

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: August 8, 2012

Order Number: GETEC-C1-12-237

Test Report Number: GETEC-E3-12-084

Test Site: GUMI COLLEGE EMC CENTER

FCC Registration Number: (100749, 443957)

FCC ID. : BEJPA72GJE

Applicant : LG Electronics Inc.

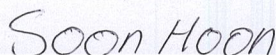
Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: DLP PROJECTOR
Type of Authority	: Certification
Model Name	: PA72G-JE, PA72B-JE
Trade Name	: LG

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 Jeong / Associate Engineer
GUMI COLLEGE EMC CENTER



Jae-Hoon Jeong, Senior Engineer
GUMI COLLEGE EMC CENTER



CONTENTS

1. GENERAL INFORMATION	3
2. INTRODUCTION	4
3. PRODUCT INFORMATION	5
3.1 DESCRIPTION OF EUT.....	5
3.2 SUPPORT EQUIPMENT / CABLES USED	6
3.3 MODIFICATION ITEM(S).....	7
4. DESCRIPTION OF TESTS.....	8
4.1 TEST CONDITION.....	8
4.2 CONDUCTED EMISSION	9
4.3 RADIATED EMISSION.....	10
5. CONDUCTED EMISSION.....	11
5.1 OPERATING ENVIRONMENT	11
5.2 TEST SET-UP	11
5.3 MEASUREMENT UNCERTAINTY.....	11
5.4 LIMIT	12
5.5 TEST EQUIPMENT USED.....	12
5.6 TEST DATA FOR CONDUCTED EMISSION	12
6. RADIATED EMISSION	17
6.1 OPERATING ENVIRONMENT	17
6.2 TEST SET-UP	17
6.3 MEASUREMENT UNCERTAINTY.....	17
6.4 LIMIT	18
6.5 TEST EQUIPMENT USED.....	18
6.6 TEST DATA FOR RADIATED EMISSION	18
7. SAMPLE CALCULATIONS.....	22
7.1 EXAMPLE 1 :	22
7.2 EXAMPLE 2 :	22
8. RECOMMENDATION & CONCLUSION.....	23
 APPENDIX A – ATTESTATION STATEMENT	
APPENDIX B – ID SAMPLE LABEL & LOCATION	
APPENDIX C – BLOCK DIAGRAM	
APPENDIX D – TEST SET-UP PHOTOGRAPHS	
APPENDIX E – EXTERNAL PHOTOGRAPHS	
APPENDIX F – INTERNAL PHOTOGRAPHS	
APPENDIX G – USER’S MANUAL	



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.** BEJPA72GJE
- **EUT Type** DLP PROJECTOR
- **Model Name** PA72G-JE, PA72B-JE
("These model names are given in accordance with customer's requirements that are not effect on EMC performance. All the electrical and mechanical characteristics are the same as basic model except model name designation.")
- **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** July 19 ~ 31, 2012
- **Place of Test** GUMI COLLEGE EMC CENTER (FCC Registration Number: 100749, 443957)
407, Bugok-Dong, Gumi-City, Gyungbok, 730-711, Republic of Korea
- **Test Report Number** GETEC-E3-12-084
- **Dates of Issue** August 8, 2012

EUT Type: DLP PROJECTOR

FCC ID.: BEJPA72GJE



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.**

DLP PROJECTOR (Model Name: PA72G-JE, PA72B-JE)

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

The site address is 407, Bugok-Dong, Gumi-City, Gyungbok, 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
407, Bugok-Dong, Gumi-City,
Gyungbok, 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.**

DLP PROJECTOR (Model Name: PA72G-JE, PA72B-JE) FCC ID.: BEJPA72GJE

MODELS	PA72G (PA72G-JE)	
Resolution (Pixel)	1280 (Horizontal) × 800 (Vertical)	
Aspect ratio	16:10 (Horizontal:Vertical)	
Panel size (mm)	11.623	
Projection distance (Video size)	0.90 m - 3.06 m (76.2 cm - 254.0 cm)	
Ratio of upward projection	100 %	
Working range of the remote control	6 m	
Video input	NTSC M / PAL-B, D, G, H, I / PAL M / PAL N / PAL 60 / SECAM	
AC-DC Adaptor	19.5 V  , 7.18 A	
Audio Output	3W + 3W	
Height (mm)	Front Side	56.5 (without foot), 60.0 (with foot)
	Rear Side	44.0 (without foot), 47.5 (with foot)
Width (mm)	230.0	
Depth (mm)	170.0	
Weight (g)	1350	
USB Device	5 V, 0.5 A (Max.)	

