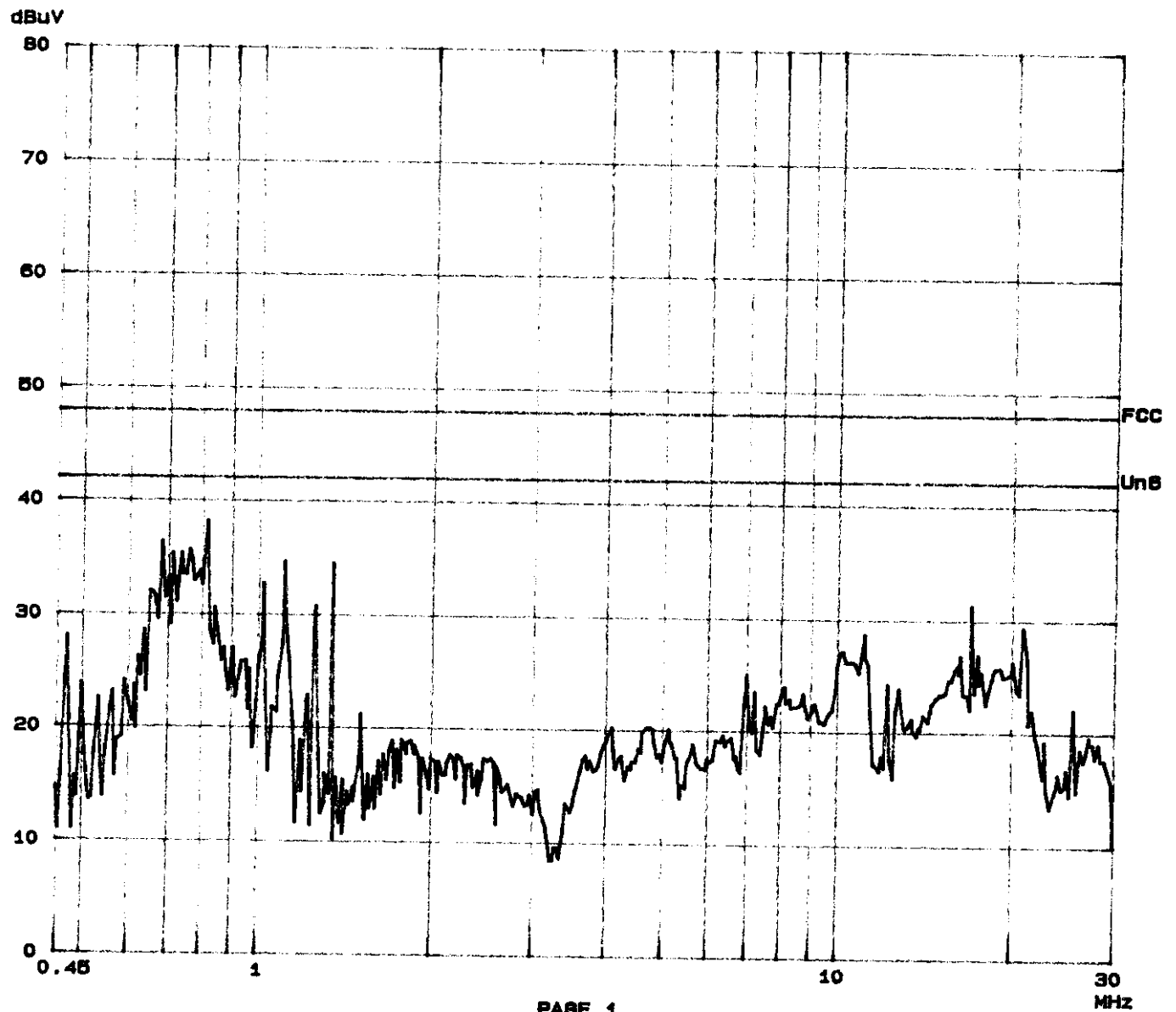
EUT: C7TZRPP-E07
Manuf: TATUNG
Op Cond: L1
Operator: Y C. CHEN
Test Spec: 540x480 31.5KHz



TATUNG EMC LAB.
FCC CLASS B

01. Aug 98 08:05

EUT: C7T2RPP-E07
Manuf: TATUNG
Op Cond: N
Operator: Y C. CHEN
Test Spec: 540x480 31.5KHz



2.7.2 Line Conducted RF Voltage Measurement Results

The frequency spectrum from 0.45 MHz to 30 MHz is investigated.
All emissions not reported below are too low against the FCC Class B limit.

