



FCC EVALUATION REPORT FOR CERTIFICATION

Manufacturer : LG Electronics Inc.

642, Jinpyung-Dong, Gumi-Si

Gyeongsangbuk-Do, 730-360, Korea

Attn: Mr. Sang-Wook Lee, Chief research engineer

Date of Issue : September 2, 2008

Test Report Number: GETEC-E3-08-038

Test Site : Gumi College EMC Center
(Registration No.: 100749)

FCC ID.: BEJW2294TT

Applicant.: LG Electronics Inc.

Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: LCD Monitor
Type of Authority	: Certification
Model Name	: W2294TT
Trade Name	: LG

This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003 / Canadian standard ICES-003

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested by,

Reviewed by,


Hyoung Seop Kim, Associate Engineer
GUMI College EMC center


Tae-Sig Park, Technical Manager
GUMI College EMC center

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

1. General Information

Applicant: LG Electronics Inc.

Applicant Address: 642, Jinpyung-Dong, Gumi-Si, Gyeongsangbuk-do, Korea

Manufacturer: LG Electronics Inc.

Manufacturer Address: 642, Jinpyung-Dong, Gumi-Si, Gyeongsangbuk-do, Korea

Contact Person: Mr. Sang -Wook Lee, Chief research engineer

Tel No.: +82-54-470-5430

- **FCC ID** BEJW2294TT
- **EUT Type** LCD Monitor
- **Model Name** W2294TT
- **Trade Name** LG
- **Serial Number** Proto type
- **Rule Part(s)** FCC Part 15 Subpart B
- **Type of Authority** Certification
- **Test Procedure(s)** ANSI C63.4 (2003) / Canadian standard ICES-003
- **Dates of Test** August 27 ~ 29, 2008
- **Place of Test** **Gumi College EMC Center** (FCC Registration No.: 100749)
407, Bugok-Dong, Gumi-si, Gyeongsangbuk-Do, Korea
- **Test Report Number** GETEC-E3-08-038
- **Dates of Issue** September 2, 2008

2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ASNI C63.4-2003) was used in determining radiated and conducted emissions emanating from **LG Electronics Inc. LCD Monitor (Model Name: W2294TT)**

These measurement tests were conducted at **Gumi College EMC Center**.

The site address is 407, Bugok-Dong, Gumi-si, Gyeongsangbuk-Do, Korea

This test site is one of the highest point of Gumi 1 college at about 200 km away from Seoul city and 40 km away from Daegu city. It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures. The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.4 on October 19, 1992



Fig 1. The map above shows the Gumi College in vicinity area.

3. Product Information

3.1 Description of EUT

The Equipment under Test (EUT) is the **LG Electronics Inc. LCD Monitor (Model Name: W2294TT) FCC ID.: BEJW2294TT**

Display	22 inches (55.867 cm) Flat Panel Active matrix-TFT LCD Anti-Glare coating Visible diagonal size : 55.867 cm 0.282 mm pixel pitch	
Sync Input	Horizontal Freq.	30 - 83 kHz (Automatic)
	Vertical Freq.	56 - 75 Hz (Automatic)
	Input Form	Separate Sync. SOG (Sync On Green) Digital
Video Input	Signal Input	15 pin D-Sub Connector DVI-D Connector (Digital)
	Input Form	RGB Analog (0.7 Vp-p/ 75 ohm), Digital
Resolution	Max	VESA 1680 x 1050 @60 Hz
	Recommend	VESA 1680 x 1050 @60 Hz
Plug&Play	DDC 2B	
Power Consumption	On Mode	: 45W(Typ.), 50W(Max)
	Sleep Mode	≤ 1 W
	Off Mode	≤ 1 W
Dimensions & Weight	With Stand	
	Width	52.5 cm / 20.67 inches
	Height	43.37 cm / 17.07 inches
	Depth	19.32 cm / 7.61 inches
	Weight(excl. packing)	4.0 kg (8.82 lbs)
Range	Without Stand	
	Width	52.5 cm / 20.46 inches
Power Input	41.71 cm / 16.42 inches	
	9.06 cm / 3.57 inches	
AC-DC Adapter	DVE, DSA-50W-12 or LienChang LCAP08	

-. Used AC/DC Adapter

: - LCAO08F(LIEN CHANG)

Input: AC 100-240V, 50-60Hz, 1.2A

Output: DC 12V, 3.5A

- DSA-50W-12(DVE)

Input: AC 100-240V, 50-60Hz, 1.0A

Output: DC 12V, 3.5A

3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model No.	S/N & FCC ID
PC	Hewlett Packard	D530	S/N: CNG34800PY FCC ID: DoC
Video card	ATI	ATI RV360(9600)	S/N: SN0402017176 FCC ID: DoC
Printer	Hewlett Packard	970CXI	S/N: MY9B01F1FG FCC ID: DoC
Serial Mouse	LOGITECH	M-S69	S/N: 334684-108 FCC ID: JNZ211443
Key-board	COMPAQ	166516-AD6	S/N: B13BBOR391006D FCC ID: DoC
Joystick	Microsoft	X05-92626	S/N: 9262600296169 FCC ID: DoC

See "Appendix E – Test Setup Photographs" for actual system test set-up

3.2.2 Used Cable(s)

Cable No.	Condition	Description
Power cable	Connected to the Adapter	1.8 m unshielded
Adapter cable(DVE)	Connected to the EUT	1.25 m unshielded
Adapter cable(LIEN CHANG)	Connected to the EUT	1.25 m unshielded with a ferrite core
Video(D-sub)cable	Connected to the EUT and PC	1.8 m shielded with two ferrite cores
Video(DVI-D)cable	Connected to the EUT and PC	1.8 m shielded with two ferrite cores

3.3 Modification Item(s)

- None

4. Description of tests

4.1 Test Condition

The EUT was installed, arranged and operated in a manner that is most representative of equipment as typically used. The measurements were carried out while varying operating modes and cable positions within typically arrangement to determine maximum emission level.

The representative and worst test mode(s) were noted in the test report.

- Test Voltage / Frequency : AC 120 V / 60 Hz
- Test Mode(s)
 - . Monitor mode
 - . Radiated emission: 1 680 * 1 050 / 60 Hz (Analog, Digital)
 - . Conducted emission: 1 680 * 1 050 / 60 Hz (Analog, Digital)
1 024 * 768 / 60 Hz (Analog), 800 * 600 / 60 Hz (Analog)
- Operating test pattern
 - . "H" character scrolling mode (Font size: 10)
 - . Black background white character
 - . Brightness and contrast was adjusted as maximum level

4.2 Conducted Emission

The Line conducted emission test facility is inside a 4 m × 8 m × 2.5 m shielded enclosure.

The EUT was placed on a non-conducting 1.0 m by 1.5 m table, which is 0.8 m in height and 0.4 m away from the vertical wall of the shielded enclosure.

The EUT is powered from the Rohde & Schwarz LISN (ESH2-Z5) and the support equipment is powered from the Rohde & Schwarz LISN (ESH3-Z5). Powers to the LISN are filtered by high-current high insertion loss power line filter.

Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

The RF output of the LISN was connected to the EMI test receiver (Rohde & Schwarz, ESCS30).

The EMI test receiver was scanned from 150 kHz to 30 MHz with 20 ms sweep time to determine the frequency producing the maximum EME from the EUT. The frequency producing the maximum level was re-examined using Quasi-Peak mode of the EMI test receiver.

