

The RFI / EMI Test Report issued by the Tatum EMC Lab

Exhibit 4



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

ON

**TATUNG CO.
COLOR MONITOR
MODEL C5W**

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

**REPORT NUMBER : TTEMC - 99012
DATE OF TEST : May. 5, 1999
DATE OF REPORT : May. 10, 1999**

TEST REPORT CERTIFICATION

APPLICANT : TATUNG CO.

MANUFACTURER : TATUNG CO.

EUT DESCRIPTION : Color Monitor

(A) MODEL NO. : C5W

(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 : May. 5 , 1999

Prepared by : (Wu Wan Ling) Wu. Wan. Ling.

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

Approved & Authorized Signer : (Mr. Tonny Lin) Tonny L

1. GENERAL INFORMATION

1.1 Description of EUT

Description	Color Monitor
Model Number	C5W
Manufacturer	Tatung Co. 22 Chungshan N. Rd., 3rd, Sec., Taipei, Taiwan 10451, R.O.C.
Applicant	Tatung Co.
FCC ID	BJMC5W
Date of Test	May.5 ,1999
Signal Cable	Shielded,undetachable
Power Cord	Shielded,detachable

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

1024 × 768 mode (48KHz, 1024 × 768 Noninterlaced)

800 × 600 mode (54KHz)

640 × 480 mode (31.5KHz)

1.2 Description of Configuration

1.2.1 Host Personal Computer

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

1.2.2 MOUSE

Model Number	DMS-400+
Serial Number	N/A
FCC ID	F4Z4K3FDM-201
Manufacturer	DFI
Data Cable	Shielded, undetachable

1.2.3 KEYBOARD

Model Number	E03633YLTW3-C
Serial Number	N/A
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.

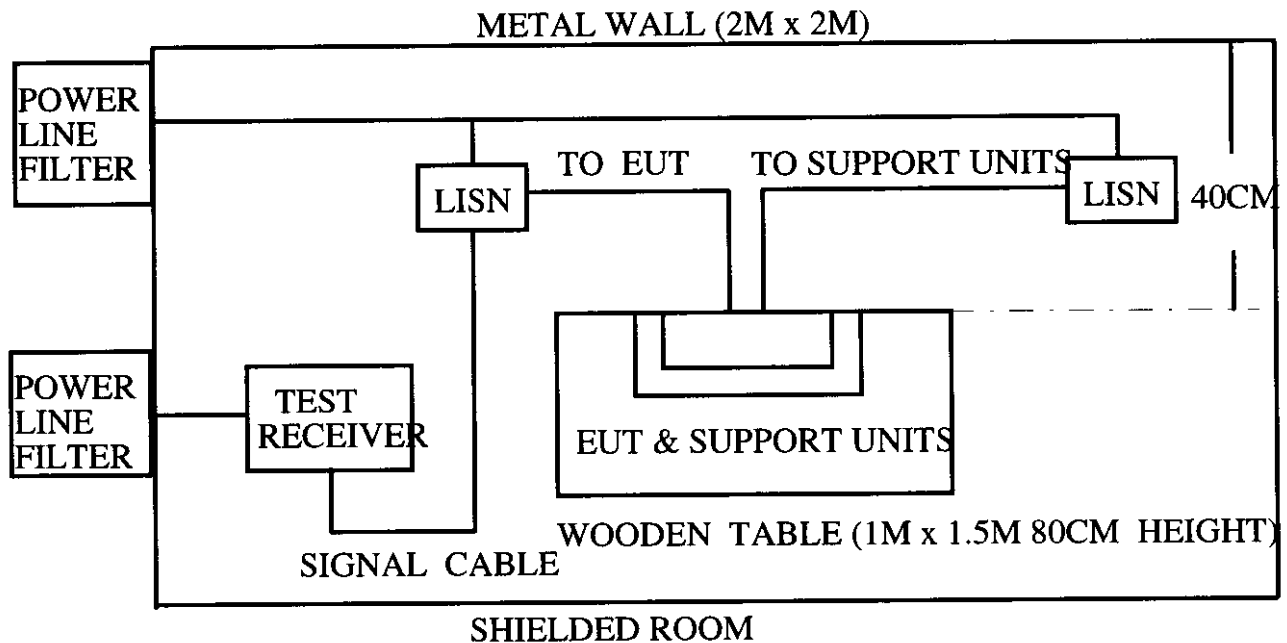
2. POWER LINE CONDUCTED TEST

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, 1998
Quasi-Peak Adapter (HP)	85650A	September, 1998
L.I.S.N. (EMCO)	3825/2	September, 1998
Printer (HP)	2227B	N/A
Plotter (HP)	7440A	September, 1998
Rohde & Schwarz Test Receiver	ESH3	September, 1998
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	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 (48KHz).