Date of Test : Aug. 1, 1998

Temperature : 35 °C

EUT : Color Monitor : C7TZ

Humidity : 70 %

Working Frequency : 48KHz

Display Pattern : 800 × 600

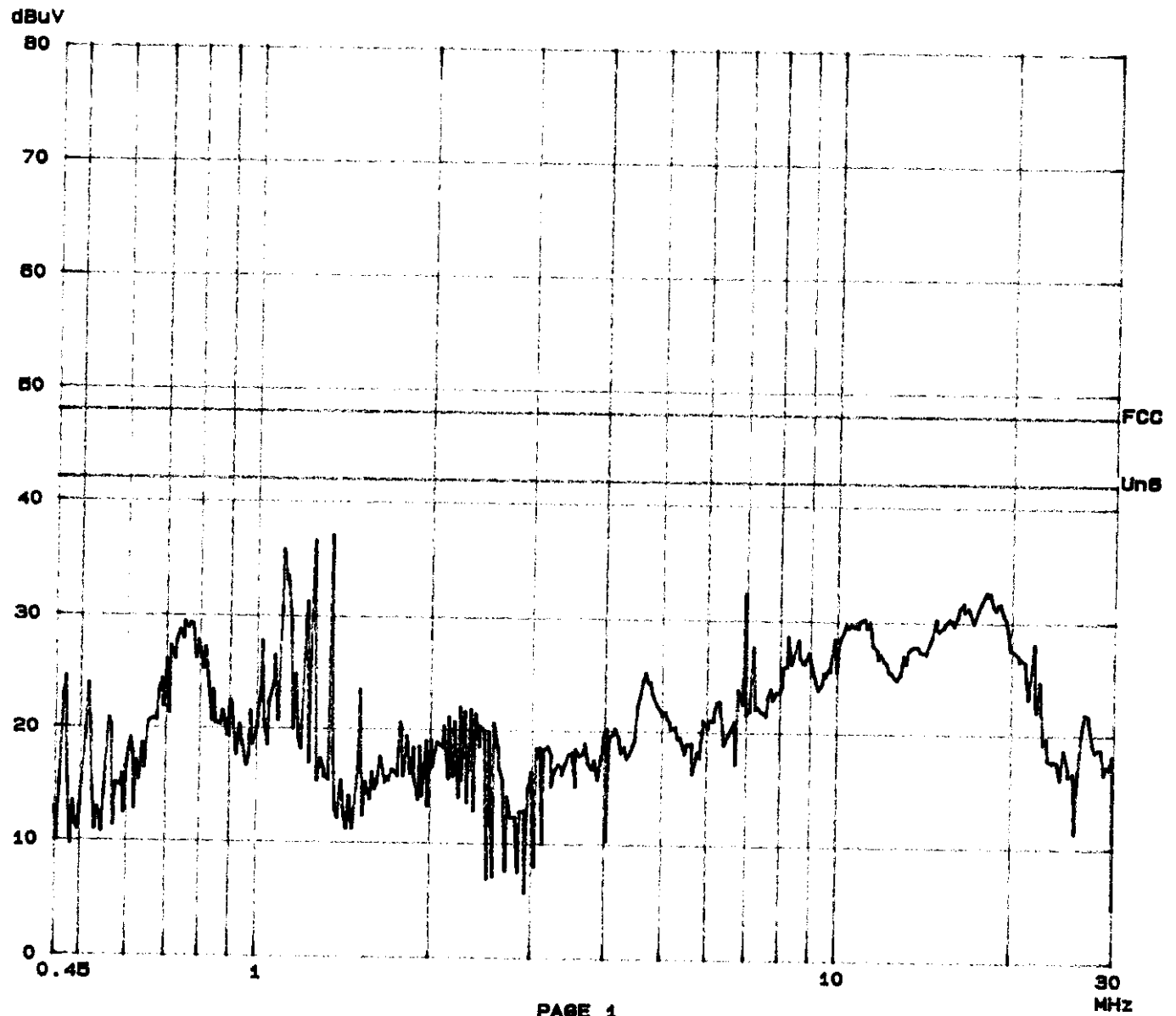
Frequency (MHz)	Reading (dB μ V)		Limits (dB μ V)
	One End & GRD	The Other End & GRD	
	(dB μ V)	(dB μ V)	
0.74	31.8		48
0.81		35.1	48
1.02	34.1	32.8	48
4.69	24.8	31.0	48
10.55	27.1	24.8	48
17.02	34.6	27.9	48
25.53	26.0	34.2	48