The bandwidth of Quasi-peak mode was set to 9 kHz. Each emission was maximized consistent with typical applications by varying the configuration of the test sample. Interface cables were connected to the available interface ports of the test unit. The effect of varying the position of cables was investigated to find the configuration that produces maximum diagram emission. Excess cable lengths were bundled at center with 30 cm– 40 cm.

Each EME reported was calibrated using the R/S signal generator

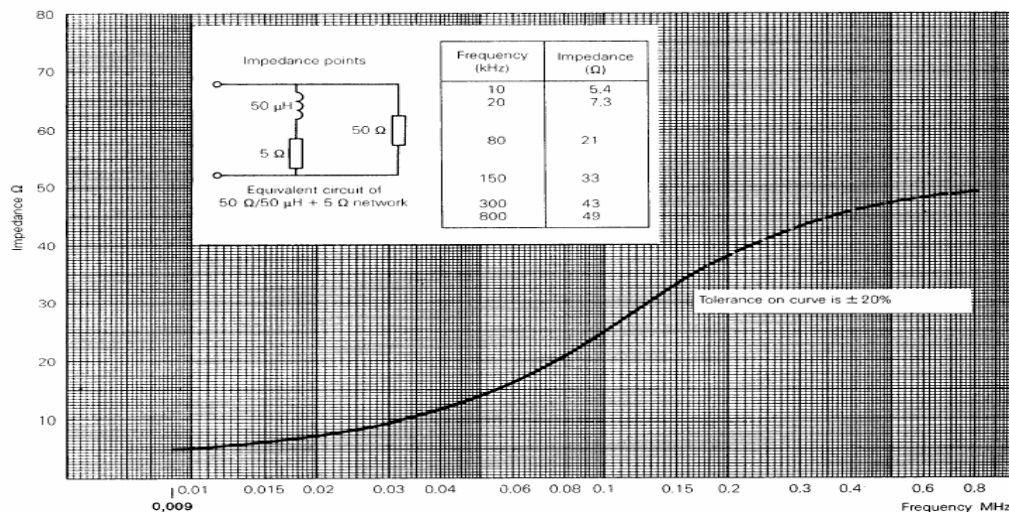


Fig 2. Impedance of LISN

4.3 Radiated Emission

Preliminary measurements were conducted 3 m semi anechoic chamber using broadband antennas to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The technology configuration, mode of operation and turntable azimuth with respect to antenna was note for each frequency found.

The spectrum was scanned from 30 MHz to 1 000 MHz using bicornical log antenna (Schwarzbeck, VULB9160). Above 1 GHz, horn antenna (Schwarzbeck, BBHA9120D) was used.

Final measurements were made outdoors at 3 m /10 m test range.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during pre-scan measurements was re-examined and investigated using EMI test receiver. The detector function was set to CISPR quasi-peak mode average mode and the bandwidth of the receiver was set to 120 kHz or 1 MHz depending on the frequency or type of signal.

The EUT, support equipment and interconnecting cables were reconfigured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8 m high non-metallic 1.0 m × 1.5 m table.

The turntable containing the test sample was rotated; the antenna height was varied 1 to 4 meter and stopped at the azimuth or height producing the maximum emission.

Each EME reported was calibrated using the R/S signal generator

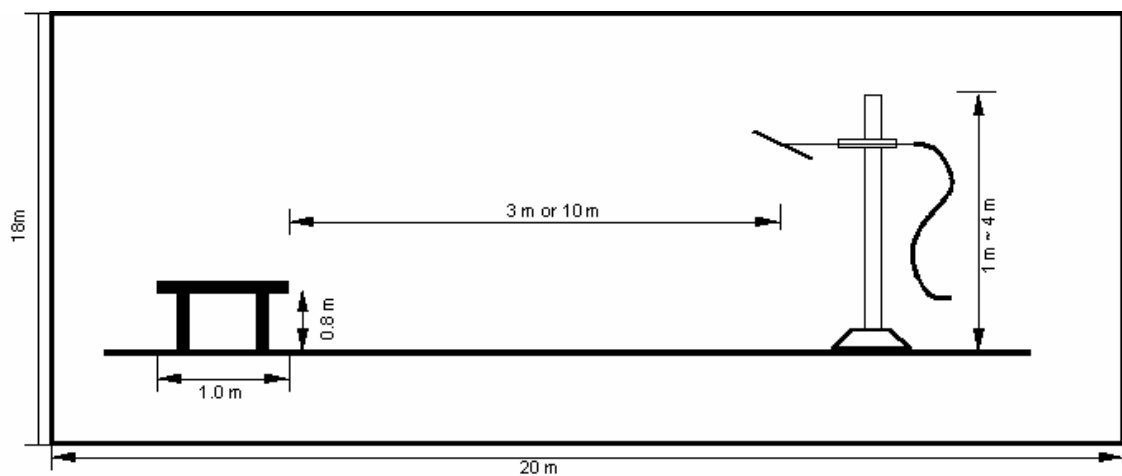


Fig 3. Dimensions of Open Site Test Area

5. Conducted Emission

5.1 Operating environment

Temperature : 26 °C
Relative humidity : 59 %R.H.

5.2 Test set-up

The conducted emission measurements were performed in the shielded room.

The EUT was placed on wooden table, 0.8 m heights above the floor, 0.4 m from the reference ground plane (GRP) wall and 0.8 m from AMN.

AMN is bonded on horizontal reference ground plane.

The ground plane, which was electrically bonded to the shield room, ground system and all power lines entering the shield room, were filtered.

5.3 Measurement uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement.”

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

Test items	Uncertainty	Remark
Conducted emission (9 kHz ~ 150 kHz)	± 2.97 dB	Confidence levels of 95 % (k=2)
Conducted emission (150 kHz ~ 30 MHz)	± 4.05 dB	Confidence levels of 95 % (k=2)

5.4 Limit

RFI Conducted	FCC Limit(dB) Class B	
Freq. Range	Quasi-Peak	Average
150 kHz – 0.5 MHz	66 – 56*	56 – 46*
0.5 MHz – 5 MHz	56	46
5 MHz – 30 MHz	60	50
*Limits decreases linearly with the logarithm of frequency.		

5.5 Test equipment used

Model Name	Manufacturer	Description	Serial Number	Due to calibration
■ - ESCS30	Rohde & Schwarz	EMI test receiver	839809/003	12. 14. 2008
■ - ESH3-Z5	Rohde & Schwarz	Artificial mains network	838979/020	12. 13. 2008
■ - ESH2-Z5	Rohde & Schwarz	Artificial mains network	829991/009	12. 13. 2008

5.6 Test data for power line conducted emission

- Test Date : August 28, 2008
 - Resolution bandwidth : 9 kHz
 - Frequency range : 0.15 MHz ~ 30 MHz

(Adapter: DVE)

◆ Test resolution: 1680 * 1 050 / 60 Hz (Analog)

