



FCC EVALUATION REPORT FOR CERTIFICATION

Applicant: LG Electronics Inc.

19-1, Cheongho-ri, Jinwi-myeon,

Pyeongteak-si, Gyeonggi-do, Korea.

Attn: Mr. Do-Hyung Kim, Chief research engineer

Date of Issue: November 16, 2012

Order Number: GETEC-C1-12-342

Test Report Number: GETEC-E3-12-118

Test Site: GUMI COLLEGE EMC CENTER

FCC Registration Number: (100749, 443957)

FCC ID. : BEJ50PN6500UA

Applicant : LG Electronics Inc.

Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: PLASMA TV/MONITOR
Type of Authority	: Certification
Model Name	: 50PN6500-UA
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 (2009) / 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,

Soon Hoon

**Soon Hoon Jeong / Associate Engineer
GUMI COLLEGE EMC CENTER**

Jae-Hoon Jeong

**Jae-Hoon Jeong, Senior Engineer
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: 19-1, Cheongho-ri, Jinwi-myeon, Pyeongteak-si, Gyeonggi-do, Korea.

Manufacturer: LG Electronics Inc.

Manufacturer Address: 19-1, Cheongho-ri, Jinwi-myeon, Pyeongteak-si, Gyeonggi-do, Korea.

Contact Person: Mr. Do-Hyung Kim, Chief research engineer

Tel Number: +82-31-610-9623

● FCC ID.	BEJ50PN6500UA
● EUT Type	PLASMA TV/MONITOR
● Model Name	50PN6500-UA
● Trade Name	LG
● Serial Number	Prototype
● Rule Part(s)	FCC Part 15 Subpart B
● Type of Authority	Certification
● Test Procedure(s)	ANSI C63.4 (2009) / Canadian standard ICES-003
● Dates of Test	November 7, 2012
● Place of Test	GUMI COLLEGE EMC CENTER (FCC Registration Number: 100749, 443957) 37 Yaeun-ro, Gumi-si Gyeongsangbuk-do, 730-711, Republic of Korea
● Test Report Number	GETEC-E3-12-118
● Dates of Issue	November 16, 2012

EUT Type: PLASMA TV/MONITOR

FCC ID: BEJ50PN6500UA





2. Introduction

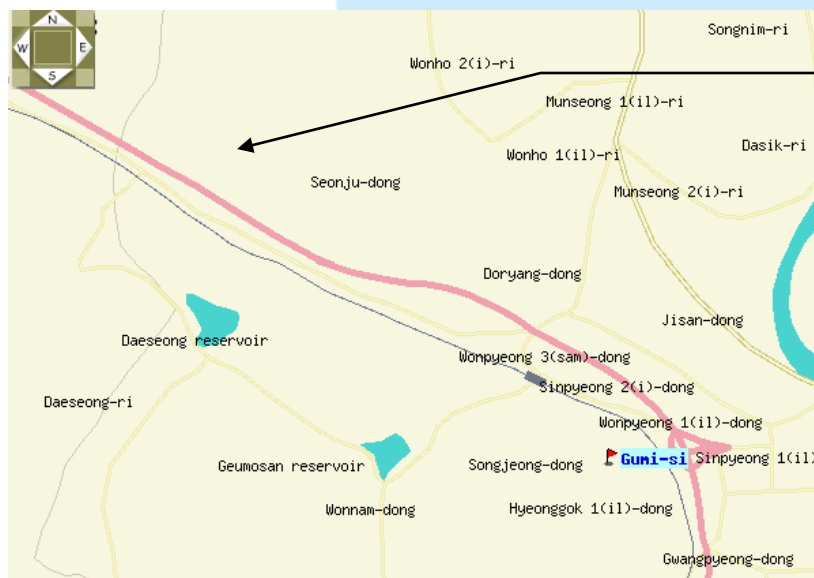
The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2009) was used in determining radiated and conducted emissions emanating from **LG Electronics Inc.**

PLASMA TV/MONITOR (Model Name: 50PN6500-UA)

These measurement tests were conducted at **GUMI COLLEGE EMC CENTER**

The site address is 37 Yaeun-ro, Gumi-si Gyeongsangbuk-do, 730-711, Republic of 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 (2009)