REMARKS : 1.All readings are Quasi-peak values.

TATUNG EMC LAB.
FCC CLASS B

01. Aug 98 10:20

EUT: C7TZRPP-E07
Manuf: TATUNG
Op Cond: L1
Operator: Y C. CHEN
Test Spec: 800x600 48KHz



2.7.3 Line Conducted RF Voltage Measurement Results

The frequency spectrum from 0.45 MHz to 30 MHz is investigated.
All emissions not reported below are too low against the FCC Class B limit.

Date of Test : Aug. 1, 1998

Temperature : 35 °C

EUT : Color Monitor : C7TZ

Humidity : 70 %

Working Frequency : 69KHz

Display Pattern : 1024 × 768
(Noninterlaced)

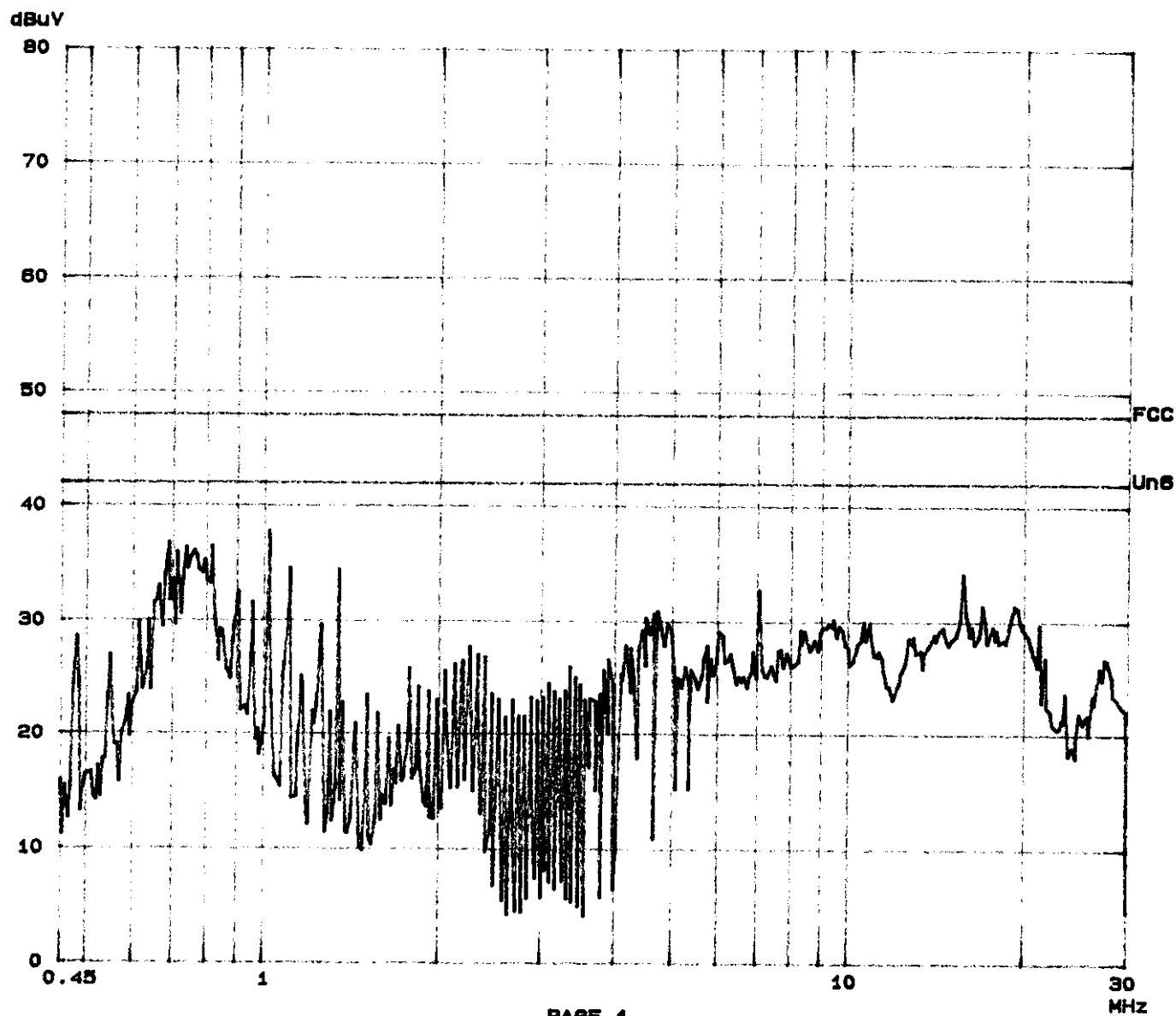
Frequency (MHz)	Reading (dB μ V)		Limits (dB μ V)
	One End & GRD	The Other End & GRD	
	(dB μ V)	(dB μ V)	
0.81	35.0		48
0.54		30.6	48
1.02	34.5	33.7	48
4.74	30.5	29.4	48
25.53	23.3	27.9	48
10.85	30.6	33.0	48
18.89	37.9	37.5	48
28.37	29.5	29.1	48