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 (54KHz) 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 : May. 5, 1999

Temperature : 28 °C

EUT : Color Monitor : C5W

Humidity : 70 %

Working Frequency : 31.5KHz

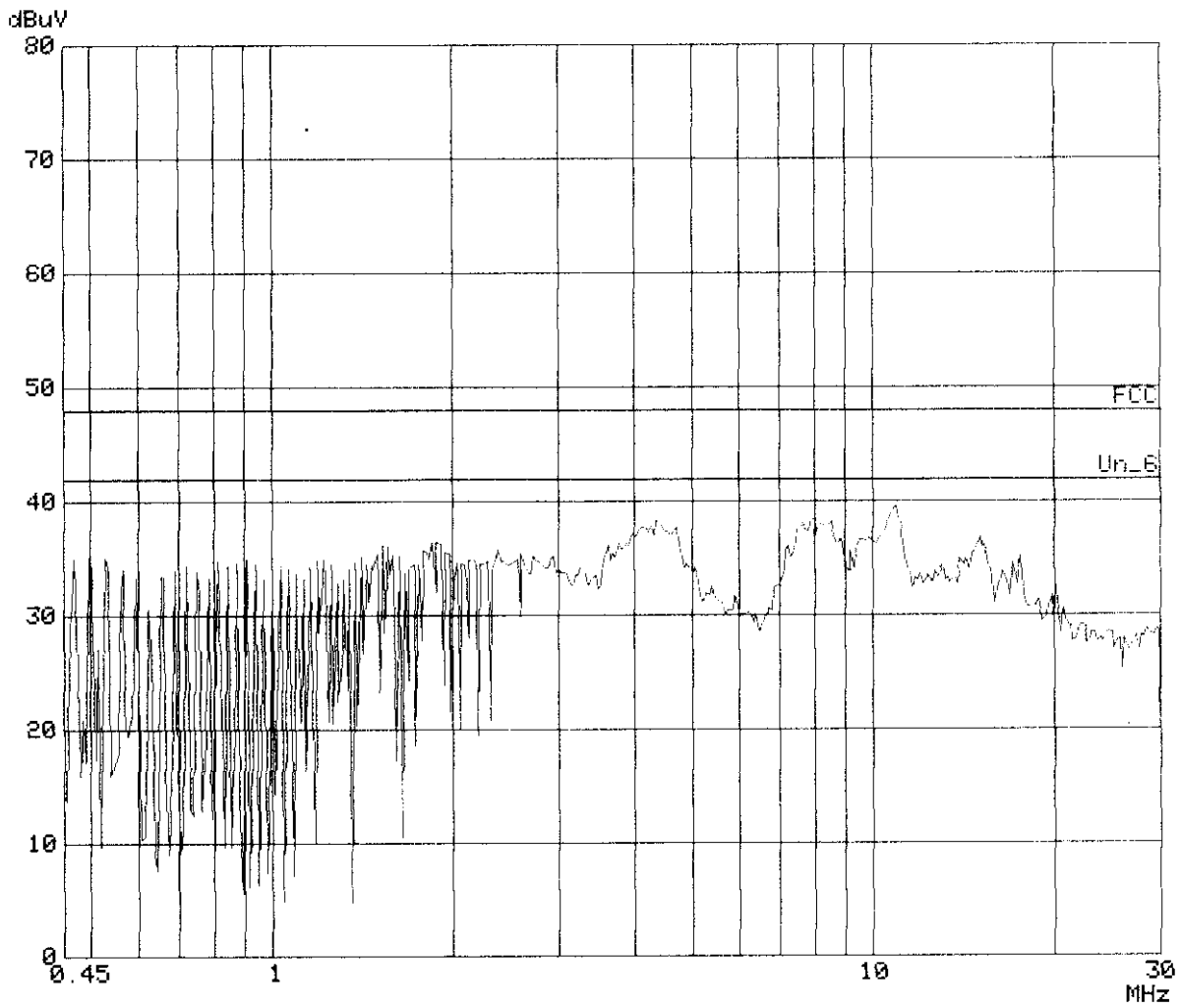
Display Pattern: 640×480

Frequency (MHz)	Reading (dB μ V)		Limits (dB μ V)
	One End & GRD	The Other End & GRD	
	(dB μ V)	(dB μ V)	
0.50	36.4	34.4	48
0.59		35.2	48
0.97		34.9	48
1.87	35.9		48
4.35	37.5	37.9	48
7.64		35.3	48
8.21	37.1		48
10.90	38.1		48
15.22	34.9	30.3	48