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730-711, Republic of Korea
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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.**

PLASMA TV/MONITOR (Model Name: 50PN6500-UA) FCC ID.: BEJ50PN6500UA

MODELS		50PA6500 (50PA6500-UG)	60PA6500 (60PA6500-UG)
Dimensions (W x H x D)	With stand	1168.0 mm x 758.0 mm x 297.0 mm (45.9 inch x 29.8 inch x 11.6 inch)	1386.8 mm x 883.2 mm x 354.7 mm (54.5 inch x 34.7 inch x 13.9 inch)
	Without stand	1168.0 mm x 704.0 mm x 53.0 mm (45.9 inch x 27.7 inch x 2.0 inch)	1386.8 mm x 818.2 mm x 53.0 mm (54.5 inch x 32.2 inch x 2.0 inch)
Weight	With stand	28.8 kg (63.4 lbs)	40.6 kg (89.5 lbs)
	Without stand	26.4 kg (58.2 lbs)	36.4 kg (80.2 lbs)
Current Value / Power consumption		2.9 A / 290 W	4.3 A / 430 W
Power requirement		AC100 - 240 V ~ 50/60 Hz	
Television System		NTSC-M, ATSC, 64 & 256 QAM	
Program Coverage		VHF 2-13, UHF 14-69, CATV 1-135, DTV 2-69, CADTV 1-135	
External Antenna Impedance		75 Ω	
Environment condition	Operating Temperature	0 - 40 °C	
	Operating Humidity	Less than 80 %	
	Storage Temperature	-20 - 60 °C	
	Storage Humidity	Less than 85 %	

- Maximum Frequency Range : 600 MHz





3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID.
PC(Main board)	ASROCK	770iCafe	S/N: 0AM0X3097310 FCC ID.: DoC
Video card	Rextechnology Co., Ltd.	HD4850	S/N: L5H041947 FCC ID.: DoC
PS2 keyboard	COMPAQ	166516-AD6	S/N: B13BBOR391006D FCC ID.: AQ6-23K15
USB mouse	Microsoft Corporation	1484	S/N: 0352700289761 FCC ID: DoC
DVD player	ILIKE ELECTRONICS CO., LTD.	CVX-3800 Full-HD	S/N: CVX-80020110110493 FCC ID.: N/A
Digital TV pattern generator	Rohde & Schwarz	TPG430B	S/N: 93.01.20.05.09.00.00.02 FCC ID.: Verification
8-VSB modulator	Telecommunication Inc.	VSB-ENC-150E	S/N: 2005-726 FCC ID.: Verification
USB memory stick	SAMSUNG	SUM-LSM2	S/N: None FCC ID.: N/A

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

3.2.2 System configuration

Description	Manufacturer	Model Name	S/N & FCC ID.
IR remote controller	LG Electronics Inc.	AKB73756521	S/N: None. FCC ID.: N/A