REMARKS: 1.ALL readings are Quasi-peak values.

TATUNG EMC LAB.
FCC CLASS B

01. Aug 98 08:47

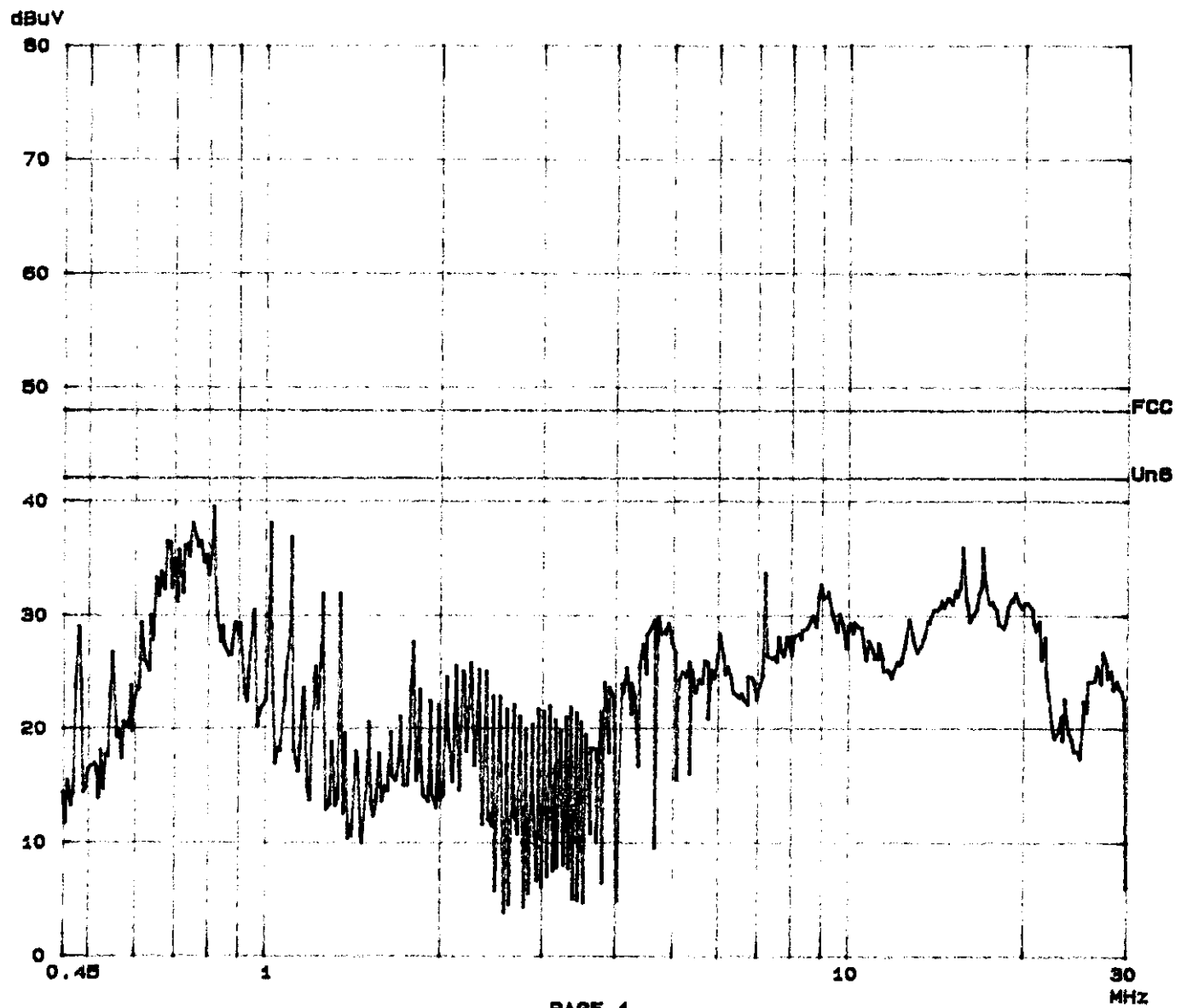
EUT: C7TZRPP-E07
Manuf: TATUNG
Op Cond: L1
Operator: Y C. CHEN
Test Spec: 1024x768 69KHz