-. Maximum Frequency Range : 667 MHz

EUT Type: DLP PROJECTOR

FCC ID.: BEJPA72GJE



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
Video 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
Headset	PHILIPS	SBC HL140	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.
Adapter ¹⁾	Ampower Technology Co., Ltd.	AAR-00	S/N: JC5UD627912013353(1.0) FCC ID.: N/A
Wi-Fi module	LG Electronics Inc.	TWFM-B003D	S/N: None. FCC ID.: BEJTWFM-B003D
IR remote controller	LG Electronics Inc.	MKJ50025110	S/N: None. FCC ID.: N/A

1) Input ratings: AC (100 – 240) V~, (50/60) Hz, 2.0 A / Output ratings: DC 19.5 V, 7.18 A



3.2.3 Used Cable(s)

Cable Name	Condition	Description
Adapter cable	Connected to the adapter	1.00 m unshielded
Power cable	Connected to the EUT	1.50 m shielded with a ferrite core
RGB(Analog) in cable	Connected to the EUT and PC	1.80 m shielded with two ferrite cores
HDMI/DVI (Digital) in cable	Connected to the EUT and PC	2.00 m shielded
AV in cable	Connected to the EUT and DVD player	1.20 m shielded
Headset cable	Connected to the EUT and headset	1.20 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.

- Test Voltage / Frequency : AC 120 V / 60 Hz
- Test Mode(s)

-. Projection mode

Radiated emission: 1 680 × 1 050 / 60 Hz (RGB: Analog, HDMI/DVI: Digital)

Conducted emission: 1 680 × 1 050 / 60 Hz (RGB: Analog, HDMI/DVI: Digital),

1 024 × 768 / 60 Hz (RGB: Analog), 640 × 480 / 60 Hz (RGB: Analog)

◆ 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 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).

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

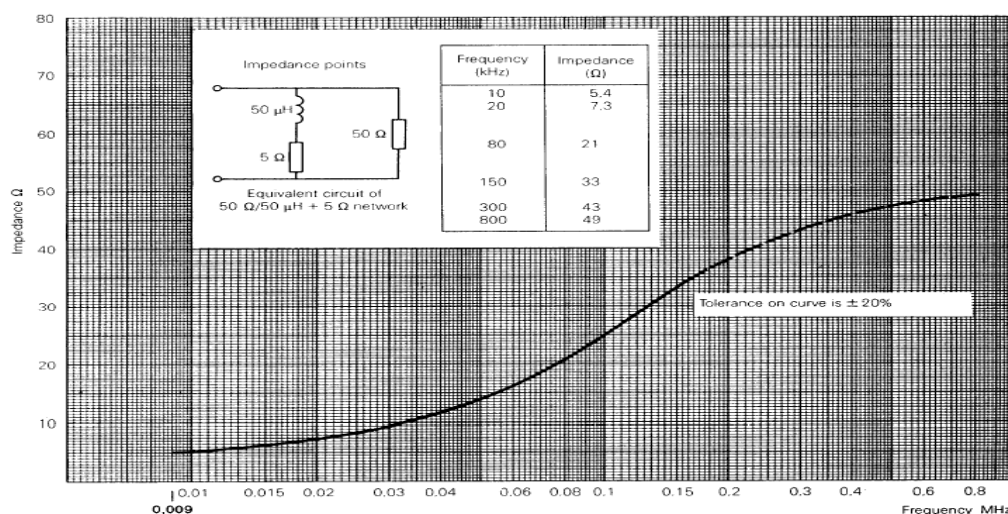


Fig 2. Impedance of LISN



4.3 Radiated Emission

Measurements (below 1 GHz) were made at Open area test site that complies to CISPR 16/ANSI C63.4. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10 m. The EUT was rotated 360° about its azimuth with the receive antenna located at 1, 2, 3 and 4 meter heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then 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, where applicable.