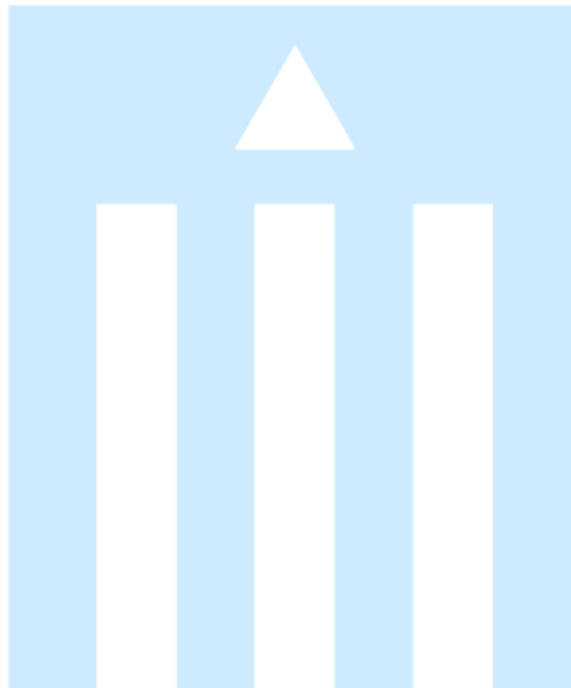


3.2.3 Used Cable(s)

Cable Name	Condition	Description
Power cable	Connected to the EUT	1.80 m unshielded with two ferrite cores
HDMI/DVI (Digital) in cable	Connected to the EUT and PC	1.80 m shielded
RS232C in cable	Connected to the EUT and PC	2.00 m shielded with a ferrite core
Component in cable	Connected to the EUT and DVD player	3.00 m shielded with a ferrite core
Antenna cable	Connected to the EUT and digital TV pattern generator	10.00 m shielded

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.

The test conditions of the noted test mode(s) in this test report are;

- Test Voltage / Frequency : AC 120 V / 60 Hz

- Test Mode(s)

- **Monitor resolution mode**

- 1 920 × 1 080 / 60 Hz (HDMI/DVI: Digital)

- **Operating test pattern**

- "H" character scrolling mode (Font size: 10)
- Black background white character
- Brightness and contrast was adjusted as maximum level
- Continuous playback of 1 kHz audio file with winamp player
- USB memory stick was connected to the USB port

"The verification report for TV/AV mode would be issued by LG Electronics Inc."





4.2 Conducted Emission

The Line conducted emission test facility is inside a 4 m × 8 m × 2.5 m shielded enclosure. (FCC Registration No.: 100749)

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).

Exploratory measurements were conducted to identify the highest emission by operating the EUT in a range of typical modes of operation, cable positions, system configuration and arrangement.

Based on exploratory measurements, the final measurements were conducted at the worst test conditions.

Exploratory measurements were scanned using Peak mode of EMI Test receiver from 150 kHz to 30 MHz with 20 ms sweep time. The final measurements were measured with Quasi-Peak and Average mode.

The bandwidth of EMI Test Receiver was set to 9 kHz. Interface cables were connected to the available interface ports of the test unit. Excess cable lengths were bundled at center with 30 cm ~ 40 cm.

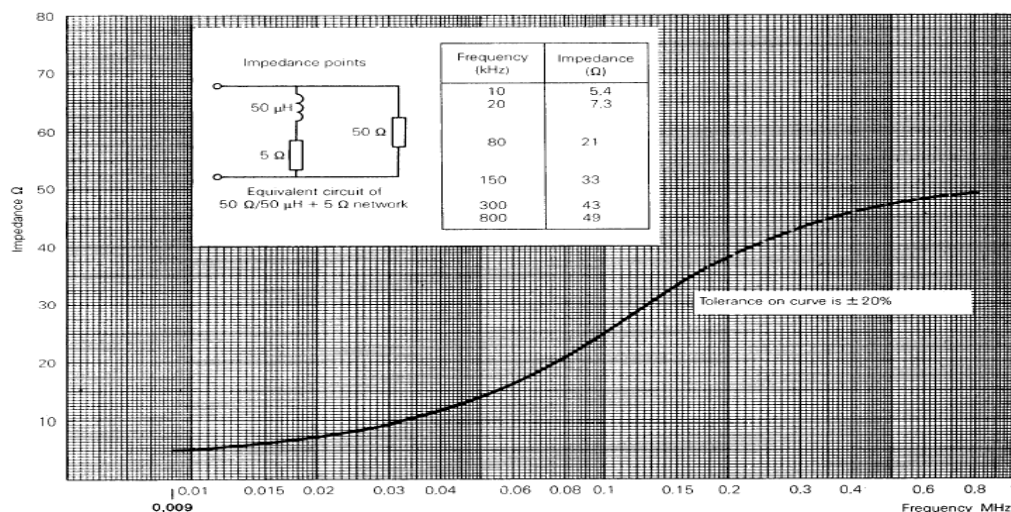


Fig 2. Impedance of LISN





4.3 Radiated Emission

Exploratory Radiated measurements were conducted at the 3m semi anechoic chamber in order to identify the highest emission by operating the EUT in a range of typical modes of operation, cable positions, system configuration and arrangement.