Frequency (MHz)	Insertion Loss	Cable Loss	Line	Q.P[dB μ V]			A.V[dB μ V]			Margin[dB μ V]	
				Limit	Reading	Result	Limit	Reading	Result	Q.P	A.V
0.194	0.12	-0.22	N	63.86	46.80	46.70	53.86	32.20	32.10	17.16	21.76
0.470	0.15	-0.16	L1	56.51	39.81	39.80	46.51	29.31	29.30	16.71	17.21
0.526	0.15	-0.19	L1	56.00	39.24	39.20	46.00	29.84	29.80	16.80	16.20
0.710	0.14	-0.23	L1	56.00	37.89	37.80	46.00	24.89	24.80	18.20	21.20
1.046	0.15	-0.23	L1	56.00	37.38	37.30	46.00	24.58	24.50	18.70	21.50
1.594	0.17	-0.28	L1	56.00	37.61	37.50	46.00	27.21	27.10	18.50	18.90
4.586	0.25	-0.15	L1	56.00	38.10	38.20	46.00	29.80	29.90	17.80	16.10
10.878	0.42	0.00	N	60.00	31.98	32.40	50.00	25.48	25.90	27.60	24.10
14.898	0.62	0.07	N	60.00	34.51	35.20	50.00	28.61	29.30	24.80	20.70
19.822	0.93	0.00	L1	60.00	41.07	42.00	50.00	37.37	38.30	18.00	11.70
21.946	0.98	0.13	L1	60.00	32.79	33.90	50.00	32.59	33.70	26.10	16.30

*Comment : Line : L1(line 1), L2(line2), L3(line 3), N(neutral)
 Q.P:Quasi-peak, A.V : Average
 Insertion Loss : Insertion Loss of LISN
 Cable Loss : Cable Loss + Pulse Limiter Insertion loss value
 "<<" : The margin is more than 30 dB

◆ Test resolution: 1680 * 1 050 / 60 Hz (HDMI)

Frequency (MHz)	Insertion Loss	Cable Loss	Line	Q.P[dB μ V]			A.V[dB μ V]			Margin[dB μ V]	
				Limit	Reading	Result	Limit	Reading	Result	Q.P	A.V
0.150	0.12	-0.14	N	66.00	55.32	55.30	56.00	37.52	37.50	10.70	18.50
0.186	0.12	-0.20	N	64.21	49.68	49.60	54.21	36.38	36.30	14.61	17.91
0.238	0.13	-0.21	N	62.16	43.18	43.10	52.16	29.58	29.50	19.06	22.66
0.394	0.14	-0.12	L1	57.97	38.18	38.20	47.97	26.38	26.40	19.77	21.57
0.470	0.15	-0.16	L1	56.51	39.71	39.70	46.51	30.21	30.20	16.81	16.31
0.530	0.15	-0.19	L1	56.00	39.14	39.10	46.00	28.74	28.70	16.90	17.30
0.754	0.14	-0.23	L1	56.00	37.39	37.30	46.00	25.49	25.40	18.70	20.60
1.022	0.15	-0.23	L1	56.00	37.48	37.40	46.00	28.48	28.40	18.60	17.60
1.326	0.16	-0.26	L1	56.00	37.20	37.10	46.00	26.60	26.50	18.90	19.50
3.286	0.21	-0.14	L1	56.00	37.33	37.40	46.00	30.13	30.20	18.60	15.80
4.578	0.25	-0.15	L1	56.00	33.90	34.00	46.00	27.20	27.30	22.00	18.70
6.678	0.31	-0.12	L1	60.00	35.71	35.90	50.00	26.81	27.00	24.10	23.00
14.594	0.59	0.08	L1	60.00	35.53	36.20	50.00	30.43	31.10	23.80	18.90
21.946	0.98	0.13	L1	60.00	36.39	37.50	50.00	35.19	36.30	22.50	13.70

*Comment : Line : L1(line 1), L2(line2), L3(line 3), N(neutral)
Q.P:Quasi-peak, A.V : Average
Insertion Loss : Insertion Loss of LISN
Cable Loss : Cable Loss + Pulse Limiter Insertion loss value
"<<" : The margin is more than 30 dB

◆ Test resolution: 1 024 * 768 / 60 Hz (Analog)

Frequency (MHz)	Insertion Loss	Cable Loss	Line	Q.P[dB μ V]			A.V[dB μ V]			Margin[dB μ V]	
				Limit	Reading	Result	Limit	Reading	Result	Q.P	A.V
0.150	0.12	-0.14	N	66.00	50.42	50.40	56.00	33.72	33.70	15.60	22.30
0.194	0.12	-0.22	N	63.86	44.40	44.30	53.86	32.20	32.10	19.56	21.76
0.514	0.15	-0.18	L1	56.00	35.83	35.80	46.00	25.23	25.20	20.20	20.80
0.822	0.14	-0.23	L1	56.00	34.79	34.70	46.00	21.89	21.80	21.30	24.20
1.466	0.16	-0.27	L1	56.00	34.01	33.90	46.00	22.91	22.80	22.10	23.20
1.834	0.18	-0.31	L1	56.00	34.83	34.70	46.00	22.93	22.80	21.30	23.20
2.162	0.18	-0.29	L1	56.00	32.31	32.20	46.00	20.71	20.60	23.80	25.40
4.406	0.24	-0.15	L1	56.00	34.71	34.80	46.00	27.11	27.20	21.20	18.80
12.342	0.49	0.02	N	60.00	36.79	37.30	50.00	29.49	30.00	22.70	20.00
12.986	0.53	0.06	N	60.00	40.51	41.10	50.00	35.21	35.80	18.90	14.20
19.686	0.82	0.00	N	60.00	39.08	39.90	50.00	35.88	36.70	20.10	13.30
23.158	1.01	0.05	L1	60.00	37.14	38.20	50.00	35.24	36.30	21.80	13.70

*Comment : Line : L1(line 1), L2(line2), L3(line 3), N(neutral)
 Q.P:Quasi-peak, A.V : Average
 Insertion Loss : Insertion Loss of LISN
 Cable Loss : Cable Loss + Pulse Limiter Insertion loss value
 "<<" : The margin is more than 30 dB

◆ Test resolution: 800 * 600 / 60 Hz (Analog)

Frequency (MHz)	Insertion Loss	Cable Loss	Line	Q.P[dB μ V]			A.V[dB μ V]			Margin[dB μ V]	
				Limit	Reading	Result	Limit	Reading	Result	Q.P	A.V
0.154	0.12	-0.15	N	65.78	43.83	43.80	55.78	30.33	30.30	21.98	25.48
0.238	0.12	-0.21	L1	62.16	39.39	39.30	52.16	31.89	31.80	22.86	20.36
0.382	0.14	-0.13	L1	58.23	36.69	36.70	48.23	27.69	27.70	21.53	20.53
0.538	0.15	-0.20	L1	56.00	36.85	36.80	46.00	26.35	26.30	19.20	19.70
1.842	0.18	-0.31	L1	56.00	34.43	34.30	46.00	22.23	22.10	21.70	23.90
2.302	0.19	-0.27	N	56.00	32.88	32.80	46.00	22.68	22.60	23.20	23.40
3.474	0.22	-0.14	L1	56.00	34.22	34.30	46.00	22.52	22.60	21.70	23.40
4.486	0.25	-0.15	L1	56.00	33.80	33.90	46.00	24.80	24.90	22.10	21.10
7.426	0.34	-0.05	N	60.00	32.51	32.80	50.00	21.91	22.20	27.20	27.80
12.318	0.47	0.02	L1	60.00	34.21	34.70	50.00	30.01	30.50	25.30	19.50
13.402	0.53	0.08	L1	60.00	38.49	39.10	50.00	32.69	33.30	20.90	16.70
14.990	0.63	0.06	N	60.00	37.51	38.20	50.00	30.51	31.20	21.80	18.80
25.594	1.07	0.09	L1	60.00	34.64	35.80	50.00	33.04	34.20	24.20	15.80

