

LG Electronics Inc.

Quality & Reliability Center

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CERTIFICATION OF COMPLIANCE

Date of Issue: March 12, 2004

Test Report No: 00431-4521-F4099

Applicant:	LG Electronics Inc.
Regulation:	FCC Part 15 Class B / Canada Standard ICES-003 Class B
Test procedure:	ANSI C63.4-2001 / Canada Standard ICES-003
Equipment Class:	Unintentional Radiators – Digital device
EUT Type:	20.1" LCD Monitor
<u>Trade Name(s):</u> LG	<u>Model No.:</u> L20MP-*,L20MB-*

This device has been verified to comply with the applicable requirements in the FCC Part 15 / Canada Standard ICES-003 and was tested in accordance with the measurement procedures specified in ANSI C63.4-2001 / Canada Standard ICES-003.

I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.



Kyeom-Soon Kim / General Manager
Quality and Reliability Center
LG Electronics Inc.

REPORT FOR A DIGITAL DEVICE

Scope - Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

U.S. Responsible Party:	LG Electronics USA Inc.
Address:	6133 North River Road, Suite 1100 (Riverway Plaza) Rosemont, IL 60018, USA
Contact Person:	P. H. Byun, General Manager
Telephone No.:	(847) 692-4630 EXT.329
Manufacturer:	LG Electronics Inc. DID Division
Address:	642 Jinpyoung-dong Kumi-City Kyoungsangbuk-do, 730-360, Korea
FCC ID No.:	BEJL20MP
EUT Class:	Unintentional Radiators - Digital device
EUT Type:	20.1" LCD Monitor
Trade Name:	LG
Model No.:	L20MP-*, L20MB-*
Rule Part:	FCC Part 15 Class B / Canada Standard ICES-003 Class B
Test Procedure:	ANSI C63.4-2001 / Canada Standard ICES-003
Date of Test:	February 27~28, 2004
Date of Receipt of EUT:	February 23, 2004
Date of Issue:	March 12, 2004
Test Report No.:	00431-4521-F4099
Test Result:	Positive

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Quality and Reliability Center reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production unit of this model are manufactured with identical electrical and mechanical components.

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This report must not be used by the client to claim product endorsement by any agency of the U.S. Government.

Tested by:



K. C. Paek / Research Engineer Quality
and Reliability Center
LG Electronics Inc.

Reviewed by :



D. H. Lee / Senior Research Engineer
Quality and Reliability Center
LG Electronics Inc.

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1. GENERAL INFORMATION

1.1 Descriptions of equipment under test (EUT)

- 1.1.1 Manufacturer: LG Electronics Inc. DID Division
642 Jinpyoung-dong Kumi-City Kyoungsangbuk-do, 730-360, Korea
 - 1.1.2 EUT Type: 20.1" LCD Monitor
 - 1.1.3 Model No.: L20MP-*, L20MB-*
 - 1.1.4 Serial No.: N/A
 - 1.1.5 Trade Name: LG
 - 1.1.6 FCC ID No.: BEJL20MP
 - 1.1.7 System characteristic and descriptions
 - a) Max. Resolution: 1600 x 1200 @ 60Hz (Analog)
1600 x 1200 @ 60 Hz (Digital)
 - b) Sync Input: Horizontal Freq. : 28 - 92 kHz (Analog)
28 - 80 kHz (Digital)
Vertical Freq. : 56 - 85 Hz
 - c) Test Mode: Display "H" pattern on the screen
 - d) Power Supply: AC 100-240 V, 50/60 Hz, 1.2 A
 - e) Power Cord: Unshielded AC power cord
 - f) Port / Input connector: 15 pin D-sub type connector (Analog)
24 pin DVI-D type connector (Digital)
USB In/Out
 - g) Cable: 1.5 m shielded D-sub with ferrite on both sides
2.0 m shielded DVI-D with ferrite on both sides
 - h) Max. Video Band Width: 162 MHz(Analog), 130 MHz(Digital)
 - i)) Used LCD panel: AU OPTRONICS CROP.-> M201UN02
FUJITSU CORP. -> FLC51UXC8V
LG.Philips LCD CO. -> LM201U04
 - j) Power-Inverter(LIPS): Lienchang
- # Model(L20MP-*) : Normal stand type
Model(L20MB-*) : Pivot stand type
Refer to APPENDIX E: EUT PHOTOGRAPHS

1.2 Regulations applied to EUT

- FCC Part 15 Class B / Canada Standard ICES-003 Class B
- : The limit of CISPR 22 Class B apply in this Radiated Emission test according to part 15.109.g).