Based on exploratory measurements, the final measurements were conducted at the worst test conditions.

Final measurements of below 1GHz were made at 3m Chamber (FCC Registration No.: 443957) or Open area test site (FCC Registration No.: 100749) that complies with CISPR 16/ANSI C63.4.

Above 1GHz final measurements were conducted at the 3m Chamber (FCC Registration No.: 443957) only.

For measurements above 1GHz, the bottom side of 3m chamber was installed with absorbers in order to meet SVSWR Limit.

Exploratory measurements were scanned using Peak mode of EMI Test receiver and final measurements were measured with Quasi-Peak mode (Below 1GHz) and Peak & Average mode (Above 1GHz).

The measurements were performed by rotating the EUT 360° and adjusting the receive antenna height from 1.0 m to 4.0 m. All frequencies were investigated in both horizontal and vertical antenna polarity.

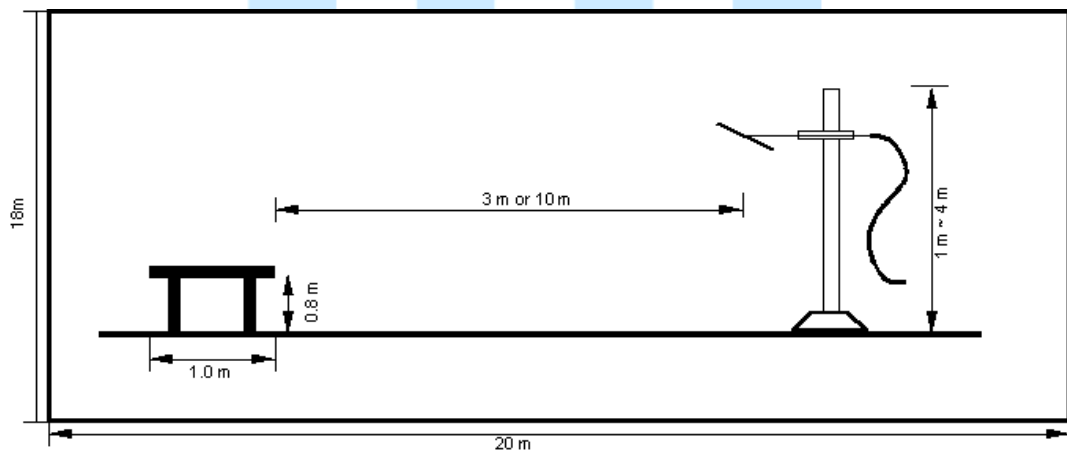


Fig 3. Dimensions of test site (Below 1GHz)

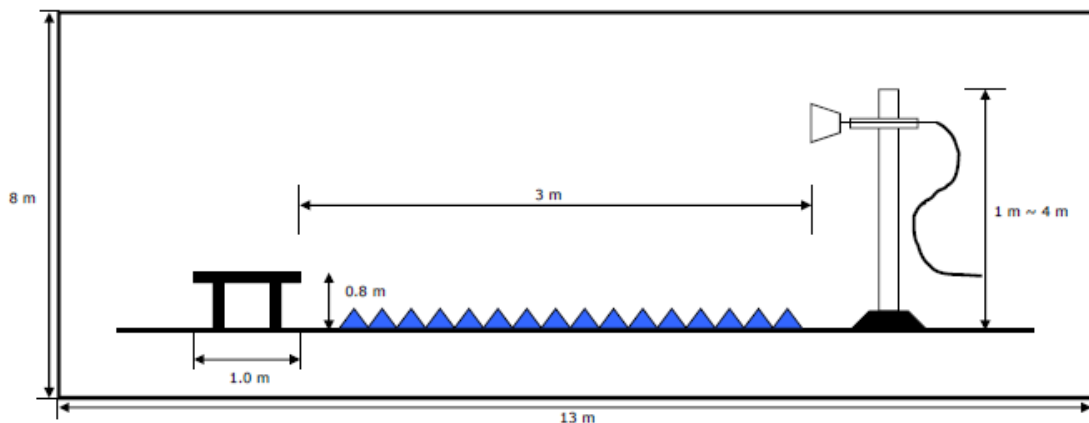


Fig 4. Dimensions of test site (Above 1GHz)

EUT Type: PLASMA TV/MONITOR

FCC ID: BEJ50PN6500UA





5. Conducted Emission

5.1 Operating Environment

Temperature : 25.0 °C
Relative Humidity : 43.0 % 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 & ISN.

