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: March 6, 2013

Order Number: GETEC-C1-13-107

Test Report Number: GETEC-E3-13-026

Test Site: GUMI COLLEGE EMC CENTER

FCC Registration Number: (100749, 443957)

FCC ID. : BEJ50LA6900UE

Applicant : LG Electronics Inc.

Rule Part(s)	**: FCC Part 15 Subpart B**
Equipment Class	**: Class B computing device peripheral (JBP)**
EUT Type	**: LED TV/Monitor**
Type of Authority	**: Certification**
Model Name	**: 50LA6900-UE, 50LA6950-UE, 50LA6650-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 vest 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,

Soon Hoon

Soon-Hoon Jeong, Associate Engineer
GUMI COLLEGE EMC CENTER

Reviewed by,

Jae-Hoon Jeong, Technical Manager
GUMI COLLEGE EMC CENTER

CONTENTS

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.** BEJ50LA6900UE
- **EUT Type** LED TV/Monitor
- **Model Name** 50LA6900-UE, 50LA6950-UE, 50LA6650-UA

The differences for all models are as follow:

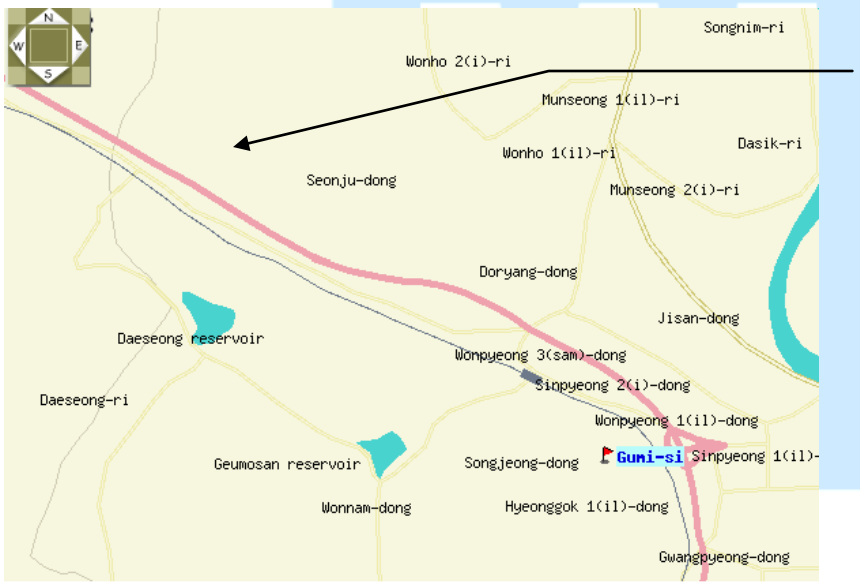
Model Name	Changed description
50LA6900-UE	Basic model name
50LA6950-UE	Packing box color
50LA6650-UA	Front tool color

- **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** February 28 ~ March 4, 2013
- **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-E3-13-026
- **Dates of Issue** March 6, 2013

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.**
LED TV/Monitor (Model Name: 50LA6900-UE, 50LA6950-UE, 50LA6650-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)



GUMI COLLEGE EMC CENTER
37 Yaeun-ro, Gumi-si,
Gyeongsangbuk-do, 730-711,
Republic of Korea
Tel: +82-54-440-1195
Fax: +82-54-440-1199

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.**
LED TV/Monitor (Model Name: 50LA6900-UE, 50LA6950-UE, 50LA6650-UA) FCC ID.: BEJ50LA6900UE

MODELS		50LA6650 (50LA6650-UA)
		50LA6900 (50LA6900-UE)
		50LA6950 (50LA6950-UE)
		50LA6970 (50LA6970-UE)
Dimensions (Width x Height x Depth)	With stand	1,129 x 730 x 326 (mm)
		44.4 x 28.7 x 12.8 (inch)
	Without stand	1,129 x 672 x 37.2 (mm)
		44.4 x 26.4 x 1.4 (inch)
Weight	With stand	19.8 Kg (43.6 lbs)
	Without stand	17.3 Kg (38.1 lbs)
Current Value / Power consumption		1.3 A / 130 W

Power requirement		AC 100 - 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 : 790 MHz