TATUNG EMC LAB.
FCC CLASS B

01. Aug 98 08:37

EUT: C7TZRPP-E07
Manuf: TATUNG
Op Cond: N
Operator: Y C. CHEN
Test Spec: 1024x768 89KHz



3. RADIATED EMISSION TEST

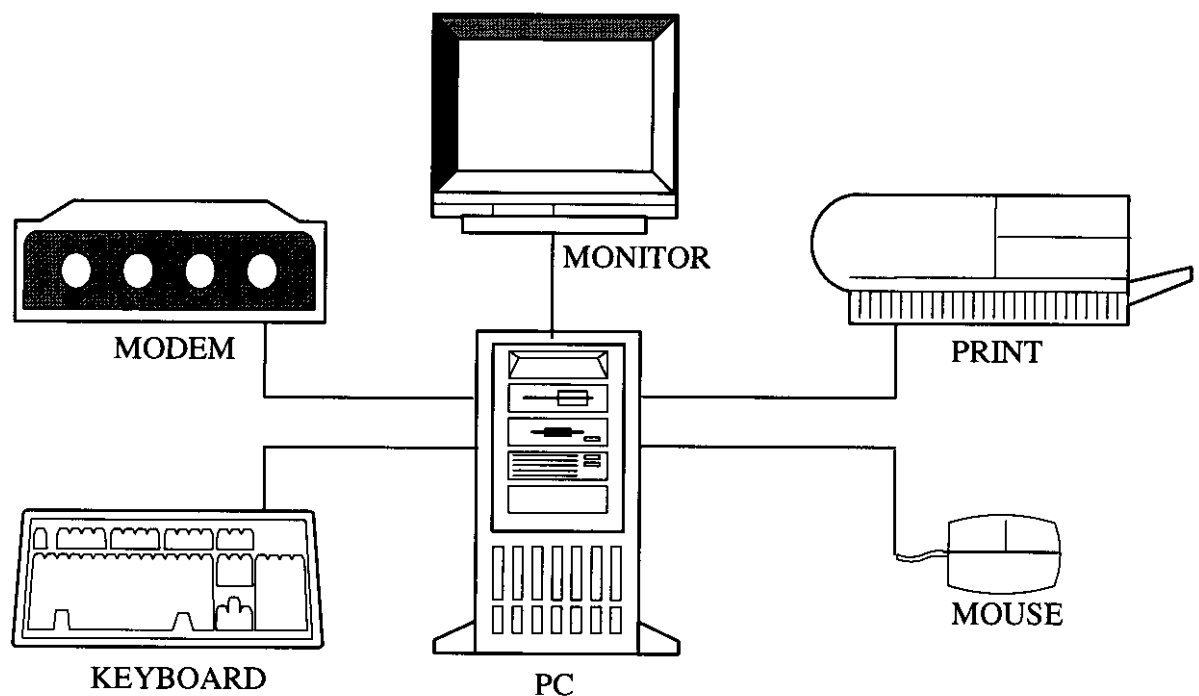
3.1 Test Equipment

The following test equipments are used during the radiated emission tests :