1.3 Measurement procedure

ANSI C63.4-2001 / Canada Standard ICES-003

1.4 Measurement place

LG Electronics Inc. Quality and Reliability Center

(451-718) 19-1, Cheongho-Ri, Jinwuy-Myun, Pyungtaeak-City, Kyunggi-do, Korea

2. GENERAL TEST CONDITIONS

The test data contained in this report were obtained by use of the measurement method recommended in FCC Rules, 47 C.F.R. § 15.31(a)(3), with equipment and at the test site filed by the Federal Communications Commission (FCC). The technical standard for a computing device is set forth in the computing devices of Part 15 of FCC Rules. The measurement for radiated emissions and power-line conducted emissions were performed in accordance with the procedures described in ANSI C63.4-2001.

2.1 Operating conditions of EUT

According to the requirements in the computing devices of Part 15, the measurement was made at each function of the EUT being connected with appropriate cables and peripherals. All measurement was investigated under operating conditions of clause 11.1 of ANSI C63.4-2001.

2.2 Stabilization of EUT operating

The EUT was operated for sufficient minutes before testing to make it stabilized in a normal operating condition. The power supplied to the EUT was filtered to meet the requirements.

2.3 Temperature and humidity

The measurement data in this report was obtained at the temperature in the range of 10 to 30 C and humidity in the range of 30 to 80%.

3. TEST SITE

3.1 Semi-anechoic chamber

Measurement of radiated emissions from EUT was made at semi-anechoic chamber that has been in compliance with Federal Communications Commissions (FCC) requirements of clause 2.948 according to ANSI C63.4-2001 on August. 19, 2003.

3.2 A shielded enclosure

The measurement of was made power line conducted emissions in a shielded enclosure providing sufficient shielding effectiveness.

4. CALIBRATIONS OF MEASURING INSTRUMENTS

All measurements were made with instruments calibrated according to the recommendation by manufacturer. Measurement of radiated emissions and power line conducted emissions were made with instruments conforming to American National Standard Specification, ANSI C63.4-2001. The calibration of measuring instrument, including any accessories that may affect test results, were performed according to the recommendation by manufacturer.

5. DESCRIPTION OF TEST CONDITION

5.1 Power line conducted emission measurements

5.1.1 Shielded enclosure

The measurement for power-line emissions from EUT was made in shielded enclosure that provides sufficient shielding effectiveness enough not to affect test results.

5.1.2 Detector function selection and bandwidth

During conducted emission measurement, a radio noise meter that has a CISPR quasi-peak detector with 10 kHz IF bandwidth of 6 dB was utilized.

5.1.3 Frequency range to be scanned

For conducted emissions measurement, frequency range of 150 kHz to 30 MHz included, was investigated.

5.1.4 Unit of measurement

Test results for conducted emissions are reported in micro-volts.

5.1.5 Line impedance stabilization network (LISN)

A LISN with characteristics that conform to the requirements of ANSI C63.4-2001 was used for the measurement of conducted power-line radio noise; (50 micro-henries / 50 ohms). Chassis and earth-points for grounding of the LISN were earth-grounded.

5.1.6 Test conditions and configuration of EUT

The EUT was configured and operated in all modes of operation so as to find the maximum enumeration of emissions from EUT.

The EUT has designed to use the public AC lines with rated AC voltage as specified in Owner's manual and Installation' manual of EUT and filtered to meet the requirement. AC power was supplied to the EUT through LISN with characteristics described in 5.1.5 of part I of this report.

The EUT was placed on a 1 m X 1.5 m X 80 cm high wooden table that is place on the earth-grounded conducting surface larger than 2 square meters. The vertical conducting surface was replaced with horizontal ground plane. Length of the power lead in excess of 80 cm horizontally separating the EUT from LISN was folded back-and-forth form at the center of the power cord not exceeding 40 cm in length.

Each type of accessory provided by manufacturer or typically used and support equipment were connected to the EUT during measurement to the typical usage and applicable as nearly as practicable.

5.1.7 Measurement uncertainty

Power line conducted emission measurements: ± 3 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT in the above mentioned way.

The measurement uncertainty was calculated in accordance with NAMAS NIS 81 : The treatment of uncertainty in EMC measurement.”

The measurement uncertainty was given with a confidence of 95%.

5.2 Radiated emissions measurements

5.2.1 Test site

Measurements were made in semi-anechoic chamber as described at 3.1 in this report.

