

Application for FCC Certificate
On Behalf of
LG Electronics U.S.A Inc.

Color Monitor

Model No.: C19LE-*

Serial No.: 44TAE27090586

FCC ID : BEJC19LE

Prepared For: LG Electronics U.S.A Inc.
2000 Millbrook Dr.Lincolnshire,
IL 60069 United States

Prepared By: Audix Technology (Shanghai) Co., Ltd.
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Report No.: ACI-F04039
Date of Test: May 21-24, 2004
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TEST REPORT FOR FCC CERTIFICATE

Applicant : LG Electronics U.S.A Inc.
 Manufacturer : Nanjing LG-Tontru Color Display System Co., Ltd.
 EUT Description : Color Monitor
 (A) Model No. : C19LE-
 (B) Serial No. : 44TAE27090586
 (C) Power Supply : AC100-240V, 50/60Hz, 2.0A

Test Procedure Used:

*FCC RULES AND REGULATIONS PART 15 SUBPART B CLASS B JULY 2003
 AND ANSI C63.4-2001*

The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart B (Class B) limits both radiated and conducted emissions.

The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (M/N: C19LE-; S/N: 44TAE27090586) which was tested in 3m anechoic chamber on May 21-24, 2004 to be technically compliant with the FCC official limits.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.

This report contains data that are not covered by the NVLAP accreditation.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Date of Test : May 21-24, 2004

Prepared by : Cathrin Yin
 CATHRIN YIN
 (Assistant)

Test Engineer

 Audix Technology (Shanghai) Co., Ltd.

Cloud Feng
 For and on behalf of
 CLOUD FENG
 (Engineer)

Reviewer : Sammy Chen
 SAMMY CHEN
 (Engineer)

Approved Signatory : Byron Kwo
 Authorized Signature(s) BYRON KWO
 (Assistant Manager)

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test

Description : Color Monitor

Type of EUT : ☒ Production ☐ Pre-product ☐ Pro-type

Model No. : C19LE-*

Serial No. : 44TAE27090586

Applicant : LG Electronics U.S.A Inc.
2000 Millbrook Dr.Lincolnshire,
IL 60069 United States

Manufacturer : Nanjing LG-Tontru Color Display System
Co., Ltd.
No.346, YaoXin Road, Nanjing China

1.2 Supported Simulators

1.2.1 PC

Manufacturer : HP

Model Number : d530CMT

P/N : CNG3470BD9

CPU : 2.6GHz.

Power Cable : Unshielded, detachable ,1.8m..

Certificate : FCC DoC, MIC(E-A011-03-2204CB),
VCCI, C-Tick, CE/EMC

1.2.2 Keyboard (PS2)

Manufacturer : Logitech

Model Number : KB-0133

Assy. P/N : 323686-AA1

CT : B69350MVBPF3DI

Data Cable : Unshielded, undetachable, 1.9m

Certificate : FCC DoC, VCCI, CE/EMC, MIC,
C-Tick (N119).

1.2.3 Mouse (PS2)

Manufacturer : HP

Model Number : M-S69

Assy. P/N : 323614-001

CT : F6AB70S5BPI1G60

Data Cable : Unshielded ,undetachable, 1.85m

Certificate : FCC ID:JNZ21-1443, VCCI, CE/EMC,
MIC, C-Tick(N231)

1.2.4 Printer

Manufacturer : HP
Model Number : C3990A
Serial Number : JPZX020487
Data Cable : Unshielded, detachable, 1.5m
Certification : GS, CE, C-Tick, FCC DoC

1.2.5 Modem

Manufacturer : Aceex
Model Number : 1414
Serial Number : 980013576
Data Cable : Unshielded, Detachable, 1.8m
FCC ID : IFAXDM1414

1.3 Description of Test Facility

Site Description : Sept. 17, 1998 file on
(Semi-Anechoic Chamber) Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046, USA

Name of Firm : Audix Technology (Shanghai) Co., Ltd.