*Comment : Line : L1(line 1), L2(line2), L3(line 3), N(neutral)
 Q.P:Quasi-peak, A.V : Average
 Insertion Loss : Insertion Loss of LISN
 Cable Loss : Cable Loss + Pulse Limiter Insertion loss value
 "<<" : The margin is more than 30 dB

(Adapter: LIEN CHANG)

◆ Test resolution: 1680 * 1 050 / 60 Hz (Analog)

Frequency (MHz)	Insertion Loss	Cable Loss	Line	Q.P[dB μ V]			A.V[dB μ V]			Margin[dB μ V]	
				Limit	Reading	Result	Limit	Reading	Result	Q.P	A.V
0.190	0.12	-0.21	L1	64.03	47.39	47.30	54.03	35.99	35.90	16.73	18.13
0.246	0.12	-0.20	L1	61.89	40.48	40.40	51.89	26.88	26.80	21.49	25.09
1.010	0.15	-0.23	N	56.00	31.58	31.50	46.00	21.08	21.00	24.50	25.00
1.478	0.16	-0.27	N	56.00	34.81	34.70	46.00	26.21	26.10	21.30	19.90
1.894	0.18	-0.31	L1	56.00	34.93	34.80	46.00	26.33	26.20	21.20	19.80
2.250	0.19	-0.28	L1	56.00	33.49	33.40	46.00	24.29	24.20	22.60	21.80
3.594	0.22	-0.14	L1	56.00	35.42	35.50	46.00	28.62	28.70	20.50	17.30
4.694	0.25	-0.15	L1	56.00	38.20	38.30	46.00	31.10	31.20	17.70	14.80
5.366	0.27	-0.17	L1	60.00	41.10	41.20	50.00	34.10	34.20	18.80	15.80
7.206	0.32	-0.07	L1	60.00	41.35	41.60	50.00	34.95	35.20	18.40	14.80
10.142	0.36	0.00	L1	60.00	36.24	36.60	50.00	27.24	27.60	23.40	22.40
12.434	0.48	0.03	L1	60.00	38.69	39.20	50.00	29.89	30.40	20.80	19.60
19.822	0.93	0.00	L1	60.00	36.47	37.40	50.00	33.17	34.10	22.60	15.90

*Comment : Line : L1(line 1), L2(line2), L3(line 3), N(neutral)
 Q.P:Quasi-peak, A.V : Average
 Insertion Loss : Insertion Loss of LISN
 Cable Loss : Cable Loss + Pulse Limiter Insertion loss value
 "<<" : The margin is more than 30 dB

◆ Test resolution: 1680 * 1 050 / 60 Hz (HDMI)

Frequency (MHz)	Insertion Loss	Cable Loss	Line	Q.P[dB μ V]			A.V[dB μ V]			Margin[dB μ V]	
				Limit	Reading	Result	Limit	Reading	Result	Q.P	A.V
0.182	0.11	-0.20	L1	64.39	45.19	45.10	54.39	35.09	35.00	19.29	19.39
0.254	0.13	-0.20	L1	61.62	38.37	38.30	51.62	27.87	27.80	23.32	23.82
1.038	0.15	-0.23	L1	56.00	32.18	32.10	46.00	20.38	20.30	23.90	25.70
1.718	0.17	-0.29	L1	56.00	36.12	36.00	46.00	26.62	26.50	20.00	19.50
2.262	0.19	-0.27	N	56.00	34.78	34.70	46.00	24.08	24.00	21.30	22.00
2.582	0.20	-0.22	N	56.00	34.32	34.30	46.00	23.62	23.60	21.70	22.40
3.954	0.23	-0.14	L1	56.00	36.71	36.80	46.00	27.71	27.80	19.20	18.20
4.770	0.25	-0.16	L1	56.00	37.51	37.60	46.00	28.61	28.70	18.40	17.30
5.434	0.27	-0.17	L1	60.00	40.50	40.60	50.00	31.40	31.50	19.40	18.50
7.682	0.33	-0.03	L1	60.00	39.40	39.70	50.00	31.20	31.50	20.30	18.50
10.218	0.36	0.00	L1	60.00	36.94	37.30	50.00	27.74	28.10	22.70	21.90
12.546	0.48	0.03	L1	60.00	38.39	38.90	50.00	31.19	31.70	21.10	18.30
19.822	0.93	0.00	L1	60.00	36.87	37.80	50.00	33.57	34.50	22.20	15.50
24.378	1.04	0.02	L1	60.00	32.04	33.10	50.00	30.14	31.20	26.90	18.80

*Comment : Line : L1(line 1), L2(line2), L3(line 3), N(neutral)
Q.P:Quasi-peak, A.V : Average
Insertion Loss : Insertion Loss of LISN
Cable Loss : Cable Loss + Pulse Limiter Insertion loss value
"<<" : The margin is more than 30 dB

◆ Test resolution: 1 024 * 768 / 60 Hz (Analog)

Frequency (MHz)	Insertion Loss	Cable Loss	Line	Q.P[dB μ V]			A.V[dB μ V]			Margin[dB μ V]	
				Limit	Reading	Result	Limit	Reading	Result	Q.P	A.V
0.182	0.11	-0.20	L1	64.39	50.09	50.00	54.39	38.59	38.50	14.39	15.89
0.250	0.13	-0.20	L1	61.75	42.77	42.70	51.75	30.87	30.80	19.05	20.95
0.306	0.13	-0.17	L1	60.07	37.54	37.50	50.07	22.74	22.70	22.57	27.37
0.446	0.14	-0.15	L1	56.94	30.01	30.00	46.94	14.61	14.60	26.94	32.34
2.382	0.19	-0.25	N	56.00	30.06	30.00	46.00	19.36	19.30	26.00	26.70
3.274	0.22	-0.14	N	56.00	34.92	35.00	46.00	17.82	17.90	21.00	28.10
4.174	0.24	-0.14	L1	56.00	34.20	34.30	46.00	24.90	25.00	21.70	21.00
4.574	0.25	-0.15	L1	56.00	38.70	38.80	46.00	27.40	27.50	17.20	18.50
6.446	0.32	-0.14	N	60.00	38.62	38.80	50.00	32.32	32.50	21.20	17.50
8.774	0.35	0.00	N	60.00	39.25	39.60	50.00	31.25	31.60	20.40	18.40
12.190	0.48	0.01	N	60.00	43.31	43.80	50.00	32.11	32.60	16.20	17.40
27.518	1.14	0.11	L1	60.00	31.75	33.00	50.00	30.55	31.80	27.00	18.20

*Comment : Line : L1(line 1), L2(line2), L3(line 3), N(neutral)
 Q.P:Quasi-peak, A.V : Average
 Insertion Loss : Insertion Loss of LISN
 Cable Loss : Cable Loss + Pulse Limiter Insertion loss value
 "<<" : The margin is more than 30 dB

◆ Test resolution: 800 * 600 / 60 Hz (Analog)