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)	± 2.74 dB	Confidence level of approximately 95 % ($k = 2$)
Conducted emission (150 kHz ~ 30 MHz)	± 4.25 dB	Confidence level of approximately 95 % ($k = 2$)





5.4 Limit

RFI Conducted	FCC Limit(dB μ V/m) 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	05. 22. 2013
■ - ESH3-Z5	Rohde & Schwarz	LISN	838979/020	05. 23. 2013
■ - ESH2-Z5	Rohde & Schwarz	LISN	829991/009	05. 23. 2013
□ - ISN T8	TESEQ. GmbH	ISN	24568	07. 04. 2013

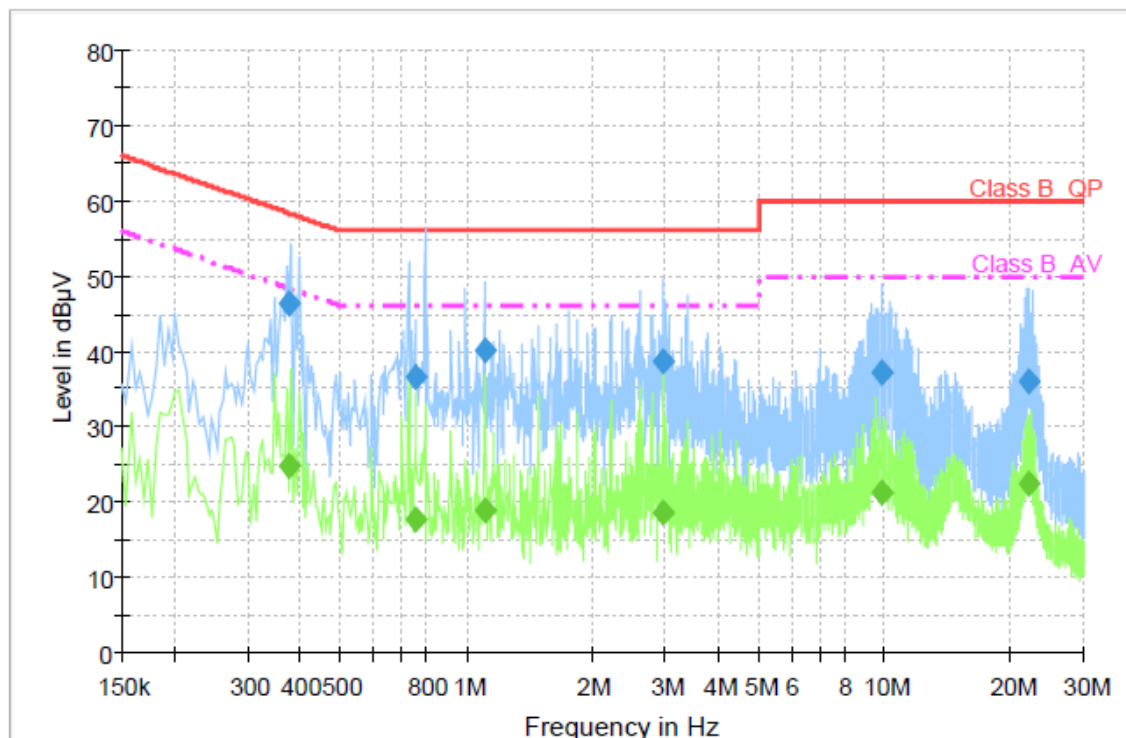
5.6 Test data for Conducted Emission

- Test Date : November 7, 2012
- Resolution Bandwidth : 9 kHz
- Frequency Range : 0.15 MHz ~ 30 MHz
- Line : L1: Live, N: Neutral





- Operating condition: 1 920 × 1 080 / 60 Hz (HDMI/DVI: Digital)