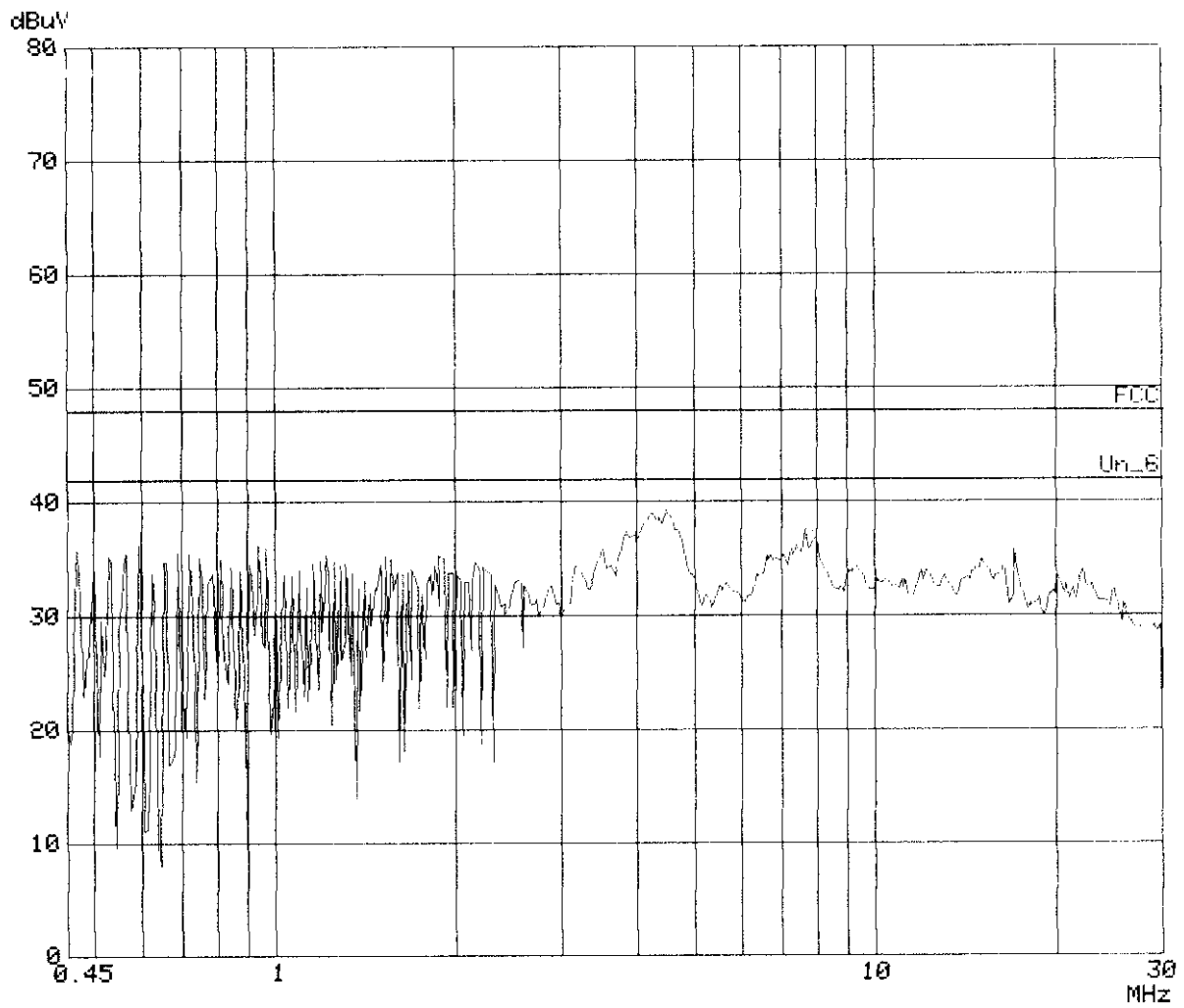
REMARKS : 1.All readings are Quasi-peak values.

EUT: C5W
Manuf: TATUNG
Op Cond: L1
Operator: Y C. CHEN
Test Spec: 640x480 31KHz
Date: 11. May 99 13:42

FCC ID:BJMC5W



Manuf: TATUNG
Op Cond: L2
Operator: Y C. CHEN
Test Spec: 640x480 31KHz
Date: 11. May 99 13:11