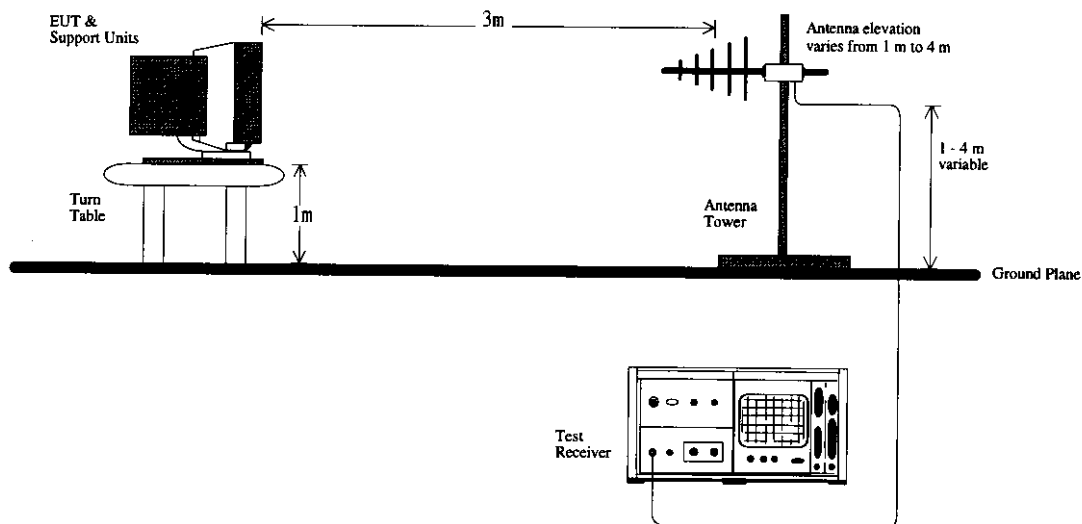
Equipments Type & Manufacturer	Model No.	Date of Calibration
Spectrum Analyzer (HP)	8568B	September,1997
RF Preselector (HP)	85685A	September,1997
Quasi-Peak Adapter (HP)	85650A	September,1997
Preamplifier (HP)	8447F OPT. H64	September,1997
Printer (HP)	2227B	
Plotter (HP)	7440A	
Dipole Antenna (EMCO)	3121C	September,1997

3.2 Test Setup

3.2.1 Block Diagram of Connections between EUT and Peripheral Devices



3.2.2 Open Field Test Site Setup Diagram



3.3 Class B Radiated Limit

Frequency (MHz)	Distance (m)	Field Strength Limits	
		$\mu\text{V/m}$	$\text{dB } \mu\text{V/m}$
30–88	3	100	40.0
88–216	3	150	43.5
216–960	3	200	46.0
960–1000	3	500	54.0

- REMARKS :
1. Emission level ($\text{dB } \mu\text{V/m}$)
 $= 20 \log \text{ Emission level } (\mu\text{V/m})$
 2. The tighter limit shall apply at the edge between two frequency bands.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.4 EUT Configuration

The configuration of EUT and its peripheral devices are the same as those used in conducted test. Please refer to 2.4.

3.5 Operating condition of EUT

Same as conducted test which is listed in 2.5.

3.6 Test Procedure

The EUT and its peripheral devices are placed on a turn table which is 1 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3 meters away from the receiving antenna which is mounted on an antenna tower. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level..Biconical, log and dipole antennas are used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, the relative positions of equipments and all of the interface cable must be changed according to ANSI C63.4/1992 on radiated measurement.

The bandwidth setting on the field strength meter (HP Spectrum Analyzer 85650A) is 120 kHz.

3.7.1 Radiated Emission Noise Measurement Results

The frequency spectrum from 30 MHz to 1000 MHz is investigated. All the emissions not reported below are too low against the FCC CLASS B limit.