Site Location : 3F 34Bldg 680 Guiping Rd,
Caohejing Hi-Tech Park,
Shanghai, China 200233

NVLAP Lab Code : 200371-0

1.4 Measurement Uncertainty

Conducted Emission Uncertainty : $U=\pm 2.66\text{dB}$
Radiated Emission Uncertainty : $U=\pm 4.26\text{dB}$

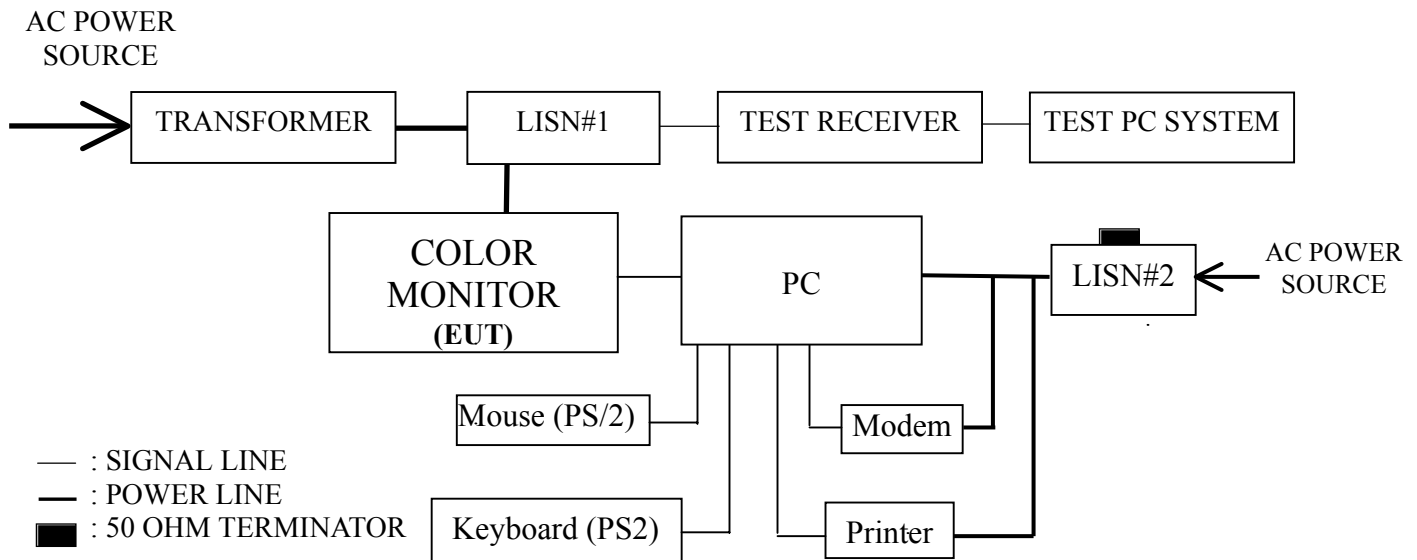
2 CONDUCTED EMISSION TEST

2.1 Test Equipment

The following test equipment are used during the conducted emission test in a shielded room:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESHS10	844077/020	Apr 20, 2004	1 Year
2.	Line Impedance Stabilization Network (LISN#1)	Kyoritsu	KNW-407	8-1280-4	Apr 20, 2004	1 Year
3.	Line Impedance Stabilization Network (LISN#2)	Kyoritsu	KNW-407	8-1280-5	Apr 27, 2004	1 Year
4.	50Ω Coaxial Switch	Anritsu	MP59B	M73389	Mar 21, 2004	1/2 Year
5.	50Ω Terminator	No.26 Factory	BNC	No.1	Mar 11, 2004	1/2 Year
6.	Software	Audix	E3	SET00200 9804M592	-	-

2.2 Block Diagram of Test Setup



2.3 Conducted Emission Limit

Frequency Range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	66~56	56~46
0.5 ~ 5	56	46
5 ~ 30	60	50
NOTE 1 – The lower limit shall apply at the transition frequencies. NOTE 2 – The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz~0.50 MHz NOTE 3 – If the average limit is met when using a quasi-peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary.		

2.4 Test Configuration

The EUT (listed in Sec.1.1) and the simulators (listed in Sec1.2) were installed as shown on Sec.2.2 to meet FCC requirement and operating in a manner which tends to maximize its emission level in a normal application.