Frequency (MHz)	Insertion Loss	Cable Loss	Line	Q.P[dB μ V]			A.V[dB μ V]			Margin[dB μ V]	
				Limit	Reading	Result	Limit	Reading	Result	Q.P	A.V
0.186	0.11	-0.20	L1	64.21	46.59	46.50	54.21	35.39	35.30	17.71	18.91
0.254	0.13	-0.20	L1	61.62	38.27	38.20	51.62	26.17	26.10	23.42	25.52
1.902	0.18	-0.31	L1	56.00	31.83	31.70	46.00	22.83	22.70	24.30	23.30
2.510	0.20	-0.23	N	56.00	31.23	31.20	46.00	19.83	19.80	24.80	26.20
3.586	0.22	-0.14	L1	56.00	36.12	36.20	46.00	26.52	26.60	19.80	19.40
4.502	0.25	-0.15	L1	56.00	37.80	37.90	46.00	27.10	27.20	18.10	18.80
4.610	0.25	-0.15	L1	56.00	40.30	40.40	46.00	31.20	31.30	15.60	14.70
5.810	0.28	-0.18	L1	60.00	41.70	41.80	50.00	32.70	32.80	18.20	17.20
12.262	0.47	0.02	L1	60.00	43.31	43.80	50.00	34.71	35.20	16.20	14.80
19.690	0.92	0.00	L1	60.00	35.78	36.70	50.00	32.18	33.10	23.30	16.90
24.762	1.04	0.04	L1	60.00	32.52	33.60	50.00	29.92	31.00	26.40	19.00
27.406	1.13	0.11	L1	60.00	31.56	32.80	50.00	29.06	30.30	27.20	19.70

*Comment : Line : L1(line 1), L2(line2), L3(line 3), N(neutral)
 Q.P:Quasi-peak, A.V : Average
 Insertion Loss : Insertion Loss of LISN
 Cable Loss : Cable Loss + Pulse Limiter Insertion loss value
 "<<" : The margin is more than 30 dB

6. Radiated Emission

6.1 Operating environment

Temperature : 24 °C
Relative humidity : 50 %R.H.

6.2 Test set-up

A preliminary scan with peak mode was performed in the semi anechoic chamber and found frequency for open area test site.

The formal radiated emission was measured at 3 m/ 10 m-distance open area test site.

The EUT was placed on a non-conductive turntable approximately 0.8 m above the ground plane.

The turntable with EUT was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels.

This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

6.3 Measurement uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement”.

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

Test items	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 3 m, Vertical)	± 3.54 dB	Confidence levels of 95 % (k=2)
Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)	± 3.49 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)	± 3.85 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal)	± 3.76 dB	Confidence levels of 95 % (k=2)
Radiated emission (30 MHz ~ 300 MHz, 10 m, Vertical)	± 3.21 dB	Confidence levels of 95 % (k=2)
Radiated emission (30 MHz ~ 300 MHz, 10 m, Horizontal)	± 3.32 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Vertical)	± 3.77 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Horizontal)	± 3.84 dB	Confidence levels of 95 % (k=2)

6.4 Limit

Frequency (MHz)	FCC Limit @ 3 m. dB μ V/m	CISPR Limit @ 10 m. dB μ V/m
30 – 88	40.0	30.0
88 – 216	43.5	30.0
216 – 230	46.0	30.0
230 – 960	46.0	37.0
960 – 1000	54.0	37.0
> 1000	54.0	No Specified limit

6.5 Test equipment used

Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESI	Rohde & Schwarz	EMI test receiver	830482/010	12. 14. 2008
■ - ESCS30	Rohde & Schwarz	EMI test receiver	839809/003	12. 14. 2008
■ - HK116	Rohde & Schwarz	Biconical ANT	832639/007	12. 11. 2009
■ - HL223	Rohde & Schwarz	Log-periodic antenna	835998/004	12. 11. 2009
■ - BBHA9120D	Schwarzbeck	Horn ANT	207	12. 26. 2009
■ - HD100	HD GmbH	Position Controller	100/692/01	N/A
■ - DS415S	HD GmbH	Turntable	415/657/01	N/A
■ - MA240	HD GmbH	Antenna Mast	240/565/01	N/A
■ - AFS 44 00101800-25-10P-44	MITEQ	Preamplifier	1258943	N/A

6.6 Test data for radiated emission

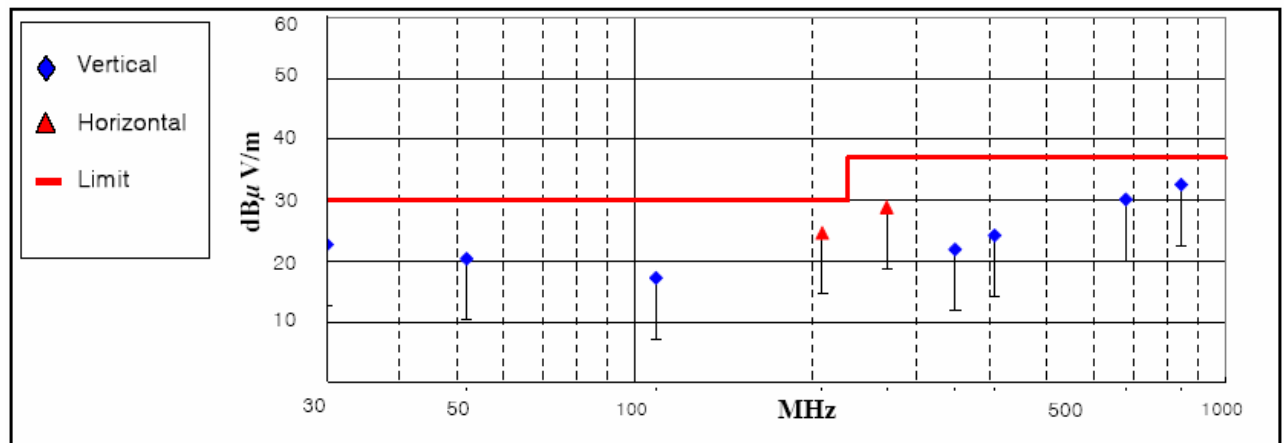
- Test Date : August 27, 2008
- Resolution bandwidth : 120 kHz / 1 MHz
- Frequency range : 30 MHz ~ 2 000 MHz
- Measurement distance : 3 m / 10 m

(Adapter: DVE)

◆ Operating Condition: 1 680 * 1 050 / 60 Hz (Analog)

Detector mode: Quasi- peak detector mode

Frequency (MHz)	Measurement Level				Limit (dBμ V/m)	Margin (dBμ V/m)	Positioning System		
	Reading	Antenna	Cable	Test Result			Pol.	Height	Angle
	Value(dBμ V)	Factor(dB)	Loss(dB)	(dBμ V/m)			(H/V)	(cm)	(°)
30.15	7.73	13.37	1.61	22.71	30.00	7.29	V	110	212
51.91	9.55	8.84	2.02	20.41	30.00	9.59	V	119	95
108.77	4.45	10.02	2.79	17.26	30.00	12.74	V	100	277
207.89	6.78	13.88	3.99	24.65	30.00	5.35	H	307	220
267.29	8.36	15.78	4.71	28.85	37.00	8.15	H	341	165
349.05	2.11	14.23	5.59	21.93	37.00	15.07	V	130	171
407.07	2.35	15.73	6.14	24.22	37.00	12.78	V	115	183
679.19	2.36	20.02	7.74	30.12	37.00	6.88	V	140	321
843.01	2.02	21.77	8.76	32.55	37.00	4.45	V	110	332