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 : May. 5, 1999

Temperature : 28 °C

EUT : Color Monitor : C5W

Humidity : 70 %

Working Frequency : 54KHz

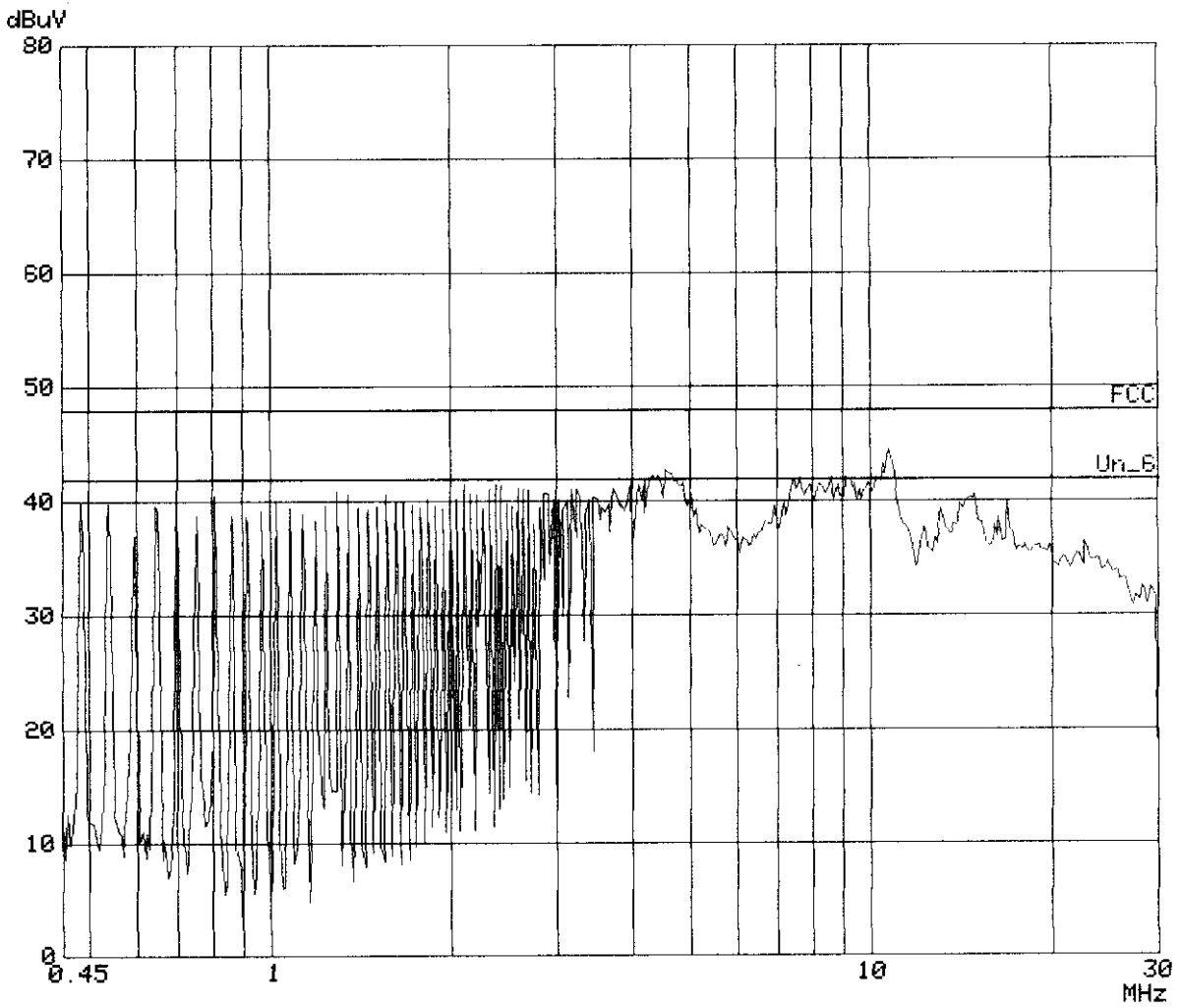
Display Pattern : 800×600

Frequency (MHz)	Reading (dB μ V)		Limits (dB μ V)
	One End & GRD	The Other End & GRD	
	(dB μ V)	(dB μ V)	
0.48	39.9		48
0.54	39.8		48
1.02	39.7		48
2.37		41.0	48
2.59		39.8	48
4.69	41.3	42.0	48
7.50	40.3	40.6	48
10.68		39.7	48
14.95	36.8	35.5	48

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

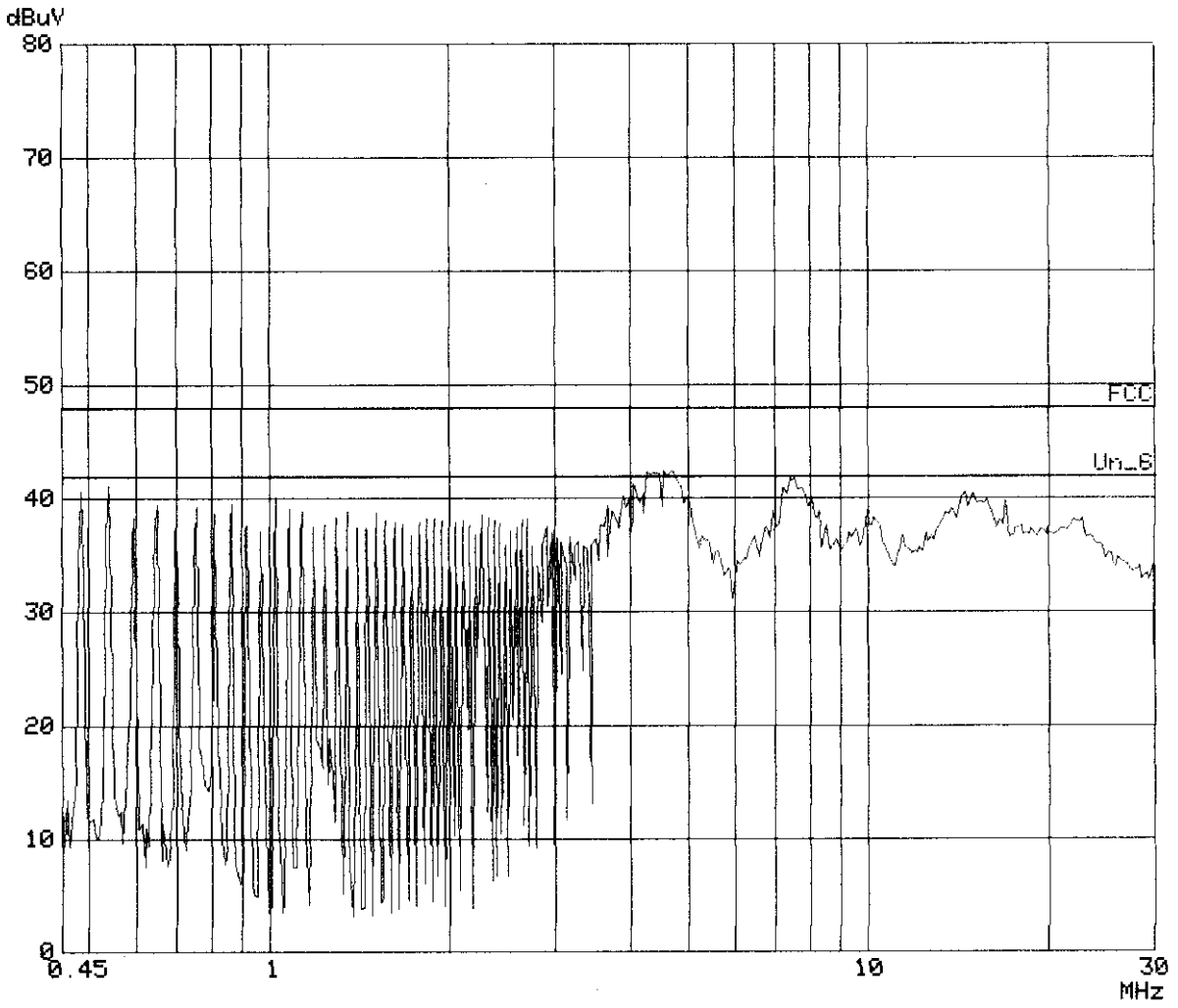
Lot: 307
Manuf: TATUNG
Op Cond: L1
Operator: Y C. CHEN
Test Spec: 800x600 54KHz
Date: 11. May 99 09:13