2.5 Operating Condition of EUT

- 2.5.1 Setup the EUT and simulators as shown in Sec. 2.2
- 2.5.2 Turn on the power of all equipment and the EUT.
- 2.5.3 Set the contrast control to maximum.
- 2.5.4 Set the brightness control to maximum or at raster extinction if raster extinction occurs at less than maximum brightness.
- 2.5.5 For color monitors, use white letters on a black background to represent all color.
- 2.5.6 Select the worse case of positive or negative video if both alternatives are available.
- 2.5.7 Set character size and number of characters per line so that typically the greatest number of characters per screen is displayed.
- 2.5.8 For monitors with graphics capabilities, a pattern consisting of all scrolling Hs should be displayed. For monitors with text only capability, a pattern consisting of random text shall be displayed. If neither of the above apply, use a typical display.
- 2.5.9 Set the EUT on the test mode, and then test.

2.6 Test Procedures

The EUT was connected to the power mains through a Line Impedance Stabilization Network (LISN). This provided a 50 ohm coupling impedance for the measuring equipment.

Both sides of AC line (VA & VB) were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed or manipulated according to FCC Part 15 during conducted emission test.

The bandwidth of Test Receiver ESHS10 was set at 10 kHz.

The frequency range from 150 kHz to 30 MHz was checked.

The test mode (1024*768 75Hz, 1280*1024 85Hz, 1600*1200 60Hz) was done on conducted disturbance test and all the test results are listed in Sec. 2.7.

2.7 Test Results

< PASS >

The frequency and amplitude of the highest conducted emission relative to the limit is reported. All emissions not reported below are too low against the prescribed limits.

The worse case is for 1600*1200 60Hz mode. The worst emission is detected at 0.185 MHz with corrected signal level of 53.84 dB(μ V) (limit is 64.24 dB(μ V)), when the VA of the EUT is connected to LISN.

EUT : Color Monitor Temperature : 23°C

Model No. : C19LE-* Humidity : 56%

Serial No. : 44TAE27090586

Test Mode : 1024*768 75Hz Date of Test : May 24, 2004

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)
VA	0.180	50.72	0.22	50.94	64.50	13.56
	0.239	47.47	0.20	47.67	62.13	14.46
	0.479	41.35	0.13	41.48	56.36	14.88
	0.658	38.54	0.13	38.67	56.00	17.33
	1.317	36.89	0.12	37.01	56.00	18.99
	7.368	44.38	0.27	44.65	60.00	15.35
VB	0.154	52.66	0.25	52.91	65.78	12.87
	0.239	47.33	0.19	47.52	62.13	14.61
	0.300	43.17	0.21	43.38	60.24	16.86
	0.479	38.75	0.16	38.91	56.36	17.45
	0.598	34.09	0.17	34.26	56.00	21.74
	25.321	35.35	0.87	36.22	60.00	23.78
NOTE 1 - Emission Level = Meter Reading + Factor. NOTE 2 - Factor = Cable Loss + Probe Factor. NOTE 3 - Probe Factor means insertion loss of LISN. NOTE 4 - All reading are Quasi-Peak Values.						

TEST ENGINEER: Cloud Feng
(CLOUD FENG)

EUT : Color Monitor Temperature : 23°C

Model No. : C19LE-* Humidity : 56%

Serial No. : 44TAE27090586

Test Mode : 1280*1024 85Hz Date of Test : May 24, 2004

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)
VA	0.182	52.32	0.22	52.54	64.37	11.83
	0.273	44.51	0.17	44.68	61.03	16.35
	0.363	42.45	0.14	42.59	58.65	16.06
	0.817	39.30	0.12	39.42	56.00	16.58
	6.914	48.91	0.24	49.15	60.00	10.85
	24.790	43.60	0.96	44.56	60.00	15.44
VB	0.182	53.22	0.23	53.45	64.42	10.97
	0.273	46.29	0.20	46.49	61.03	14.54
	0.363	41.79	0.19	41.98	58.65	16.67
	0.724	34.19	0.18	34.37	56.00	21.63
	7.368	33.03	0.32	33.35	60.00	26.65
	28.152	38.96	0.94	39.90	60.00	20.10
NOTE 1 - Emission Level = Meter Reading + Factor. NOTE 2 - Factor = Cable Loss + Probe Factor. NOTE 3 - Probe Factor means insertion loss of LISN. NOTE 4 - All reading are Quasi-Peak Values.						