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.376000	46.4	1000.0	9.000	GND	L1	10.1	12.0	58.4	
0.756000	36.5	1000.0	9.000	GND	L1	10.1	19.5	56.0	
1.112000	40.1	1000.0	9.000	GND	L1	10.2	15.9	56.0	
2.948000	38.8	1000.0	9.000	GND	L1	10.2	17.2	56.0	
9.868000	37.1	1000.0	9.000	GND	L1	10.3	22.9	60.0	
22.088000	36.1	1000.0	9.000	GND	N	10.3	23.9	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.376000	24.7	1000.0	9.000	GND	L1	10.1	23.6	48.4	
0.756000	17.8	1000.0	9.000	GND	L1	10.1	28.2	46.0	
1.112000	19.0	1000.0	9.000	GND	L1	10.2	27.0	46.0	
2.948000	18.5	1000.0	9.000	GND	L1	10.2	27.5	46.0	
9.868000	21.3	1000.0	9.000	GND	L1	10.3	28.7	50.0	
22.088000	22.5	1000.0	9.000	GND	N	10.3	27.5	50.0	

< Fig 5. Conducted emission result >





6. Radiated Emission

6.1 Operating Environment

Temperature : 23.0 °C
Relative Humidity : 42.0 % R.H.

6.2 Test Set-up

A preliminary and final measurement was at 3 m anechoic chamber.

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(Anechoic Chamber)	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 3 m, Vertical)	± 4.38 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)	± 3.50 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)	± 3.75 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal)	± 3.59 dB	Confidence level of approximately 95 % ($k = 2$)





6.4 Limit

Frequency (MHz)	FCC Limit @ 3 m. dBμV/m	CISPR Limit @ 10 m. dBμV/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 ~ 1 000	54.0	37.0
> 1 000	54.0	No Specified limit

6.5 Test Equipment used

Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESIB26	Rohde & Schwarz	EMI Test Receiver	830482/010	05. 23. 2013
■ - VULB9160	Schwarzbeck	Broadband Test Antenna	3193	03. 15. 2014
■ - BBHA9120D	Schwarzbeck	Horn Antenna	597	01. 23. 2013
■ - MCU066	maturo GmbH	Position Controller	1390306	N/A
■ - TT2.5SI	maturo GmbH	Turntable	1390307	N/A
■ - AM 4.0	maturo GmbH	Antenna Mast	1390308	N/A
■ - AFS 44 00101800-25-10P-44	MITEQ	Preamplifier	1258943	11. 12. 2012

6.6 Test data for Radiated Emission

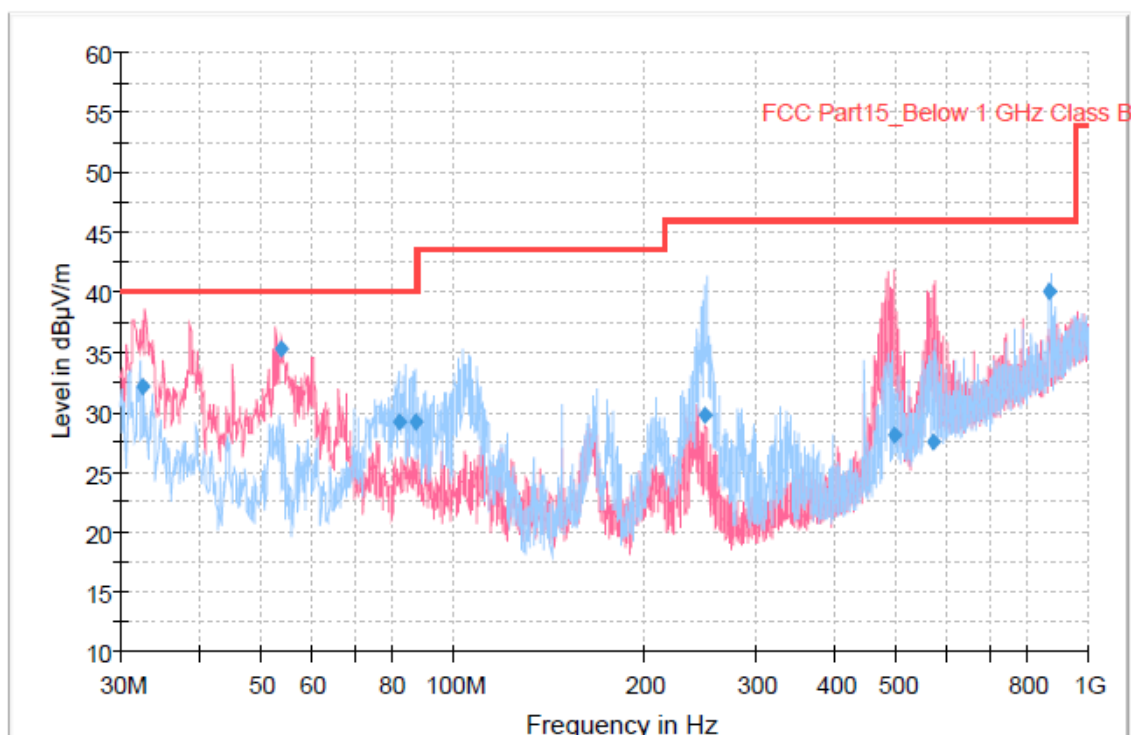
- Test Date : November 7, 2012
- Measurement Distance : 3 m
- Note : The highest frequency of the internal source of the EUT is between 500 MHz and 1 000 MHz (600 MHz). The measurement was made up to 5 000 MHz
- Measurement