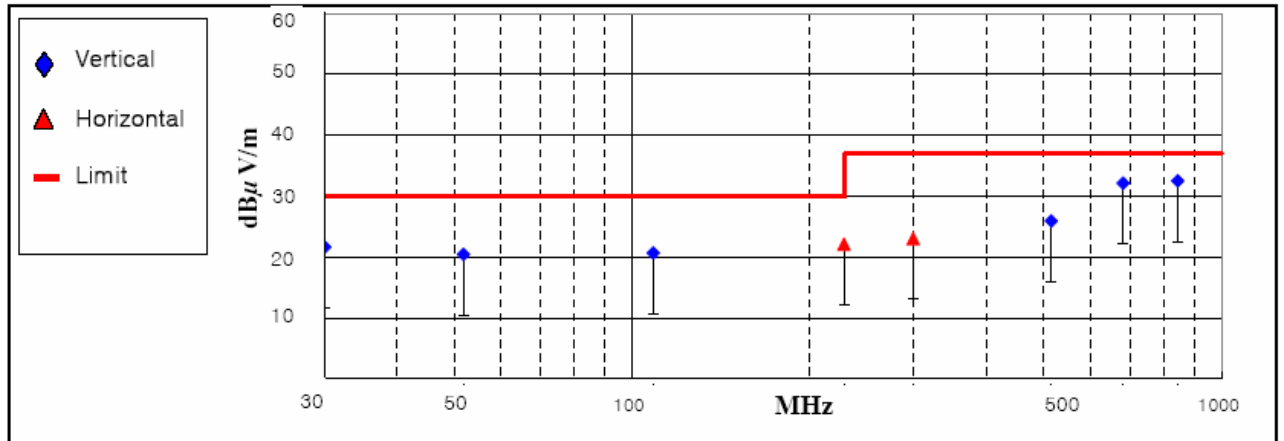


< Fig 4. Radiated emission result (30 MHz ~ 1 000 MHz)>

◆ Operating Condition: 1 680 * 1 050 / 60 Hz (Digital)

Detector mode: Quasi- peak detector mode

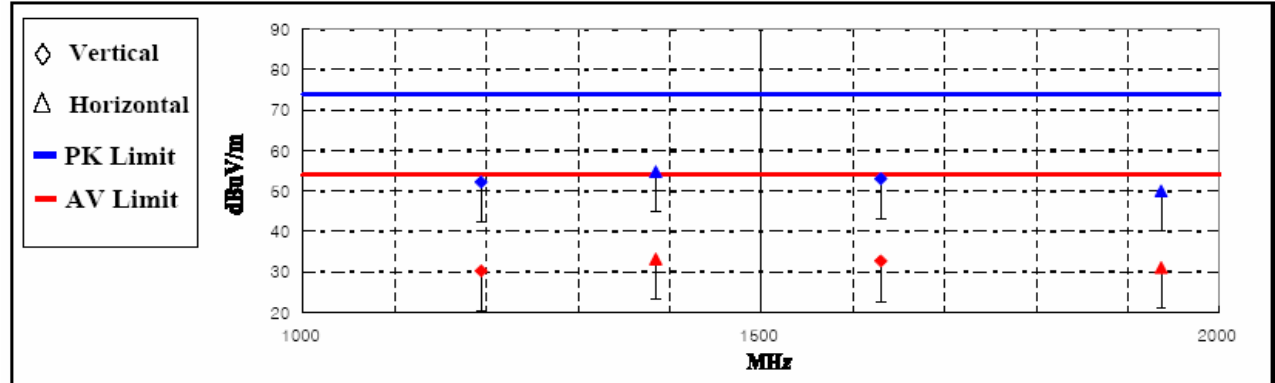
Frequency (MHz)	Measurement Level				Limit (dB μ V/m)	Margin (dB μ V/m)	Positioning System		
	Reading	Antenna	Cable	Test Result			Pol.	Height	Angle
	Value(dB μ V)	Factor(dB)	Loss(dB)	(dB μ V/m)			(H/V)	(cm)	(°)
30.15	6.65	13.37	1.61	21.63	30.00	8.37	V	110	182
51.81	9.57	8.85	2.02	20.44	30.00	9.56	V	109	144
108.72	7.86	10.02	2.79	20.67	30.00	9.33	V	107	285
228.99	3.34	14.53	4.25	22.12	30.00	7.88	H	340	244
300.01	5.21	12.74	5.10	23.05	37.00	13.95	H	310	81
514.59	2.15	17.08	6.72	25.95	37.00	11.05	V	107	330
680.50	4.34	20.04	7.75	32.13	37.00	4.87	V	185	173
842.17	2.03	21.74	8.75	32.52	37.00	4.48	V	160	330



< Fig 5. Radiated emission result (30 MHz ~ 1 000 MHz)>

- ◆ Operating Condition: 1 680 * 1 050 / 60 Hz (Analog)
 Detector mode: Peak detector mode / Average detector mode

Frequency (MHz)	Measurement Level						Limit (dBμ V/m)		Margin (dBμ V/m)		Positioning System		
	Reading Value (dBμ V/m)		AF	AMP / CL	Test Result (dBμ V/m)						Pol.	Height	Angle
	Peak	Average	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
1194.20	67.75	45.85	25.21	-40.76	52.20	30.30	74.00	54.00	21.80	23.70	V	109	25
1384.70	69.30	47.70	25.54	-40.04	54.80	33.20	74.00	54.00	19.20	20.80	H	312	189
1630.20	66.43	46.13	25.87	-39.30	53.00	32.70	74.00	54.00	21.00	21.30	V	113	190
1936.20	62.84	43.94	26.16	-39.00	50.00	31.10	74.00	54.00	24.00	22.90	H	310	75

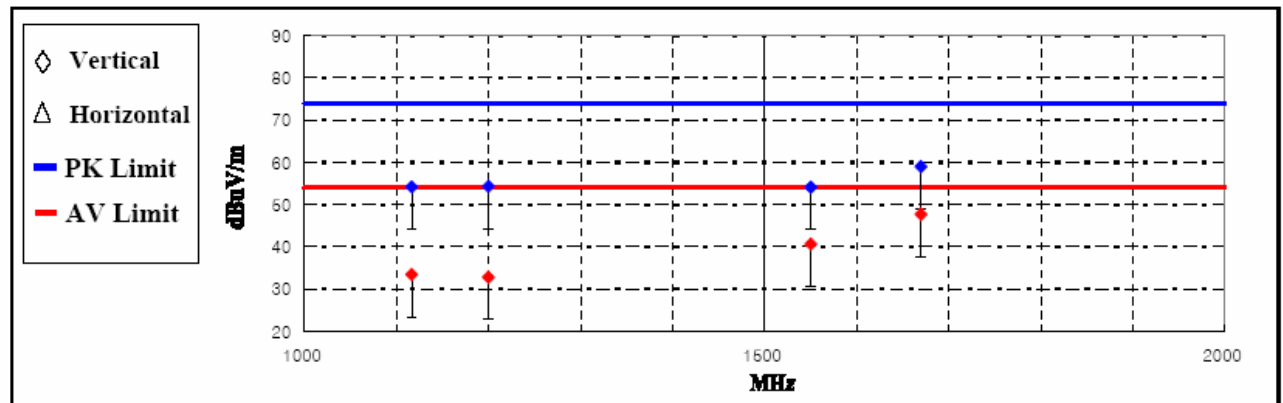


*Comment : AMP/CL_Cable loss value + AMP gain value
 AF : Antenna factor value
 Pol. : H(Horizontal), V(Vertical)

< Fig 6. Radiated emission result (1 000 MHz ~ 2 000 MHz)>

- ◆ Operating Condition: 1 680 * 1 050 / 60 Hz (Digital)
 Detector mode: Peak detector mode / Average detector mode