5.2.2 Detector function selection and bandwidth

In radiated emissions measurement, a field strength meter that has a CISPR quasi-peak detector was used. The 6 dB bandwidth of the detector of instrument is 120 kHz over frequency range of 30 to 1000 MHz. Emissions to be scanned 1 to 2 GHz was detected in average mode.

5.2.3 Unit of measurement

Test results of radiated emissions measurement are reported in micro-volts per meter at the specific distance. Using the unit of dBuV on the test instrument, the indication unit was converted to field strength unit of uV/m as following method;

$$F \text{ (uV/m)} = 10^{\{(R+CL+AF)/20\}} \text{ (uV/m)}$$

here,

F: Field Strength in uV/m, R: Meter Reading Level in dB(uV),

CL: Cable Loss from antenna to meter in dB,

AF: Antenna Factor of receiving antenna in dB/(m)

5.2.4 Antennas

Measurements were made using calibrated half-wave tuned dipole antenna for final measurements and biconical / log-periodic / horn antenna in range of 30 to 2000 MHz for preliminary measurements to determine the emission characteristics of the EUT. Measurements were also made for both horizontal and vertical polarization.

The horizontal distance between the receiving antenna and the closest periphery of the EUT was 10 meters as described in 8.2.3 of ANSI C63.4-2001.

5.2.5 Frequency range to be scanned

For radiated emissions measurements, the spectrum in the range of 30 to 2000 MHz was investigated. (The highest frequency generated or used by the EUT is 162 MHz, as mentioned in 1.1.7 h.)

5.2.6 Test conditions and configuration of EUT

The EUT was configured and operated in all modes of operation so as to find the maximum enumeration of emissions from EUT. The EUT was placed on a 80 cm high non metallic 1 m X 1.5 m table. The turn table containing the system was rotated and the antenna height was varied 4 m to find the maximum enumeration of emissions from EUT. Each type of accessory provided by manufacturer or typically used and support equipment were connected to the EUT during measurement to the typical usage and applicable as nearly as practicable.

5.2.7 Measurement uncertainty

Radiated emissions measurements: ± 5 dB

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT in the above mentioned way.

The measurement uncertainty was calculated in accordance with NAMAS NIS 81 : The treatment of uncertainty in EMC measurement.”

The measurement uncertainty was given with a confidence of 95%.

6. MEASURING INSTRUMENTS AND SET-UP

6.1 Power line conducted emissions

6.1.1 Test receiver

Rohde & Schwarz, Model ESIB7 (20Hz to 7 GHz)

Detector function: CISPR Quasi-Peak / Average

IF Bandwidth: 9 kHz

6.1.2 Line Impedance Stabilization Network (LISN)

EUT: Rohde & Schwarz, Model ESH3-Z5

Peripheral: Rohde & Schwarz, Model ESH3-Z5

Impedance Characteristic : 50uH / 50 Ω

6.2 Radiated emissions

6.2.1 Test receiver

Rohde & Schwarz, Model ESIB7 (20Hz to 7 GHz)

Detector function: CISPR Quasi-Peak

IF Bandwidth: 120 kHz / 1 MHz

6.2.2 Receiving Antennas.

a) Schwarzbeck, Model VHAP Tuned dipole antenna (30 to 300 MHz)

b) Schwarzbeck, Model UHAP: Tuned dipole antenna (300 to 1000MHz)

c) Schwarzbeck, Model VHBB 9124: Bi-conical Antenna (30 ~ 300 MHz)

d) Schwarzbeck, Model VUSLP 9111: Log-periodic antenna (300 ~ 1000 MHz)

e) Schwarzbeck, Model BBHA 9120D: Double ridged horn antenna (1 ~ 18 GHz)

7. TEST DATA

7-1. Power line conducted emissions (§ 15.107)

Product: 20.1" LCD Monitor
Model: L20MP-*, L20MB-*

Serial No.: N/A
Test Date: February 27, 2004

Detector: Quasi-peak /Average
Test Limit: Class B

a) LG Philips LCD panel : Analog Mode (1600 X 1200@60 Hz)

Frequency (MHz)	Quasi-Peak (dBuV)			Average (dBuV)			Phase (L1/L2)
	Tested Level	Limit	Margin (dB)	Tested Level	Limit	Margin (dB)	
0.19	46.6	63.9	-17.3	37.6	53.9	-16.3	L1
0.25	41.3	61.9	-20.6	35.3	51.9	-16.6	L2
0.29	44.4	60.7	-16.3	42.2	50.7	-8.5	L2

b) LG Philips LCD panel: Digital Mode (1600 X 1200@60 Hz)