FCC ID: B3MCSW



LOT: CSW
Manuf: TATUNG
Op Cond: L2
Operator: Y C. CHEN
Test Spec: 800x600 54KHz
Date: 11. May 99 08:59

FCC ID:BJMCSW



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 : May. 5, 1999

Temperature : 28 °C

EUT : Color Monitor : C5W

Humidity : 70 %

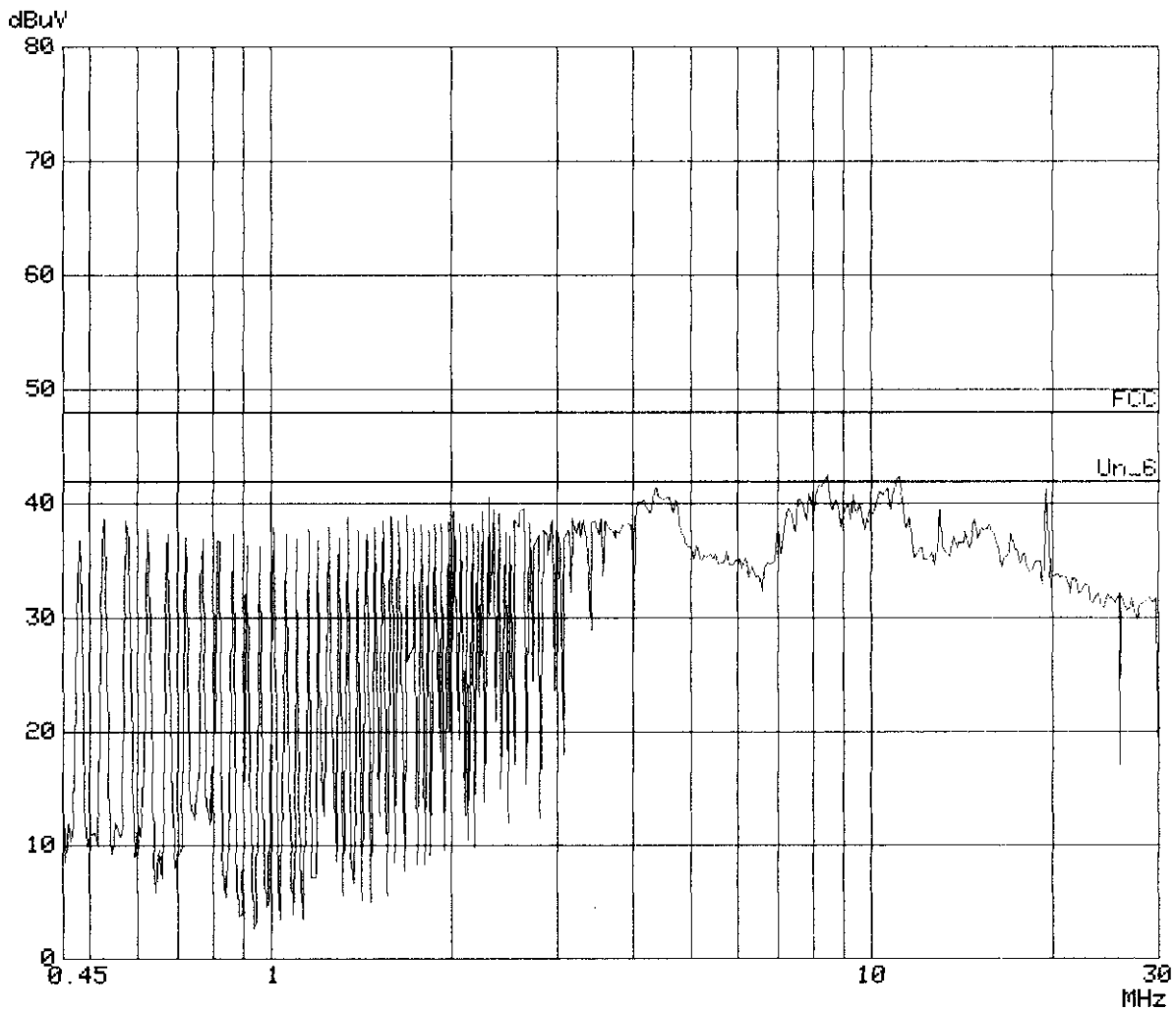
Working Frequency : 48KHz

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)	
0.52	38.5		48
0.57	38.8	39.9	48
0.62		39.4	48
0.76		38.2	48
2.37	39.6		48
4.37	40.0	40.5	48
7.69		39.6	
8.42	40.4		48
11.11	40.6	35.9	48