3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID.
PC(Main board)	ASUSTEK COMPUTER INC.	P8H61	S/N: 0BG084-02014-MIBFE0-A05 FCC ID.: DoC
Graphic card	Digital Greentech Co., Ltd.	VX4850	S/N: LG1112056668 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: CVX380020110110493 FCC ID.: Verification
USB memory stick	SAMSUNG	SUM-PSB4	S/N: TBBB202478F FCC ID.: DoC
Headphone	PHILIPS	SBC HL140	S/N: None FCC ID.: N/A
Cell phone	LG Electronics Inc	LG-LU6200	S/N: 201KPNY0507743 FCC ID.: N/A
TV Test transmitter	Rohde & Schwarz	SFQ	S/N: 100563 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.
Motion remote controller	LG Electronics Inc.	AN-MR400G	S/N: None. FCC ID.: BEJMR400G
Bluetooth module	LG Electronics Inc.	BM-LD401	S/N: None. FCC ID.: BEJLDS401
Wi-Fi module	LG Electronics Inc.	WN8122E1	S/N: None. FCC ID.: BEJWN8122E1

3.2.3 Used Cable(s)

Cable Name	**Condition**	**Description**
Power cable	Connected to the EUT	1.80 m unshielded
HDMI (Digital) in cable	Connected to the EUT and PC	1.80 m shielded
Mobile high-definition link in cable	Connected to the EUT and PC	1.00 m shielded with a ferrite core
HDMI in cable	Connected to the EUT and DVD player	1.80 m shielded
Component in cable	Connected to the EUT and DVD player	3.00 m shielded
Headphone cable	Connected to the EUT and headphone	1.20 m shielded
LAN cable	Connected to the EUT and network	10.00 m unshielded
Antenna cable	Connected to the EUT and TV test transmitter	10.00 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.

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: 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
-. Connected to internet via LAN interface

"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.

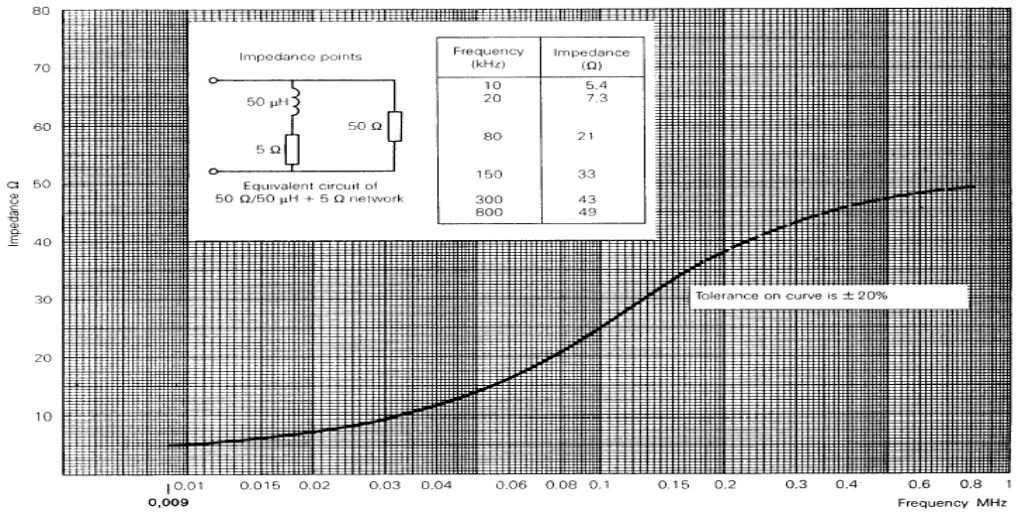


Fig 2. Impedance of LISN

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.