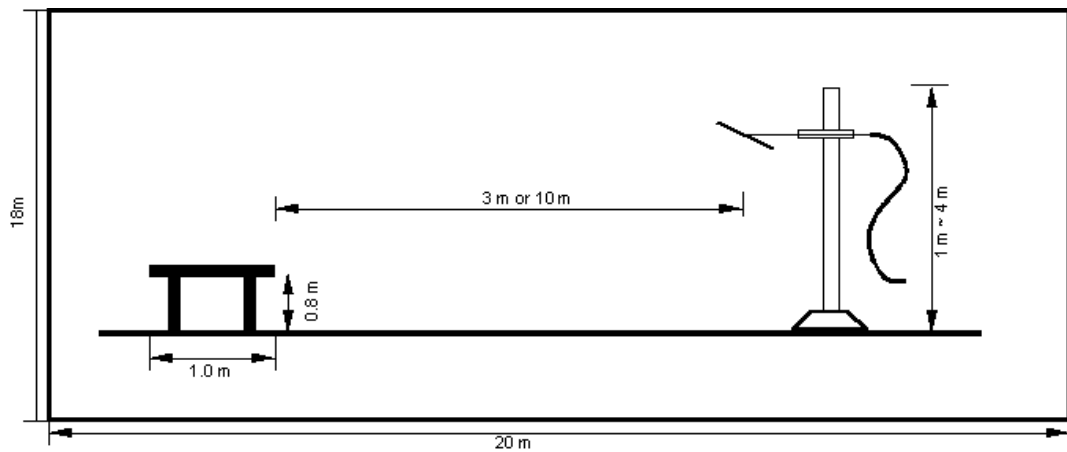


Fig 3. Dimensions of test site

The measurements (above 1 GHz) were made 3 m distance test site that complies to CISPR 16-1-4 (2007). In order to meet SVSWR Limit (Within 6 dB), the bottom side of test site was installed with absorbers. 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. The measurements were conducted with Average and Peak value.