Date of Test : Aug. 1, 1998

Temperature : 35 °C

EUT : Color Monitor : C7TZ

Humidity : 70 %

Working Frequency : 31.5KHz

Display Pattern : 640 × 480

Frequency (MHz)	Antenna Factor (dB)	Cable Loss +Amp. (dB)	Meter Reading Horizontal (dB μ V/m)	Emission Level Horizontal (dB μ V/m)	Limits (dB μ V/m)
31.990	13.32	25.24	39.30	27.38	40.00
47.980	10.42	25.43	46.10	31.09	40.00
55.920	10.15	25.35	44.40	29.20	40.00
61.040	9.62	25.42	44.60	28.80	40.00
66.320	8.58	25.36	37.90	21.12	40.00
73.840	7.15	24.95	41.50	23.70	40.00
114.520	14.15	24.64	37.80	27.30	43.50
145.380	13.00	24.52	35.90	24.38	43.50
162.960	14.47	24.57	38.90	28.80	43.50
167.970	15.07	24.54	37.00	27.53	43.50
170.450	15.53	24.55	36.40	27.38	43.50
195.510	17.05	24.02	31.00	24.02	43.50
205.550	12.30	23.96	32.90	21.24	43.50
220.590	12.07	23.76	29.20	17.51	46.00

REMARKS : 1. All readings are Quasi-peak values

Date of Test : Aug. 1, 1998

Temperature : 35 °C

EUT : Color Monitor : C7TZ

Humidity : 70 %

Working Frequency : 31.5KHz

Display Pattern : 640×480

Frequency (MHz)	Antenna Factor (dB)	Cable Loss +Amp. (dB)	Meter Reading Vertical (dB μ V/m)	Emission Level Vertical (dB μ V/m)	Limits (dB μ V/m)
32.680	13.13	25.18	47.50	35.45	40.00
46.020	10.56	25.49	44.90	29.97	40.00
58.350	10.06	25.39	45.00	29.67	40.00
61.340	9.56	25.42	46.10	30.24	40.00
66.710	8.50	25.34	37.60	20.76	40.00
75.550	7.08	24.87	42.80	25.02	40.00
114.540	14.15	24.64	40.80	30.30	43.50
195.520	17.05	24.02	31.20	24.22	43.50
145.420	13.01	24.52	33.20	21.69	43.50
162.960	14.47	24.57	36.30	26.20	43.50
167.970	15.07	24.54	34.40	24.93	43.50
170.460	15.53	24.55	35.40	26.39	43.50
208.070	12.26	23.90	31.30	19.67	43.50
220.590	12.07	23.76	29.70	18.01	46.00

REMARKS : 1. All readings are Quasi-peak values

3.7.2 Radiated Emission Noise Measurement Results

The frequency spectrum from 30 MHz to 1000 MHz is investigated. All the emissions not reported below are too low against the FCC CLASS B limit.

Date of Test : Aug. 1, 1998

Temperature : 35 °C

EUT : Color Monitor : C7TZ

Humidity : 70 %

Working Frequency : 48KHz

Display Pattern : 800 × 600

Frequency (MHz)	Antenna Factor (dB)	Cable Loss +Amp. (dB)	Meter Reading Horizontal (dB μ V/m)	Emission Level Horizontal (dB μ V/m)	Limits (dB μ V/m)
39.410	11.44	25.56	42.10	27.98	40.00
46.090	10.55	25.48	48.30	33.37	40.00
54.030	10.22	25.32	46.30	31.19	40.00
64.560	8.92	25.41	45.50	29.01	40.00
74.310	7.13	24.93	42.20	24.41	40.00
158.520	14.24	24.45	41.00	30.79	43.50
163.450	14.51	24.56	39.10	29.04	43.50
188.240	17.12	23.96	38.90	32.06	43.50
213.017	12.19	23.77	34.50	22.92	43.50
237.780	12.53	23.63	30.40	19.30	46.00
257.570	13.29	23.53	27.20	16.95	46.00
262.550	13.46	23.41	29.60	19.65	46.00

REMARKS : 1. All readings are Quasi-peak values.