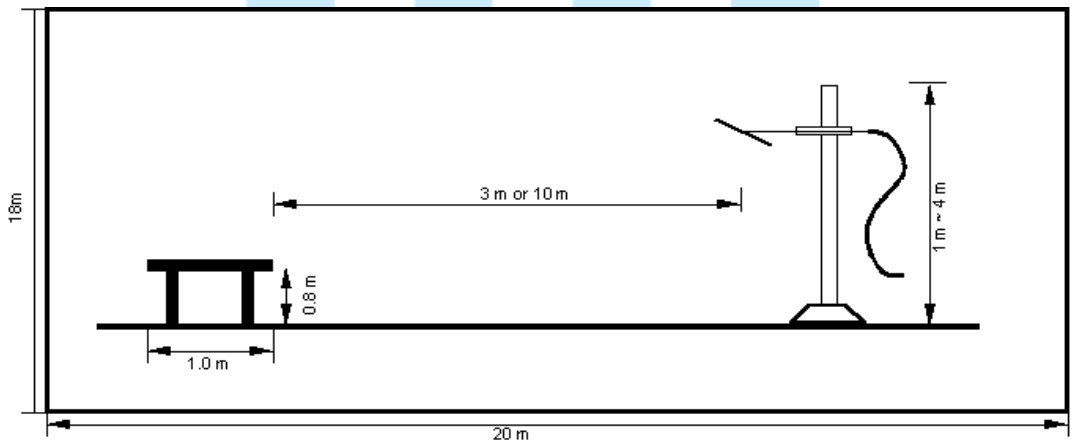


Fig 3. Dimensions of test site (Below 1GHz)

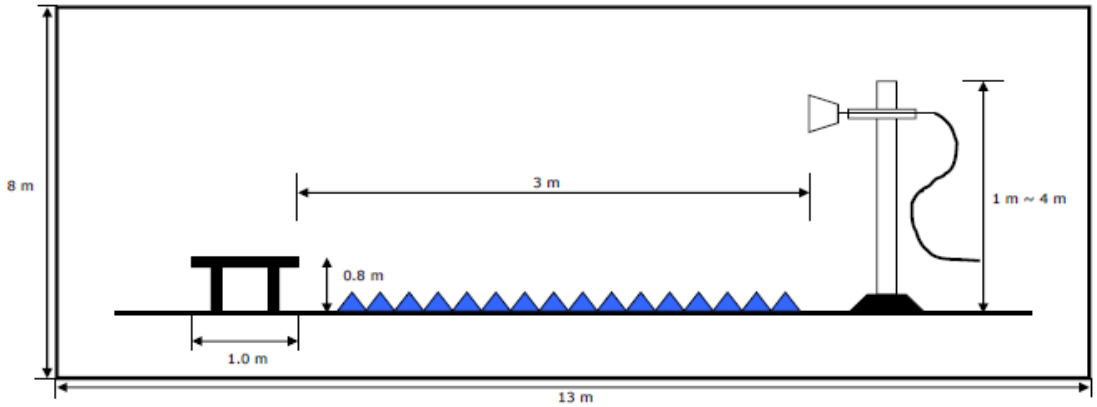


Fig 4. Dimensions of test site (Above 1GHz)

5. Conducted Emission

5.1 Operating Environment

Temperature : 24.0 ℃
Relative Humidity : 40.0 % 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(dBμV/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.		