TEST ENGINEER: Cloud Feng
(CLOUD FENG)

EUT : Color Monitor Temperature : 23°C

Model No. : C19LE-* Humidity : 56%

Serial No. : 44TAE27090586

Test Mode : 1600*1200 60Hz Date of Test : May 24, 2004

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)
VA	0.185	53.62	0.22	53.84	64.24	10.40
	0.282	45.33	0.16	45.49	60.76	15.27
	0.375	43.27	0.14	43.41	58.39	14.98
	0.938	40.08	0.11	40.19	56.00	15.81
	1.310	40.29	0.12	40.41	56.00	15.59
	6.662	47.22	0.24	47.46	60.00	12.54
VB	0.185	52.99	0.23	53.22	64.24	11.02
	0.282	46.77	0.20	46.97	60.76	13.79
	0.375	42.53	0.19	42.72	58.39	15.67
	0.561	35.66	0.16	35.82	56.00	20.18
	1.310	33.26	0.18	33.44	56.00	22.56
	25.591	42.68	0.88	43.56	60.00	16.44
NOTE 1 - Emission Level = Meter Reading + Factor. NOTE 2 - Factor = Cable Loss + Probe Factor. NOTE 3 - Probe Factor means insertion loss of LISN. NOTE 4 - All reading are Quasi-Peak Values.						

TEST ENGINEER: Cloud Feng
(CLOUD FENG)

3 RADIATED EMISSION TEST

3.1 Test Equipment

The following test equipment are used during the radiated emission test in a semi-anechoic chamber:

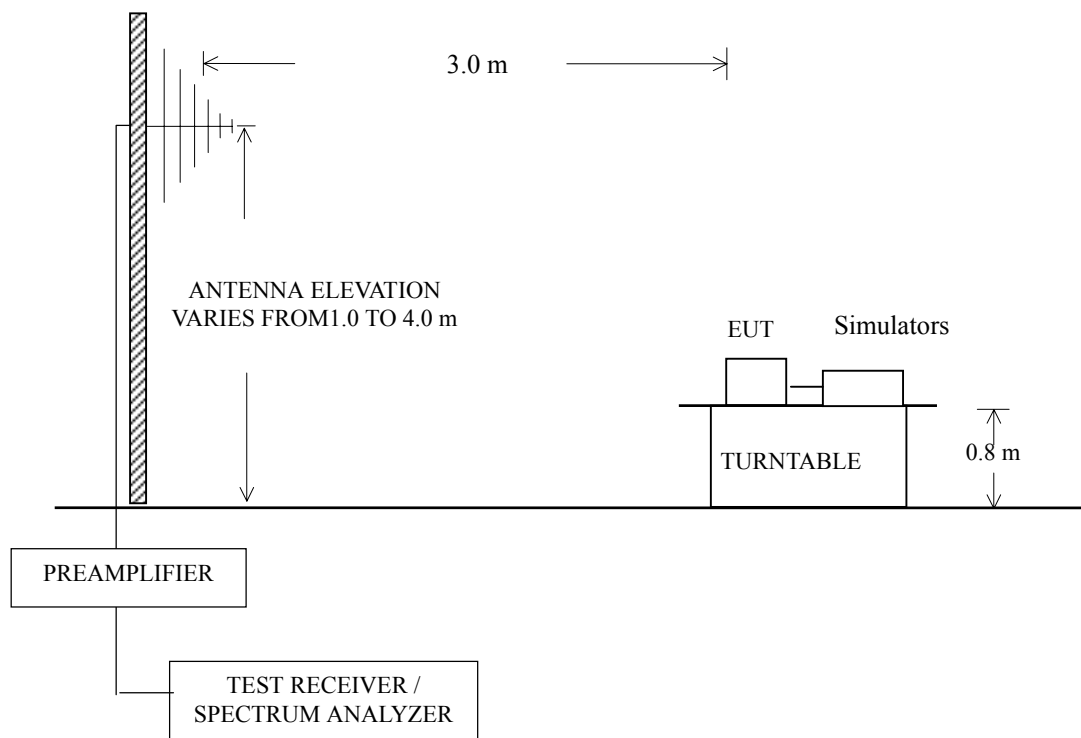
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analyzer	HP	8593EM	3628A00167	Apr 22, 2004	1 Year
2.	Bilog Antenna	Chase	CBL6111	1145	Mar 20, 2004	1/2 Year
3.	Test Receiver	Rohde & Schwarz	ESVS10	832699/004	Apr 26, 2004	1 Year
4.	Preamplifier	HP	8447D	2944A06849	Mar 22, 2004	1/2 Year
5.	50Ω Coaxial Switch	Anritsu	MP59B	M74689	Mar 21, 2004	1/2 Year
6.	Software	Audix	E3	SET00200 9912M295-2	-	-