Date of Test : Aug. 1, 1998

Temperature : 35 °C

EUT : Color Monitor : C7TZ

Humidity : 70 %

Working Frequency : 48KHz

Display Pattern : 800×600

Frequency (MHz)	Antenna Factor (dB)	Cable Loss +Amp. (dB)	Meter Reading Vertical (dB μ V/m)	Emission Level Vertical (dB μ V/m)	Limits (dB μ V/m)
36.080	12.24	25.16	46.90	33.97	40.00
45.720	10.58	25.49	48.00	33.08	40.00
54.180	10.21	25.32	48.90	33.79	40.00
60.760	9.67	25.41	48.70	32.96	40.00
75.460	7.09	24.87	44.20	26.42	40.00
74.280	7.13	24.93	47.00	29.21	40.00
158.520	14.24	24.45	38.90	28.69	43.50
163.480	14.51	24.56	37.00	26.94	43.50
212.990	12.19	23.77	32.80	21.22	43.50
237.790	12.53	23.63	30.20	19.10	43.50
257.580	13.29	23.53	29.20	18.95	46.00
262.550	13.46	23.41	29.10	19.15	46.00

REMARKS : 1. All readings are Quasi-peak values.

3.7.3 Radiated Emission Noise Measurement Results

The frequency spectrum from 30 MHz to 1000 MHz is investigated. All the emissions not reported below are too low against the FCC CLASS B limit.

Date of Test : Aug. 1, 1998

Temperature : 35 °C

EUT : Color Monitor : C7TZ

Humidity : 70 %

Working Frequency : 69KHz

Display Pattern : 1024×768

(Noninterlaced)

Frequency (MHz)	Antenna Factor (dB)	Cable Loss +Amp. (dB)	Meter Reading Horizontal (dB μ V/m)	Emission Level Horizontal (dB μ V/m)	Limits (dB μ V/m)
38.900	11.55	25.50	46.50	32.55	40.00
40.660	11.22	25.58	41.30	26.95	40.00
44.430	10.68	25.53	43.90	29.05	40.00
53.820	10.22	25.33	45.90	30.79	40.00
66.160	8.61	25.36	44.00	27.25	40.00
75.620	7.08	24.86	41.50	23.72	40.00
122.910	13.42	24.49	41.80	30.74	43.50
141.810	12.66	24.59	37.30	25.36	43.50
151.250	14.10	24.44	42.50	32.16	43.50
160.700	14.33	24.58	42.80	32.55	43.50
170.170	15.48	24.55	40.80	31.73	43.50
207.990	12.26	23.90	40.20	28.57	46.00
236.350	12.47	23.64	35.20	24.03	46.00
264.700	13.54	23.35	30.10	20.28	46.00
302.510	15.42	22.82	29.80	22.41	46.00

REMARKS : 1. All readings are Quasi-peak values.

Date of Test : Aug. 1, 1998

Temperature : 35 °C

EUT : Color Monitor : C7TZ

Humidity : 70 %

Working Frequency : 69KHz

Display Pattern : 1024 × 768

(Noninterlaced)

Frequency (MHz)	Antenna Factor (dB)	Cable Loss +Amp. (dB)	Meter Reading Vertical (dB μ V/m)	Emission Level Vertical (dB μ V/m)	Limits (dB μ V/m)
35.880	12.29	25.14	48.20	35.35	40.00
40.660	11.22	25.58	46.00	31.65	40.00
57.030	10.10	25.37	48.60	33.34	40.00
61.330	9.56	25.42	47.40	31.54	40.00
66.170	8.61	25.36	42.40	25.65	40.00
71.330	7.61	25.11	43.40	25.90	40.00
75.610	7.08	24.87	47.50	29.72	40.00
122.900	13.42	24.49	38.50	27.44	43.50
141.810	12.66	24.59	36.00	24.06	43.50
151.230	14.10	24.44	40.10	29.76	43.50
160.700	14.33	24.58	40.80	30.55	43.50
170.170	15.48	24.55	37.00	27.93	43.50
207.950	12.26	23.90	34.20	22.56	43.50
236.330	12.47	23.64	36.40	25.23	46.00
264.710	13.54	23.35	33.90	24.08	46.00
302.530	15.42	22.82	29.30	21.91	46.00

REMARKS : 1. All readings are Quasi-peak values