Frequency (MHz)	Measurement Level						Limit (dBμ V/m)		Margin (dBμ V/m)		Positioning System		
	Reading Value (dBμ V/m)		AF	AMP / CL	Test Result (dBμ V/m)						Pol.	Height	Angle
	Peak	Average	(dB)	(dB)	Peak	Average	Peak	Average	Peak	Average	(H/V)	(cm)	(°)
1116.20	69.99	49.29	25.07	-40.86	54.20	33.50	74.00	54.00	19.80	20.50	V	200	177
1199.70	69.86	48.36	25.22	-40.78	54.30	32.80	74.00	54.00	19.70	21.20	V	100	35
1550.10	67.92	54.52	25.80	-39.62	54.10	40.70	74.00	54.00	19.90	13.30	V	185	170
1669.80	72.55	61.25	25.91	-39.46	59.00	47.70	74.00	54.00	15.00	6.30	V	100	180



*Comment : AMP/CL_Cable loss value + AMP gain value
 AF : Antenna factor value
 Pol. : H(Horizontal), V(Vertical)

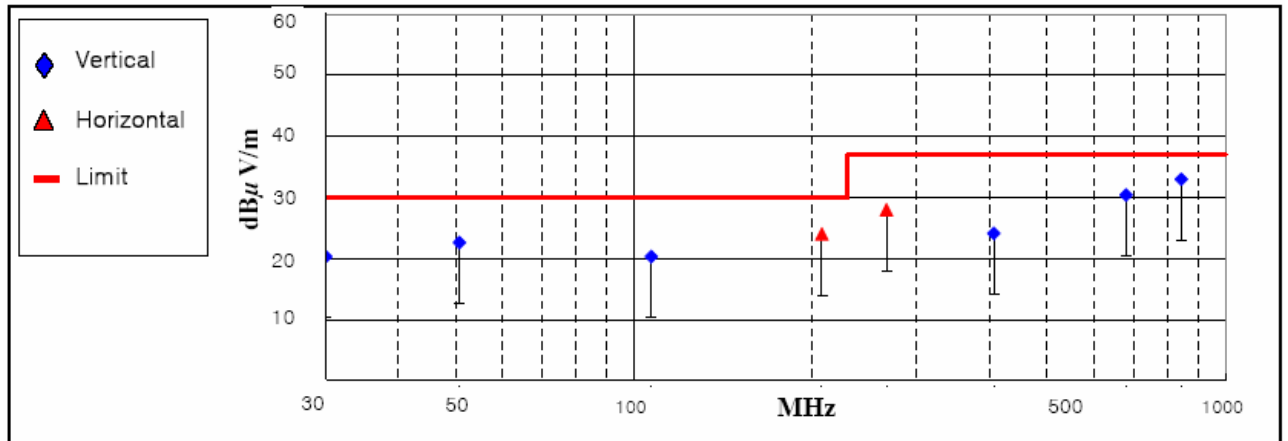
< Fig 7. Radiated emission result (1 000 MHz ~ 2 000 MHz)>

(Adapter: LIEN CHANG)

◆ Operating Condition: 1 680 * 1 050 / 60 Hz (Analog)

Detector mode: Quasi- peak detector mode

Frequency (MHz)	Measurement Level				Limit (dBμ V/m)	Margin (dBμ V/m)	Positioning System		
	Reading	Antenna	Cable	Test Result			Pol.	Height	Angle
	Value(dBμ V)	Factor(dB)	Loss(dB)	(dBμ V/m)			(H/V)	(cm)	(°)
30.14	5.34	13.37	1.61	20.32	30.00	9.68	V	107	211
50.73	11.62	8.99	2.01	22.62	30.00	7.38	V	110	110
107.01	7.67	9.91	2.77	20.35	30.00	9.65	V	120	240
207.88	6.15	13.88	3.99	24.02	30.00	5.98	H	322	232
267.29	7.49	15.78	4.71	27.98	37.00	9.02	H	330	144
405.91	2.29	15.70	6.13	24.12	37.00	12.88	V	120	150
679.20	2.68	20.02	7.74	30.44	37.00	6.56	V	131	146
842.27	2.48	21.75	8.75	32.98	37.00	4.02	V	182	321

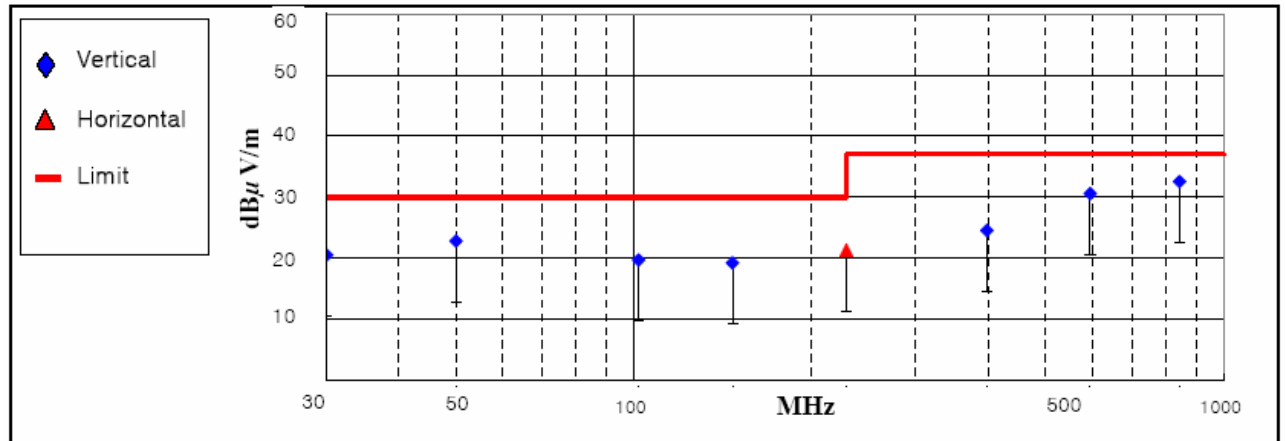


< Fig 8. Radiated emission result (30 MHz ~ 1 000 MHz)>

◆ Operating Condition: 1 680 * 1 050 / 60 Hz (Digital)

Detector mode: Quasi- peak detector mode

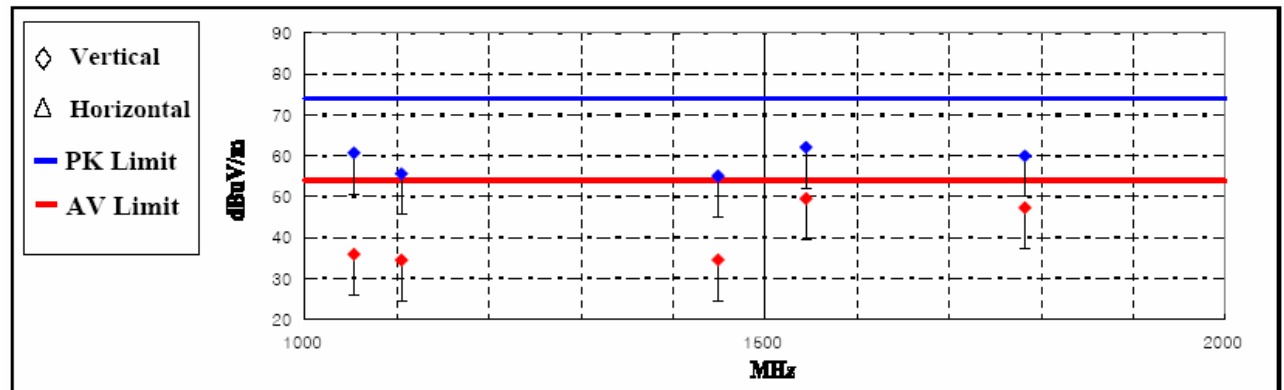
Frequency (MHz)	Measurement Level				Limit (dBμ V/m)	Margin (dBμ V/m)	Positioning System		
	Reading	Antenna	Cable	Test Result			Pol.	Height	Angle
	Value(dBμ V)	Factor(dB)	Loss(dB)	(dBμ V/m)			(H/V)	(cm)	(°)
30.17	5.54	13.36	1.61	20.51	30.00	9.49	V	110	201
50.03	11.72	9.08	2.00	22.80	30.00	7.20	V	100	133
101.95	7.40	9.59	2.72	19.71	30.00	10.29	V	122	312
147.11	4.38	11.50	3.34	19.22	30.00	10.78	V	141	330
229.51	2.52	14.54	4.25	21.31	30.00	8.69	H	312	21
397.12	2.98	15.50	6.07	24.55	37.00	12.45	V	122	170
593.99	5.21	18.02	7.35	30.58	37.00	6.42	V	107	188
842.51	2.04	21.75	8.76	32.55	37.00	4.45	V	180	12