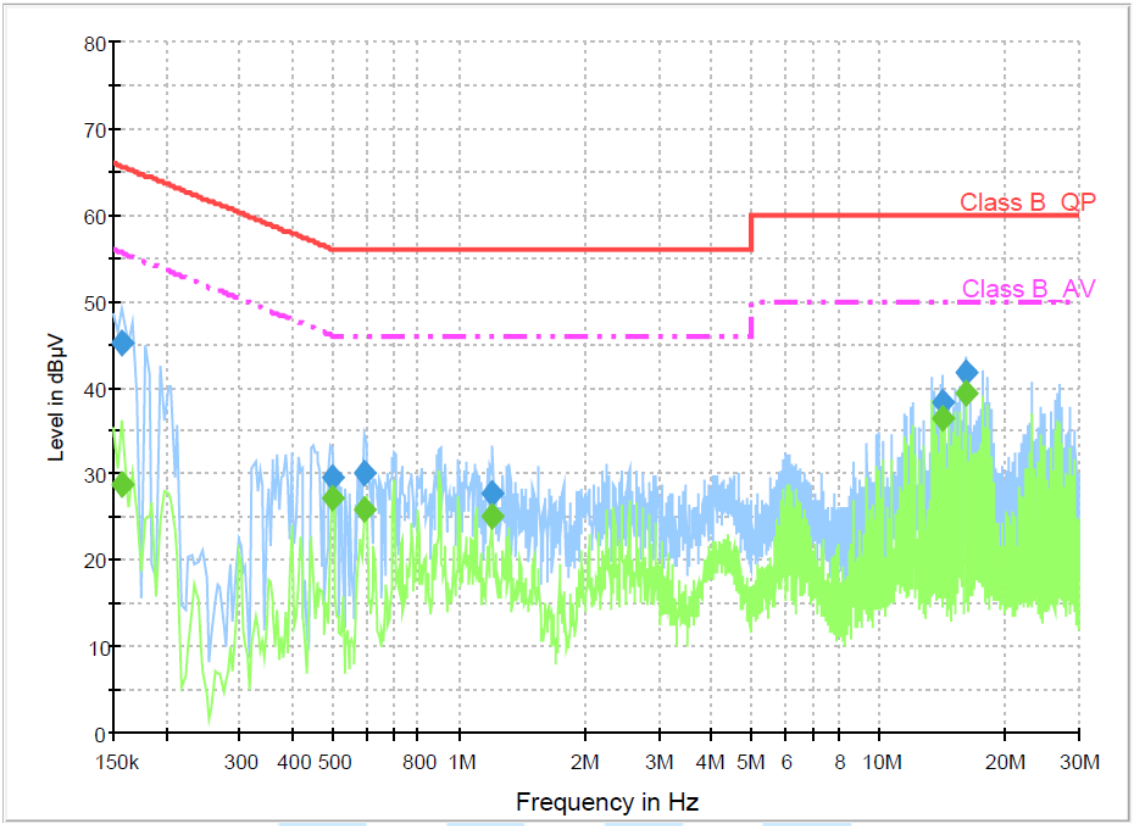
5.5 Test Equipment used

	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 : February 28, 2013
-. Resolution Bandwidth : 9 kHz
-. Frequency Range : 0.15 MHz ~ 30 MHz
-. Line : L1: Live, N: Neutral

▪ Operating condition: 1 0920 × 1 080 / 60 Hz (HDMI: Digital)



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.158000	45.2	1000.0	9.000	GND	N	10.1	20.3	65.6	
0.500000	29.6	1000.0	9.000	GND	L1	10.1	26.4	56.0	
0.596000	30.2	1000.0	9.000	GND	N	10.1	25.8	56.0	
1.196000	27.6	1000.0	9.000	GND	L1	10.1	28.4	56.0	
14.272000	38.4	1000.0	9.000	GND	N	10.3	21.6	60.0	
16.228000	41.7	1000.0	9.000	GND	L1	10.3	18.3	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.158000	28.7	1000.0	9.000	GND	N	10.1	26.9	55.6	
0.500000	27.2	1000.0	9.000	GND	L1	10.1	18.8	46.0	
0.596000	25.8	1000.0	9.000	GND	N	10.1	20.2	46.0	
1.196000	25.2	1000.0	9.000	GND	L1	10.1	20.8	46.0	
14.272000	36.3	1000.0	9.000	GND	N	10.3	13.7	50.0	
16.228000	39.2	1000.0	9.000	GND	L1	10.3	10.8	50.0	

< Fig 5. Conducted emission result >

6. Radiated Emission

6.1 Operating Environment

Temperature : 23.0 ℃
Relative Humidity : 43.0 % 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)	± 4.35 dB	Confidence level of approximately 95 % (k = 2)
Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)	± 4.29 dB	Confidence level of approximately 95 % (k = 2)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)	± 4.43 dB	Confidence level of approximately 95 % (k = 2)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal)	± 4.21 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	207	01. 29. 2014
■ - 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. 2013