Frequency (MHz)	Quasi-Peak (dBuV)			Average (dBuV)			Phase (L1/L2)
	Tested Level	Limit	Margin (dB)	Tested Level	Limit	Margin (dB)	
0.19	49.8	63.9	-14.1	41.3	53.9	-12.6	L2
0.20	45.1	63.8	-18.7	37.6	53.8	-16.2	L1
0.30	44.3	60.5	-16.2	42.1	50.5	-8.4	L2

c) AU LCD panel : Analog Mode (1600 X 1200@60 Hz)

Frequency (MHz)	Quasi-Peak (dBuV)			Average (dBuV)			Phase (L1/L2)
	Tested Level	Limit	Margin (dB)	Tested Level	Limit	Margin (dB)	
0.20	46.8	63.7	-16.9	39.7	53.7	-14.0	L2
0.25	35.1	61.9	-26.8	35.2	51.9	-16.7	L1
0.47	46.5	56.9	-10.4	20.5	46.9	-26.4	L1

d) AU LCD panel : Digital Mode (1600 X 1200@60 Hz)

Frequency (MHz)	Quasi-Peak (dBuV)			Average (dBuV)			Phase (L1/L2)
	Tested Level	Limit	Margin (dB)	Tested Level	Limit	Margin (dB)	
0.19	49.0	64.1	-15.1	35.2	54.1	-18.9	L2
0.70	39.4	56.0	-16.6	29.8	46.0	-16.2	L1
1.30	35.2	56.0	-20.8	28.2	46.0	-17.8	L1

e) Fujitsu LCD panel : Analog Mode (1600 X 1200@60 Hz)

Frequency (MHz)	Quasi-Peak (dBuV)			Average (dBuV)			Phase (L1/L2)
	Tested Level	Limit	Margin (dB)	Tested Level	Limit	Margin (dB)	
0.24	46.9	62.2	-15.3	43.7	52.2	-8.5	L1
0.32	45.3	60.0	-14.7	42.2	50.0	-7.8	L1
0.79	33.7	56.0	-22.3	33.5	46.0	-12.5	L1

f) Fujitsu LCD panel : Digital Mode (1600 X 1200@60 Hz)

Frequency (MHz)	Quasi-Peak (dBuV)			Average (dBuV)			Phase (L1/L2)
	Tested Level	Limit	Margin (dB)	Tested Level	Limit	Margin (dB)	
0.20	46.7	63.7	-17.0	34.9	53.7	-18.8	L1
0.41	40.2	58.0	-17.8	35.0	48.0	-13.0	L1
0.90	35.7	56.0	-20.3	27.0	46.0	-19.0	L1

Result: Positive

NOTES:

1. All modes of operation were investigated.
2. The EUT was tested under the condition that all of support device and accessories described in clause 9 in this test report was connected and normally operated during the testing.
3. All other emissions are non-significant.
4. Phase L1 = Hot Phase L2 = Neutral

7-2. Radiated emissions (§ 15.109)

Product: 20.1" LCD Monitor
Model: L20MP-*, L20MB-*

Serial No.: N/A
Test Date: February 28, 2004

Detector: Quasi-peak

Test distance: 10m

Test Limit: CISPR 22 Class B

a) LG Philips LCD panel : Analog Mode (1600 X 1200@60 Hz)

Frequency (MHz)	Reading (dBuV)	AF (dB/m)	CL (dB)	Pol.	F/S (dBuV/m)	Limit (dBuV/m)	Margin (dB)
62.88	18.2	7.1	1.1	V	26.3	30.0	-3.7
108.88	13.7	9.1	1.3	V	24.1	30.0	-5.9
599.36	11.8	17.3	3.2	V	32.3	37.0	-4.7

b) LG Philips LCD panel : Digital Mode (1600 X 1200@60 Hz)

Frequency (MHz)	Reading (dBuV)	AF (dB/m)	CL (dB)	Pol.	F/S (dBuV/m)	Limit (dBuV/m)	Margin (dB)
47.96	12.7	12.4	0.9	V	26.0	30.0	-4.0
62.88	18.1	7.1	1.1	V	26.2	30.0	-3.8
630.00	7.4	19.0	3.5	H	29.9	37.0	-7.1

c) AU LCD panel : Analog Mode (1600 X 1200@60 Hz)

Frequency (MHz)	Reading (dBuV)	AF (dB/m)	CL (dB)	Pol.	F/S (dBuV/m)	Limit (dBuV/m)	Margin (dB)
124.00	14.1	9.1	1.3	V	24.5	30.0	-5.5
891.00	4.7	20.7	4.0	H	29.4	37.0	-7.6
915.92	2.4	23.5	4.2	H	30.1	37.0	-6.9

d) AU LCD panel : Digital Mode (1600 X 1200@60 Hz)