Frequency range	30 MHz ~ 1 GHz	Above 1 GHz
Detector mode	Quasi peak	Peak / Average
Resolution bandwidth	120 kHz	1 MHz





- Operating condition: 1 920 × 1 080 / 60 Hz (HDMI/DVI: Digital)



Final Result 1

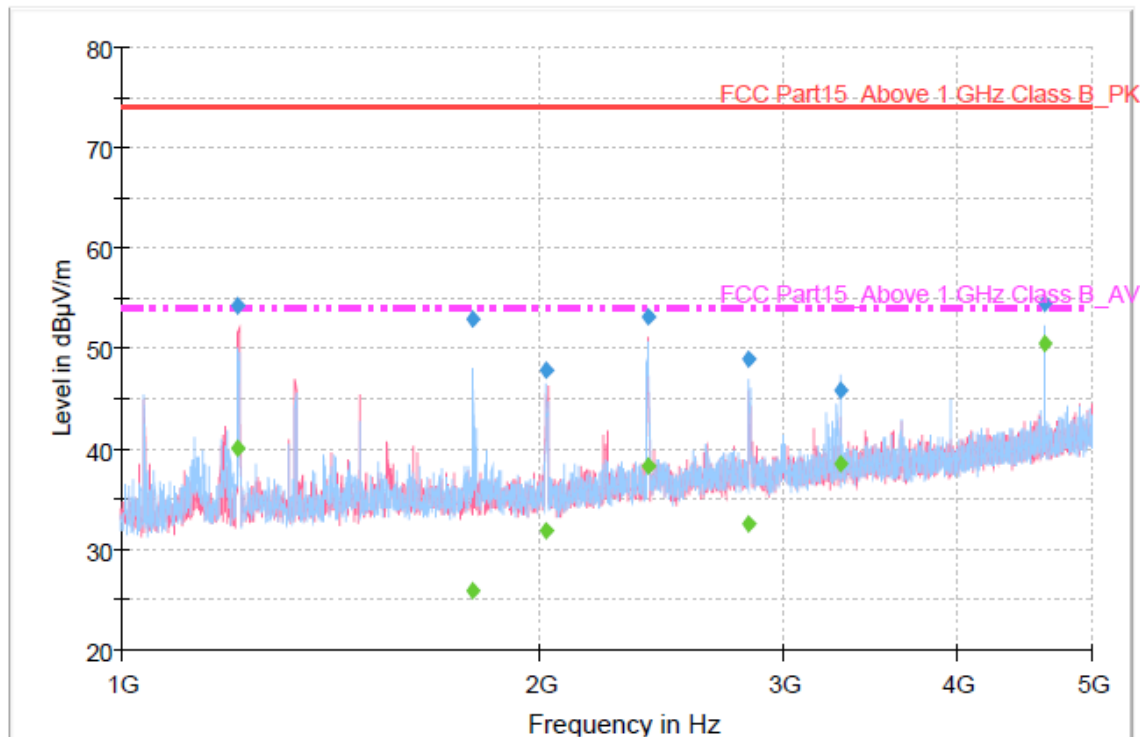
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
32.488750	32.2	1000.0	120.000	100.0	V	113.0	12.4	7.8	40.0
53.933750	35.2	1000.0	120.000	100.0	V	168.0	13.0	4.8	40.0
82.698750	29.2	1000.0	120.000	200.0	H	47.0	8.9	10.8	40.0
87.210000	29.1	1000.0	120.000	200.0	H	16.0	9.1	10.9	40.0
249.776250	29.7	1000.0	120.000	118.0	H	-4.0	13.0	16.3	46.0
494.572500	28.0	1000.0	120.000	110.0	V	191.0	19.5	18.0	46.0
572.460000	27.4	1000.0	120.000	100.0	V	174.0	21.6	18.6	46.0
872.075000	40.0	1000.0	120.000	110.0	H	84.0	26.7	6.0	46.0