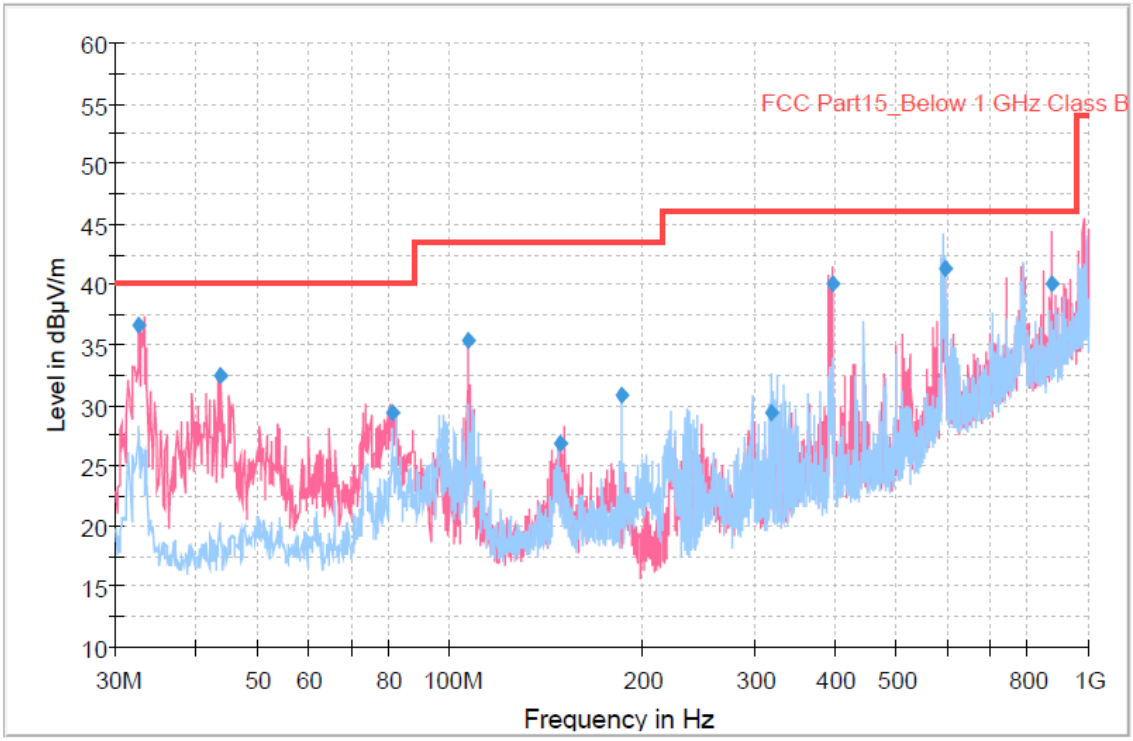
6.6 Test data for Radiated Emission

-. Test Date : March 1 ~ 4, 2013
-. Measurement Distance : 3 m
-. Note : The highest frequency of the internal source of the EUT is between 500 MHz and 1 000 MHz (790 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: Digital)