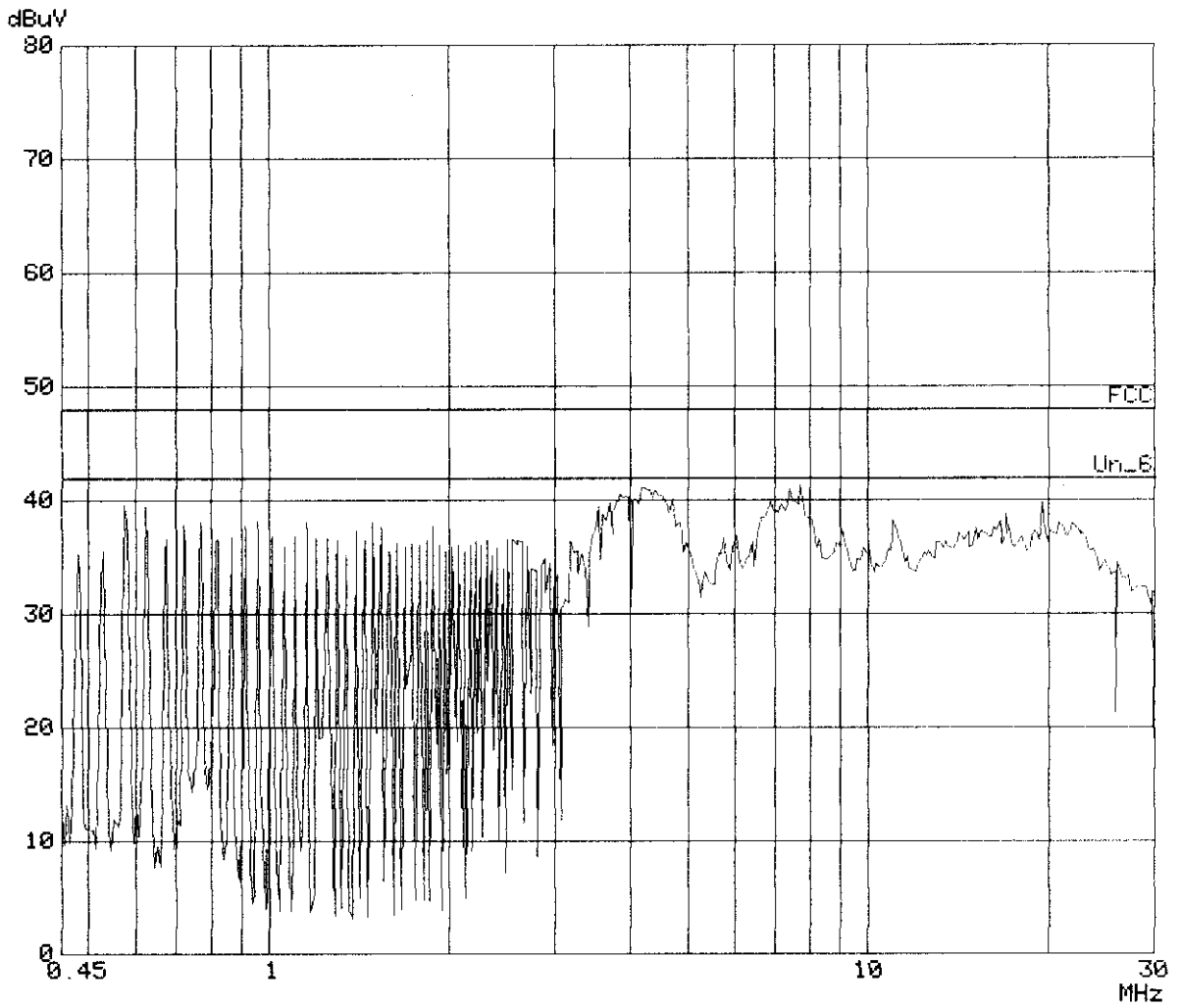
REMARKS: 1.ALL readings are Quasi-peak values.

Manuf: TAIUNG
Op Cond: L1
Operator: Y C. CHEN
Test Spec: 1024x768 48KHz
Date: 11. May 99 14:09



LOT:
Manuf: TATUNG
Op Cond: L2
Operator: Y C. CHEN
Test Spec: 1024x768 48KHz
Date: 11. May 99 13:56