3.2 Block Diagram of Test Setup

3.2.1 EUT and simulators

Same as Sec.2.2.

3.2.2 Radiated emission test setup



3.3 Radiated Emission Limit

Frequency (MHz)	Distance (m)	Field strength limits (μV/m)	
		(μV/m)	dB(μV/m)
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
NOTE 1 - Emission Level dB(μV/m) = 20 log Emission Level (μV/m) NOTE 2 - The tighter limit applies at the band edges. NOTE 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 Test Configuration

The configuration of the EUT and simulators are same as those used in conducted emission test.

Please refer to Sec.2.4.

3.5 Operating Condition of EUT

Same as conducted emission test which is listed in Sec.2.5, except the test setup replaced by Sec.3.2.

3.6 Test Procedures

The EUT and simulators were placed on a turntable which is 0.8 meter above ground. The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) was used as receiving antenna. Both horizontal and vertical polarization of the antenna were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to FCC Part 15 requirements during radiated emission test.

The bandwidth of Test Receiver R&S ESVS10 was set at 120 kHz.

The frequency range from 30 MHz to 1000 MHz was checked.

The test mode (1024*768 75Hz, 1280*1024 85Hz, 1600*1200 60Hz) was done on radiated disturbance test and all the test results are listed in Sec.3.7.

3.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

The worse case is for 1024*768 75Hz mode. The worst emission at horizontal polarization was detected at 754.590 MHz with corrected signal level of 41.41 dB(μ V/m) (limit is 46.00 dB(μ V/m)), when the antenna was 1.20m height and the turn table was at 205°. The worst emission at vertical polarization was detected at 48.430 MHz with corrected signal level of 37.38 dB(μ V/m) (limit is 40.00 dB(μ V/m)), when the antenna was 1.00m height and the turn table was at 135°.

0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

EUT : Color Monitor Temperature : 20.7°C

Model No. : C19LE-* Humidity : 53%

Serial No. : 44TAE27090586

Test Mode : 1024*768 75Hz Date of Test : May 21, 2004

Polarization	Frequency (MHz)	Meter Reading dB(μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB(μV/m)	Limits dB(μV/m)	Margin (dB)
Horizontal	48.430	47.79	8.64	0.96	28.43	28.96	40.00	11.04
	96.930	47.19	6.72	1.38	28.29	27.00	43.50	16.50
	145.430	42.28	12.89	1.66	28.07	28.76	43.50	14.74
	237.580	40.50	12.77	2.18	27.64	27.81	46.00	18.19
	562.530	33.99	21.42	3.56	28.83	30.14	46.00	15.86
	754.590	42.13	23.61	4.22	28.55	41.41	46.00	4.59
Vertical	48.430	56.21	8.64	0.96	28.43	37.38	40.00	2.62
	13.880	42.51	12.05	1.62	28.14	28.04	43.50	15.46
	167.740	40.11	11.22	1.81	27.98	25.16	43.50	18.34
	392.780	35.78	17.24	2.89	28.14	27.77	46.00	18.23
	754.590	40.77	23.61	4.22	28.55	40.05	46.00	5.95
	955.380	35.28	26.64	4.78	27.99	38.71	46.00	7.29

NOTE 1 - Emission Level = Meter Reading + Antenna Factor + Cable Loss – Preamp Factor.

NOTE 2 - All reading are Quasi-Peak values.

NOTE 3 - At the frequency 48.430 MHz (Vertical polarization), the measured results are below the specification limit by a margin less than the measurement uncertainty, it is not therefore possible to determine compliance at a level of confidence of 95%. However, the measured result indicates a higher probability that the product tested complies with the specification limit.