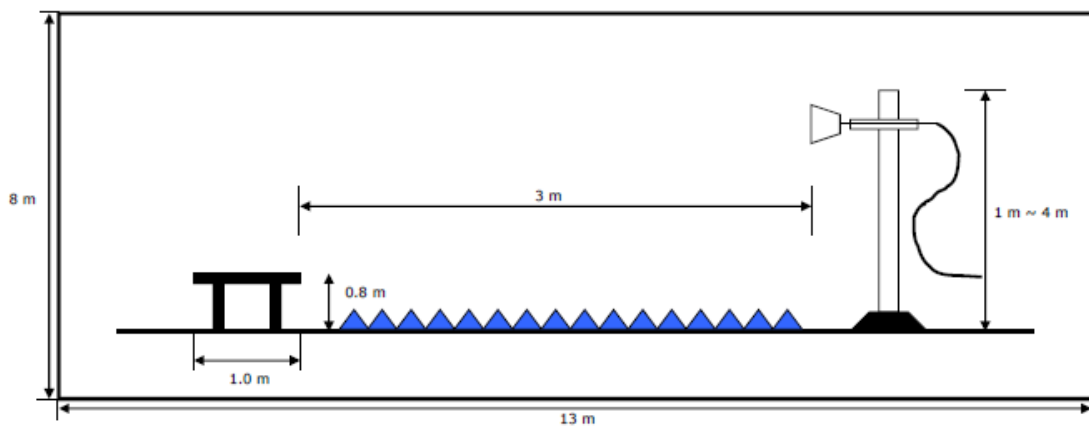


Fig 4. Dimensions of test site



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

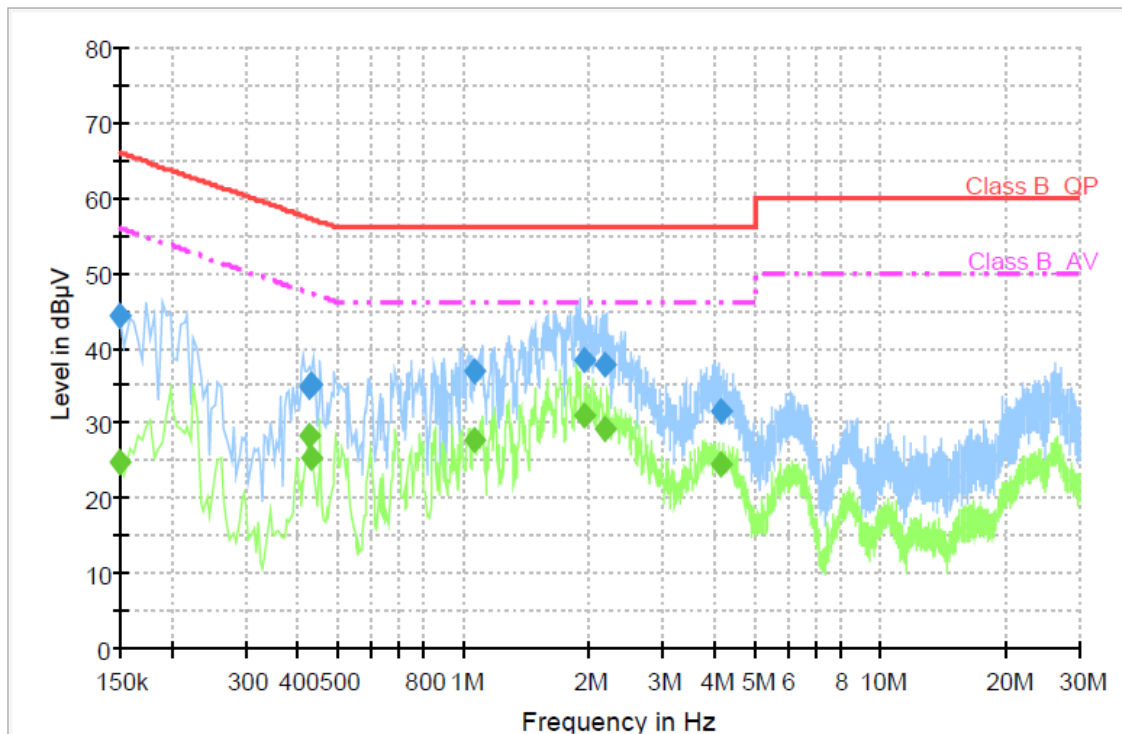
Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESCS30	Rohde & Schwarz	EMI Test Receiver	839809/003	12. 05. 2012
■ - ESH3-Z5	Rohde & Schwarz	LISN	838979/020	12. 07. 2012
■ - ESH2-Z5	Rohde & Schwarz	LISN	829991/009	12. 07. 2012
□ - ENY81-CA6	Rohde & Schwarz	ISN	101573	10. 19. 2012

5.6 Test data for Conducted Emission

- . Test Date : July 20, 2012
- . Resolution Bandwidth : 9 kHz
- . Frequency Range : 0.15 MHz ~ 30 MHz
- . Line : L1: Live, N: Neutral



◆ Operating condition: 1 680 × 1 050 / 60 Hz (RGB: Analog)



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	44.2	200.0	9.000	GND	L1	10.1	21.8	66.0	
0.428000	34.9	200.0	9.000	GND	L1	10.1	22.4	57.3	
0.432000	35.0	200.0	9.000	GND	L1	10.1	22.2	57.2	
1.060000	36.9	200.0	9.000	GND	L1	10.2	19.1	56.0	
1.940000	38.2	200.0	9.000	GND	L1	10.2	17.8	56.0	
2.180000	37.8	200.0	9.000	GND	L1	10.2	18.2	56.0	
4.140000	31.5	200.0	9.000	GND	L1	10.3	24.5	56.0	