FCC ID: B3MCSW



3. RADIATED EMISSION TEST

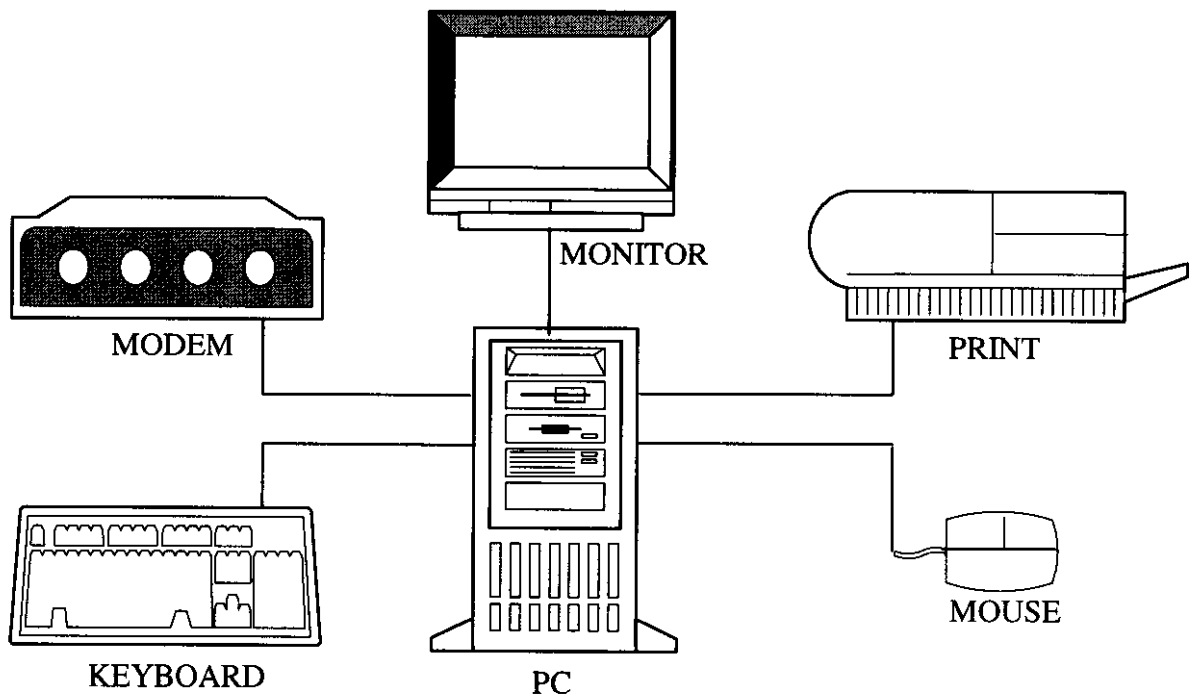
3.1 Test Equipment

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

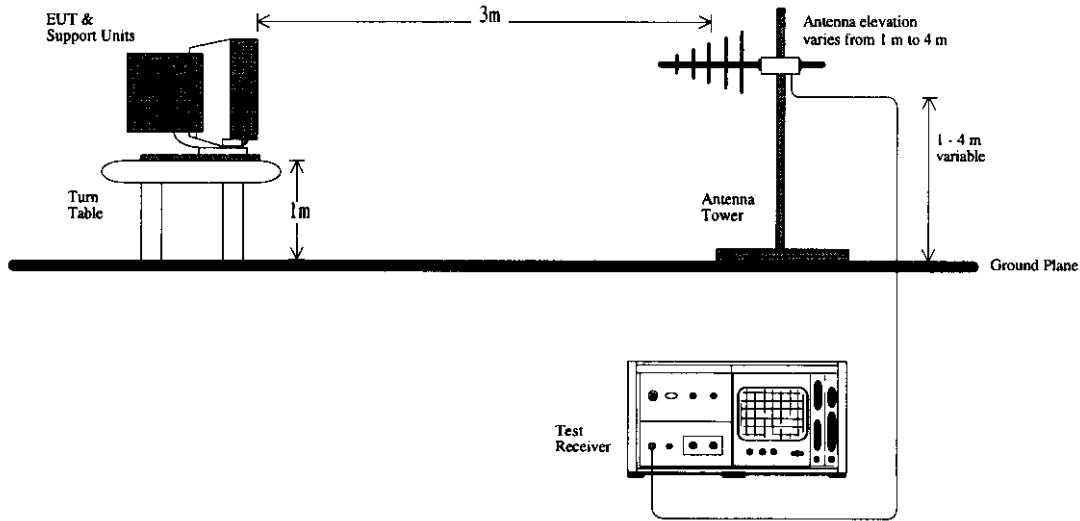
Equipments Type & Manufacturer	Model No.	Date of Calibration
Spectrum Analyzer (HP)	8568B	September, 1998
RF Preselector (HP)	85685A	September, 1998
Quasi-Peak Adapter (HP)	85650A	September, 1998
Preamplifier (HP)	8447F OPT. H64	September, 1998
Printer (HP)	2227B	
Plotter (HP)	7440A	
Dipole Antenna (EMCO)	3121C	September, 1998

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 : May. 5, 1999

Temperature : 28 °C

EUT : Color Monitor : C5W

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)
39.120	11.50	25.52	37.70	23.68	40.00
44.130	10.72	25.53	38.20	23.38	40.00
54.990	10.18	25.33	47.60	32.45	40.00
69.250	8.02	25.25	38.70	21.47	40.00
75.590	7.08	24.87	44.60	26.82	40.00
130.370	12.87	24.61	32.60	20.86	43.50
137.840	12.66	24.64	32.50	20.52	43.50
142.850	12.76	24.57	36.70	24.88	43.50
155.400	14.13	24.32	45.60	35.41	43.50
162.880	14.47	24.57	45.60	35.50	43.50
170.470	15.54	24.55	40.80	31.79	43.50
218.090	12.11	23.73	41.20	29.58	46.00
213.150	12.19	23.77	41.60	30.02	43.50
220.590	12.07	23.76	43.70	32.01	46.00
225.600	12.07	23.82	43.00	31.25	46.00
243.410	12.75	23.52	41.90	31.13	46.00
262.960	13.48	23.40	42.90	32.98	46.00