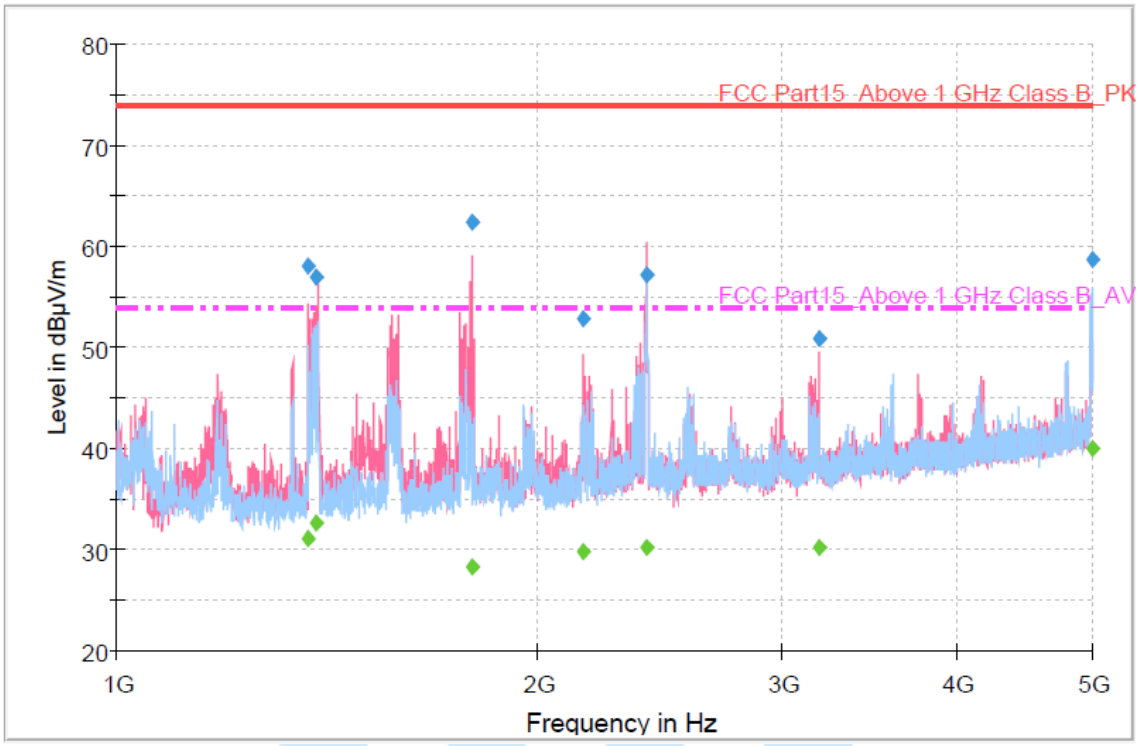


Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
32.600000	36.6	1000.0	120.000	100.0	V	140.0	12.4	3.4	40.0
43.781250	32.4	1000.0	120.000	100.0	V	222.0	12.7	7.6	40.0
81.205000	29.4	1000.0	120.000	150.0	V	256.0	8.9	10.6	40.0
106.710000	35.3	1000.0	120.000	110.0	V	308.0	11.1	8.2	43.5
148.491250	26.9	1000.0	120.000	100.0	V	356.0	13.9	16.6	43.5
185.643750	30.9	1000.0	120.000	183.0	H	283.0	12.3	12.6	43.5
318.817500	29.4	1000.0	120.000	100.0	H	245.0	15.3	16.6	46.0
398.342500	40.2	1000.0	120.000	100.0	V	148.0	17.3	5.8	46.0
595.177500	41.4	1000.0	120.000	170.0	H	124.0	22.5	4.6	46.0
876.243750	40.2	1000.0	120.000	100.0	V	243.0	26.7	5.8	46.0

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

▪ Operating condition: 1 920 × 1 080 / 60 Hz (HDMI: 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)
1370.460000	58.0	1000.0	1000.000	100.0	V	198.0	-9.3	16.0	74.0
1390.480000	57.0	1000.0	1000.000	100.0	V	198.0	-9.2	17.0	74.0
1795.560000	62.5	1000.0	1000.000	100.0	V	-15.0	-7.8	11.5	74.0
2156.200000	52.9	1000.0	1000.000	125.0	V	220.0	-7.0	21.1	74.0
2395.340000	57.3	1000.0	1000.000	100.0	V	190.0	-5.5	16.7	74.0
3181.280000	50.9	1000.0	1000.000	100.0	V	199.0	-3.7	23.1	74.0
4995.280000	58.7	1000.0	1000.000	100.0	H	329.0	1.0	15.3	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)
1370.460000	31.2	1000.0	1000.000	100.0	V	198.0	-9.3	22.8	54.0
1390.480000	32.7	1000.0	1000.000	100.0	V	198.0	-9.2	21.3	54.0
1795.560000	28.3	1000.0	1000.000	100.0	V	-15.0	-7.8	25.7	54.0
2156.200000	29.7	1000.0	1000.000	125.0	V	220.0	-7.0	24.3	54.0
2395.340000	30.2	1000.0	1000.000	100.0	V	190.0	-5.5	23.8	54.0
3181.280000	30.3	1000.0	1000.000	100.0	V	199.0	-3.7	23.7	54.0
4995.280000	40.0	1000.0	1000.000	100.0	H	329.0	1.0	14.0	54.0

< Fig 7. Radiated emission result (1 000 MHz ~ 5 000 MHz) >

7. Sample Calculations

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

7.1 Example 1 :

■ **20.3 MHz**

Class B Limit = 250 μV = 48 dBμV

Reading = 39.2 dBμV

$10^{(39.2dB\mu V/20)}$ = 91.2 μV

Margin = 48 dBμV - 39.2 dBμV

= 8.8 dB

7.2 Example 2 :

■ **66.7 MHz**

Class B Limit = 100 μV/m = 40.0 dBμV/m

Reading = 31.0 dBμV

Antenna Factor + Cable Loss = 5.8 dB

Total = 36.8 dBμV/m

Margin = 40.0 dBμV/m – 36.8 dBμV/m

= 3.2 dB

8. Recommendation & Conclusion

The data collected shows that the **LG Electronics Inc. LED TV/Monitor (Model Name: 50LA6900-UE, 50LA6950-UE, 50LA6650-UA)** was complies with §15.107 and 15.109 of the FCC Rules.

- The end -