TEST ENGINEER: Cloud Feng
(CLOUD FENG)

EUT : Color Monitor Temperature : 20.7°C

Model No. : C19LE-* Humidity : 53%

Serial No. : 44TAE27090586

Test Mode : 1280*1024 85Hz Date of Test : May 21, 2004

Polarization	Frequency (MHz)	Meter Reading dB(μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB(μV/m)	Limits dB(μV/m)	Margin (dB)
Horizontal	46.490	45.11	10.57	0.96	28.45	28.19	40.00	11.81
	70.740	43.85	6.45	1.18	28.38	23.10	40.00	16.90
	130.880	41.76	12.05	1.62	28.14	27.29	43.50	16.21
	184.230	47.95	10.77	1.92	27.89	32.75	43.50	10.75
	250.190	50.98	13.53	2.25	27.53	39.23	46.00	6.77
	754.590	41.66	23.61	4.22	28.55	40.94	46.00	5.06
Vertical	48.430	53.38	8.64	0.96	28.43	34.55	40.00	5.45
	130.880	41.64	12.05	1.62	28.14	27.17	43.50	16.33
	184.230	44.78	10.77	1.92	27.89	29.58	43.50	13.92
	353.980	41.59	16.21	2.74	27.83	32.71	46.00	13.29
	754.590	41.73	23.61	4.22	28.55	41.01	46.00	4.99
	926.280	36.20	25.37	4.68	27.67	38.58	46.00	7.42
NOTE 1 - Emission Level = Meter Reading + Antenna Factor + Cable Loss – Preamp Factor. NOTE 2 - All reading are Quasi-Peak values.								

TEST ENGINEER: cloud Feng
(CLOUD FENG)

EUT : Color Monitor Temperature : 20.7°C

Model No. : C19LE-* Humidity : 53%

Serial No. : 44TAE27090586

Test Mode : 1600*1200 60Hz Date of Test : May 21, 2004

Polarization	Frequency (MHz)	Meter Reading dB(μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB(μV/m)	Limits dB(μV/m)	Margin (dB)
Horizontal	121.180	41.41	13.76	1.58	28.18	28.57	43.50	14.93
	167.740	43.64	11.22	1.81	27.98	28.69	43.50	14.81
	189.080	47.29	10.62	1.95	27.88	31.98	43.50	11.52
	23.790	48.64	12.36	2.15	27.67	35.48	46.00	10.52
	256.980	47.33	13.69	2.26	27.50	35.78	46.00	10.22
	754.590	42.23	23.61	4.22	28.55	41.51	46.00	4.49
Vertical	48.430	53.87	8.64	0.96	28.43	35.04	40.00	4.96
	130.880	41.20	12.05	1.62	28.14	26.73	43.50	16.77
	167.740	40.18	11.22	1.81	27.98	25.23	43.50	18.27
	352.040	39.90	16.14	2.71	27.81	30.94	46.00	15.06
	390.840	40.11	17.20	2.89	28.13	32.07	46.00	13.93
	754.590	40.81	23.61	4.22	28.55	40.09	46.00	5.91
NOTE 1 - Emission Level = Meter Reading + Antenna Factor + Cable Loss – Preamp Factor. NOTE 2 - All reading are Quasi-Peak values.								

TEST ENGINEER: Cloud Feng
(CLOUD FENG)

4 DEVIATION TO TEST SPECIFICATIONS

The following components are used during the countermeasure procedures:

Name	Model Number	Specifications (mm)			Manufacturer	Location
		Length	Internal diameter	External diameter		
Magnetic core	125-074J	28.2±0.8	9.5±0.4	18.2±0.5	FEELUX Co., Ltd. BOAM R&D Co., Ltd.	See Appendix II Figure5, 6
Magnetic core	70-1601708001	17.0±0.5	8.0±0.3	16.0±0.5	URITE&EQ Co., Ltd.	See Appendix II Figure5, 6
Magnetic core	125-074K	15.0±0.5	6.9±0.3	13.9±0.3	FEELUX Co., Ltd. BOAM R&D Co., Ltd.	See Appendix II Figure5, 6
Note: The Manufacturer had to add the magnetic cores to the cables in the production of this EUT in order that complies with the limits.						