Frequency (MHz)	Reading (dBuV)	AF (dB/m)	CL (dB)	Pol.	F/S (dBuV/m)	Limit (dBuV/m)	Margin (dB)
126.72	11.3	11.7	1.5	V	24.5	30.0	-5.5
315.00	12.2	14.8	2.5	V	29.4	37.0	-7.6
833.76	5.4	20.7	4.0	V	30.1	37.0	-6.9

e) Fujitsu LCD panel : Analog Mode (1600 X 1200@60 Hz)

Frequency (MHz)	Reading (dBuV)	AF (dB/m)	CL (dB)	Pol.	F/S (dBuV/m)	Limit (dBuV/m)	Margin (dB)
60.44	15.4	7.1	1.1	V	23.5	30.0	-6.5
833.20	8.3	20.7	4.0	H	33.0	37.0	-4.0

f) Fujitsu LCD panel : Digital Mode (1600 X 1200@60 Hz)

Frequency (MHz)	Reading (dBuV)	AF (dB/m)	CL (dB)	Pol.	F/S (dBuV/m)	Limit (dBuV/m)	Margin (dB)
157.48	8.6	13.6	1.7	V	23.9	30.0	-6.1
833.00	5.4	20.7	4.0	H	30.1	37.0	-6.9
915.84	3.4	23.5	4.2	H	31.1	37.0	-5.9

Detector: Average

Test distance: 3m

Test Limit: FCC Part 15 Class B

About all test cases

Frequency(GHz)	Reading(dBuV)	AF(dB/m)	CL(dB)	Pol.	F/S(dBuV/m)	Limit(dBuV/m)	Margin(dB)
1 ~ 2	<<	-	-	H/V	<<	54.0	Above 10 dB

* There is no significant level.

Result: Positive

* Limit

30 - 230 MHz: 30.0 dBuV/m

230 - 1000 MHz: 37.0 dBuV/m

1GHz – 2GHz: 54.0 dBuV/m

NOTES:

1. All modes of operation were investigated.
2. The limits of CISPR 22 Class B apply in this conducted emissions test according to § 15.109.g).
3. The EUT was tested under the condition that all of support device and accessories described in clause 9 in this test report was connected and normally operated during the testing.
4. All cables were maximized on the testing.
5. All other emissions are non-significant.
6. AF = Antenna factor CL = Cable loss F/S = Field Strength

8. LIST OF INSTRUMENTS USED

Type	Maker	Model	Cal. Date	N Date
Test receiver	R&S	ESIB7	10-Oct.-03	11-Oct.-04
LISN	R&S	ESH3-Z5	07-Jul.-03	07-Jul.-04
LISN	R&S	ESH3-Z5	03-Nov.-03	03-Nov.-04
Biconical antenna	S/B	VHBB 9124	21-Nov-03	21-Dec.-04
Log-periodic antenna	S/B	VUSLP 9111	21-Nov-03	21-Dec.-04
Tuned dipole antenna	S/B	VHAP	21-Nov-03	21-Dec.-04
Tuned dipole antenna	S/B	UHAP	21-Nov-03	21-Dec.-04
Double ridged horn antenna	S/B	BBHA 9120D	13-Oct.-03	13-Oct.-04

R&S: Rohde & Schwarz

S/B: Schwarzbeck

Cal. Date: Calibration date

N Date: Next calibration date

9. SUPPORT DEVICE & ACCESSORIES USED

9-1. Support device

9-1-1. Desktop computer

Model:	G7-600
Maker:	Gateway
S/N:	01141853
FCC ID:	DOC (CLASS B)

9-1-2. Keyboard

Model:	SK-2511A
Maker:	H/P
S/N:	M010208088
FCC ID:	GYUR73SK

9-1-3. Computer USB Mouse

Model:	CM-B700
Maker:	Chic Technology Co.
S/N:	000072357
FCC ID:	IOWCM-B700

9-1-4. Printer

Model:	C6427A
Maker:	H/P
S/N:	CN17C1C0FP
FCC ID:	DOC (CLASS B)

9-1-5. Modem

Model:	0701
Maker:	US ROBOTICS
S/N:	24LGG8DB0673
FCC ID:	DOC (CLASS B)

9-1-6. Graphic Card

Model:	Geforce 4 Ti 4200
Maker:	SUMA
S/N:	14612382290180
FCC ID:	DOC (CLASS B)