< Fig 6. Radiated emission result (30 MHz ~ 1 000 MHz) >





- Operating condition: 1 920 × 1 080 / 60 Hz (HDMI/DVI: Digital)
- Green marker: Average detector, Blue marker: Peak detector



Final Result 1

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1213.380000	54.2	1000.0	1000.000	130.0	V	225.0	-10.0	19.8	74.0
1791.860000	53.0	1000.0	1000.000	200.0	H	332.0	-7.8	21.0	74.0
2022.760000	47.9	1000.0	1000.000	100.0	H	347.0	-7.5	26.1	74.0
2395.840000	53.3	1000.0	1000.000	119.0	V	191.0	-5.5	20.7	74.0
2831.040000	48.9	1000.0	1000.000	100.0	H	238.0	-4.5	25.1	74.0
3299.840000	45.9	1000.0	1000.000	128.0	H	140.0	-3.5	28.1	74.0
4619.900000	54.6	1000.0	1000.000	200.0	H	107.0	0.0	19.4	74.0

Final Result 2

Frequency (MHz)	CAverage (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1213.380000	40.3	1000.0	1000.000	130.0	V	225.0	-10.0	13.8	54.0
1791.860000	26.0	1000.0	1000.000	200.0	H	332.0	-7.8	28.0	54.0
2022.760000	32.0	1000.0	1000.000	100.0	H	347.0	-7.5	22.0	54.0
2395.840000	38.4	1000.0	1000.000	119.0	V	191.0	-5.5	15.6	54.0
2831.040000	32.7	1000.0	1000.000	100.0	H	238.0	-4.5	21.3	54.0
3299.840000	38.6	1000.0	1000.000	128.0	H	140.0	-3.5	15.4	54.0
4619.900000	50.5	1000.0	1000.000	200.0	H	107.0	0.0	3.5	54.0

< Fig 7. Radiated emission result (1000 MHz ~ 5 000 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 dB μV
Reading	= 39.2 dB μV
$10^{(39.2\text{dB}\mu\text{V}/20)}$	= 91.2 μV
Margin	= 48 dB μV - 39.2 dB μV = 8.8 dB

7.2 Example 2 :

■ 66.7 MHz

Class B Limit	= 100 $\mu\text{V}/\text{m}$ = 40.0 dB $\mu\text{V}/\text{m}$
Reading	= 31.0 dB μV
Antenna Factor + Cable Loss	= 5.8 dB
Total	= 36.8 dB $\mu\text{V}/\text{m}$
Margin	= 40.0 dB $\mu\text{V}/\text{m}$ - 36.8 dB $\mu\text{V}/\text{m}$ = 3.2 dB





8. Recommendation & Conclusion

The data collected shows that the **LG Electronics Inc. PLASMA TV/MONITOR (Model Name: 50PN65000-UA)** was complies with §15.107 and 15.109 of the FCC Rules.

- The end -