< Fig 9. Radiated emission result (30 MHz ~ 1 000 MHz)>

- ◆ Operating Condition: 1 680 * 1 050 / 60 Hz (Analog)
 Detector mode: Peak detector mode / Average detector mode

Frequency (MHz)	Measurement Level						Limit (dBμ V/m)		Margin (dBμ V/m)		Positioning System		
	Reading Value (dBμ V/m)		AF (dB)	AMP / CL (dB)	Test Result (dBμ V/m)		Peak	Average	Peak	Average	Pol. (H/V)	Height (cm)	Angle (°)
	Peak	Average			Peak	Average							
1053.10	76.76	51.96	24.95	-41.01	60.70	35.90	74.00	54.00	13.30	18.10	V	110	277
1104.60	71.45	50.35	25.05	-40.90	55.60	34.50	74.00	54.00	18.40	19.50	V	109	280
1448.70	69.37	48.87	25.66	-39.93	55.10	34.60	74.00	54.00	18.90	19.40	V	113	177
1544.30	75.95	63.40	25.79	-39.64	62.10	49.55	74.00	54.00	11.90	4.45	V	140	190
1782.30	73.05	60.35	26.02	-39.07	60.00	47.30	74.00	54.00	14.00	6.70	V	189	180

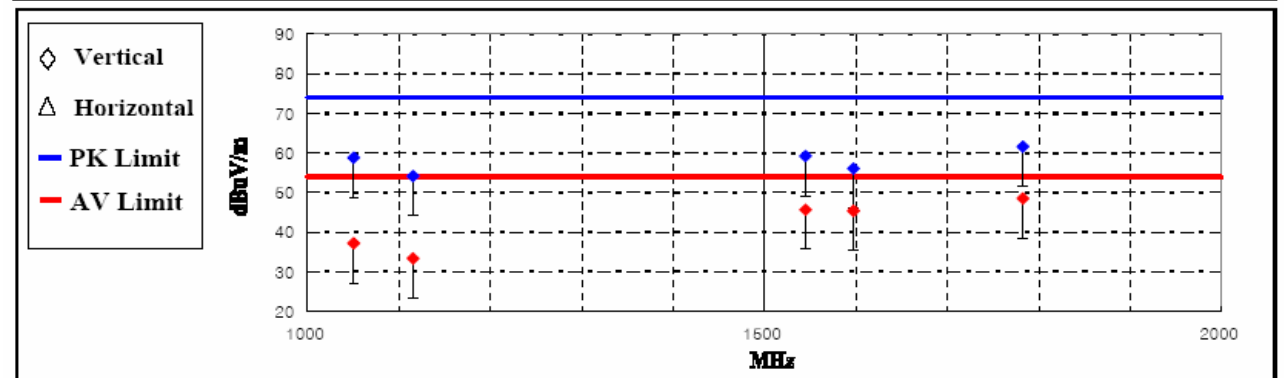


*Comment : AMP/CL_Cable loss value + AMP gain value
 AF : Antenna factor value
 Pol. : H(Horizontal), V(Vertical)

< Fig 10. Radiated emission result (1 000 MHz ~ 2 000 MHz)>

- ◆ Operating Condition: 1 680 * 1 050 / 60 Hz (Digital)
 Detector mode: Peak detector mode / Average detector mode

Frequency (MHz)	Measurement Level						Limit (dBμ V/m)		Margin (dBμ V/m)		Positioning System		
	Reading Value (dBμ V/m)		AF (dB)	AMP / CL (dB)	Test Result (dBμ V/m)		Peak	Average	Peak	Average	Pol. (H/V)	Height (cm)	Angle (°)
	Peak	Average			Peak	Average							
1050.20	74.87	53.27	24.95	-41.02	58.80	37.20	74.00	54.00	15.20	16.80	V	110	265
1115.40	69.99	49.19	25.07	-40.86	54.20	33.40	74.00	54.00	19.80	20.60	V	199	170
1544.60	73.05	59.55	25.79	-39.64	59.20	45.70	74.00	54.00	14.80	8.30	V	181	185
1597.20	69.59	58.89	25.84	-39.33	56.10	45.40	74.00	54.00	17.90	8.60	V	107	180
1782.60	74.65	61.55	26.02	-39.07	61.60	48.50	74.00	54.00	12.40	5.50	V	122	166



*Comment : AMP/CL_Cable loss value + AMP gain value
 AF : Antenna factor value
 Pol. : H(Horizontal), V(Vertical)

< Fig 11. Radiated emission result (1 000 MHz ~ 2 000 MHz)>

7. Sample Calculations

$$\begin{aligned} \text{dB}\mu\text{V} &= 20 \text{ Log}_{10}(\mu\text{V}/\text{m}) \\ \text{dB}\mu\text{V} &= \text{dBm} + 107 \\ \mu\text{V} &= 10^{(\text{dB}\mu\text{V}/20)} \end{aligned}$$

7.1 Example 1 :

■ 20.3 MHz

Class B Limit	=	250 μV	=	48 $\text{dB}\mu\text{V}$
Reading	=	- 67.8 dBm (Calibrated level)		
Convert to $\text{dB}\mu\text{V}$	=	- 67.8 $\text{dBm} + 107$	=	39.2 $\text{dB}\mu\text{V}$
$10^{(39.2\text{dB}\mu\text{V}/20)}$	=	91.2 μV		
Margin	=	39.2 – 48	=	-8.8
	=	8.8 dB below Limit		

7.2 Example 2 :

■ 66.7 MHz

Class B Limit	=	100 $\mu\text{V}/\text{m}$	=	40.0 $\text{dB}\mu\text{V}/\text{m}$
Reading	=	- 76.0 dBm (Calibrated level)		
Convert to $\text{dB}\mu\text{V}/\text{m}$	=	- 76.0 $\text{dBm} + 107$	=	31.0 $\text{dB}\mu\text{V}/\text{m}$
Antenna Factor + Cable Loss	=	5.8 dB		
Total	=	36.8 $\text{dB}\mu\text{V}/\text{m}$		
Margin	=	36.8 – 40.0	=	-3.2
	=	3.2 dB below Limit		

8. Recommendation & conclusion

The data collected shows that the **LG Electronics Inc. LCD Monitor (Model Name: W2294TT)** was complies with §15.107 and 15.109 of the FCC Rules.