REMARKS : 1. All readings are Quasi-peak values

Date of Test : May. 5, 1999

Temperature : 28 °C

EUT : Color Monitor : C5W

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)
38.090	11.74	25.41	45.10	31.44	40.00
44.420	10.68	25.53	44.50	29.65	40.00
55.500	10.16	25.34	47.50	32.32	40.00
69.250	8.02	25.25	41.90	24.67	40.00
75.490	7.09	24.87	47.80	60.02	40.00
82.290	7.32	24.89	46.40	28.83	40.00
130.370	12.87	24.61	32.30	20.56	43.50
137.850	12.66	24.64	32.10	20.12	43.50
162.900	14.47	24.57	40.60	30.50	43.50
218.040	12.11	23.73	32.60	20.98	46.00
220.590	12.07	23.76	33.40	21.71	46.00
225.580	12.07	23.82	33.00	21.25	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 : May. 5, 1999

Temperature : 28 °C

EUT : Color Monitor : C5W

Humidity : 70 %

Working Frequency : 54KHz

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)
39.580	11.40	25.58	43.50	29.32	40.00
45.300	10.61	25.51	40.60	25.70	40.00
56.570	10.12	25.36	39.00	23.76	40.00
67.890	8.28	25.31	40.10	23.07	40.00
73.560	7.18	24.97	41.90	24.11	40.00
113.170	14.08	24.65	37.30	26.74	43.50
135.780	12.70	24.65	40.40	28.45	43.50
147.660	13.36	24.48	40.40	29.28	43.50
152.740	14.11	24.40	39.60	29.32	43.50
158.410	14.24	24.44	43.00	32.80	43.50
169.740	15.40	24.55	42.70	33.55	43.50
181.070	16.25	23.91	36.50	28.84	43.50
209.320	12.24	23.86	36.60	24.98	43.50
215.030	12.16	23.74	42.40	30.82	43.50
220.630	12.07	23.76	39.50	27.80	46.00
226.310	12.09	23.81	41.90	30.18	46.00
237.600	12.52	23.63	37.50	26.39	46.00
243.340	12.75	23.52	40.90	30.13	46.00
282.850	14.42	23.01	38.50	29.91	46.00

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

Date of Test : May. 5, 1999

Temperature : 28 °C

EUT : Color Monitor : C5W

Humidity : 70 %

Working Frequency : 54KHz

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)
39.590	11.40	25.58	48.90	34.72	40.00
45.250	10.61	25.51	47.60	32.70	40.00
56.610	10.12	25.36	45.60	30.36	40.00
67.880	8.28	25.31	44.90	27.87	40.00
73.560	7.18	24.97	44.30	26.51	43.50
114.640	14.15	24.64	38.60	28.11	43.50
124.500	13.24	24.50	38.10	26.84	43.50
130.120	12.88	24.60	38.60	26.87	43.50
135.770	12.70	24.65	38.90	26.95	43.50
141.490	12.63	24.60	34.20	22.23	43.50
152.720	14.11	24.40	39.70	29.42	43.50
158.410	14.24	24.44	43.40	33.20	43.50
215.000	12.16	23.74	37.10	25.52	43.50
220.670	12.07	23.76	31.50	19.80	46.00
226.190	12.08	23.81	36.00	24.27	46.00
271.530	13.78	23.19	32.30	22.88	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 : May. 5, 1999

Temperature : 28 °C

EUT : Color Monitor : C5W

Humidity : 70 %

Working Frequency : 48KHz

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)
39.410	11.44	25.56	41.10	26.98	40.00
45.540	10.59	25.50	42.90	27.99	40.00
52.120	10.26	25.35	44.40	29.31	43.50
68.260	8.21	25.30	42.00	24.91	43.50
75.800	7.07	24.85	41.70	23.92	43.50
84.550	7.72	24.90	49.00	31.82	43.50
125.720	13.10	24.51	41.60	30.19	43.50
143.110	12.78	24.57	42.30	30.52	43.50
156.100	14.14	24.30	46.60	36.44	43.50
162.650	14.45	24.57	42.80	32.68	43.50
208.170	12.26	23.89	41.10	29.47	43.50
214.670	12.16	23.74	44.70	33.12	43.50
217.440	12.12	23.73	37.80	26.18	46.00
221.180	12.06	23.78	41.00	29.28	46.00
227.680	12.13	23.79	40.70	29.03	46.00
279.720	14.22	23.03	40.20	31.39	46.00

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

Date of Test : May. 5, 1999

Temperature : 28 °C

EUT : Color Monitor : C5W

Humidity : 70 %

Working Frequency :48KHz

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)
38.890	11.56	25.50	48.30	34.36	40.00
45.470	10.59	25.50	47.50	32.59	40.00
52.020	10.26	25.35	46.30	31.21	43.50
60.000	9.83	25.41	47.80	32.22	43.50
70.290	7.81	25.18	46.40	29.03	43.50
84.620	7.74	24.90	47.50	30.34	43.50
162.630	14.45	24.57	36.20	26.08	43.50
130.070	12.88	24.60	38.50	26.77	43.50
143.120	12.78	24.57	38.50	26.72	43.50
214.700	12.16	23.74	36.00	24.42	43.50
217.490	12.12	23.73	29.90	18.28	46.00
221.190	12.06	23.78	34.10	22.38	46.00
227.670	12.13	23.79	37.90	26.23	46.00

REMARKS : 1. All readings are Quasi-peak values