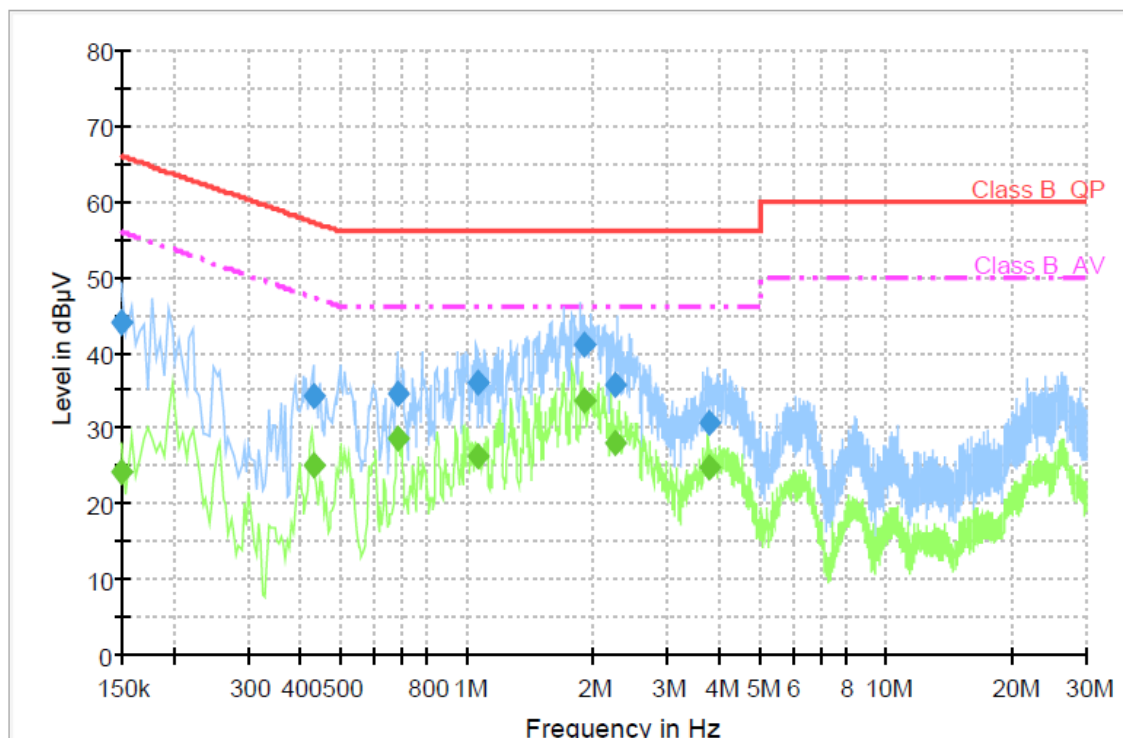
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	24.8	200.0	9.000	GND	L1	10.1	31.2	56.0	
0.428000	28.4	200.0	9.000	GND	L1	10.1	18.9	47.3	
0.432000	25.5	200.0	9.000	GND	L1	10.1	21.8	47.2	
1.060000	27.6	200.0	9.000	GND	L1	10.2	18.4	46.0	
1.940000	31.0	200.0	9.000	GND	L1	10.2	15.0	46.0	
2.180000	29.2	200.0	9.000	GND	L1	10.2	16.8	46.0	
4.140000	24.6	200.0	9.000	GND	L1	10.3	21.4	46.0	

< Fig 5. Conducted emission result >



◆ Operating condition: 1 024 × 768 / 60 Hz (RGB: Analog)



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	44.1	200.0	9.000	GND	L1	10.1	21.9	66.0	
0.432000	34.3	200.0	9.000	GND	L1	10.1	22.9	57.2	
0.684000	34.7	200.0	9.000	GND	L1	10.1	21.3	56.0	
1.064000	36.1	200.0	9.000	GND	N	10.2	19.9	56.0	
1.904000	41.0	200.0	9.000	GND	L1	10.2	15.0	56.0	
2.252000	35.8	200.0	9.000	GND	N	10.2	20.2	56.0	
3.776000	30.8	200.0	9.000	GND	N	10.3	25.2	56.0	

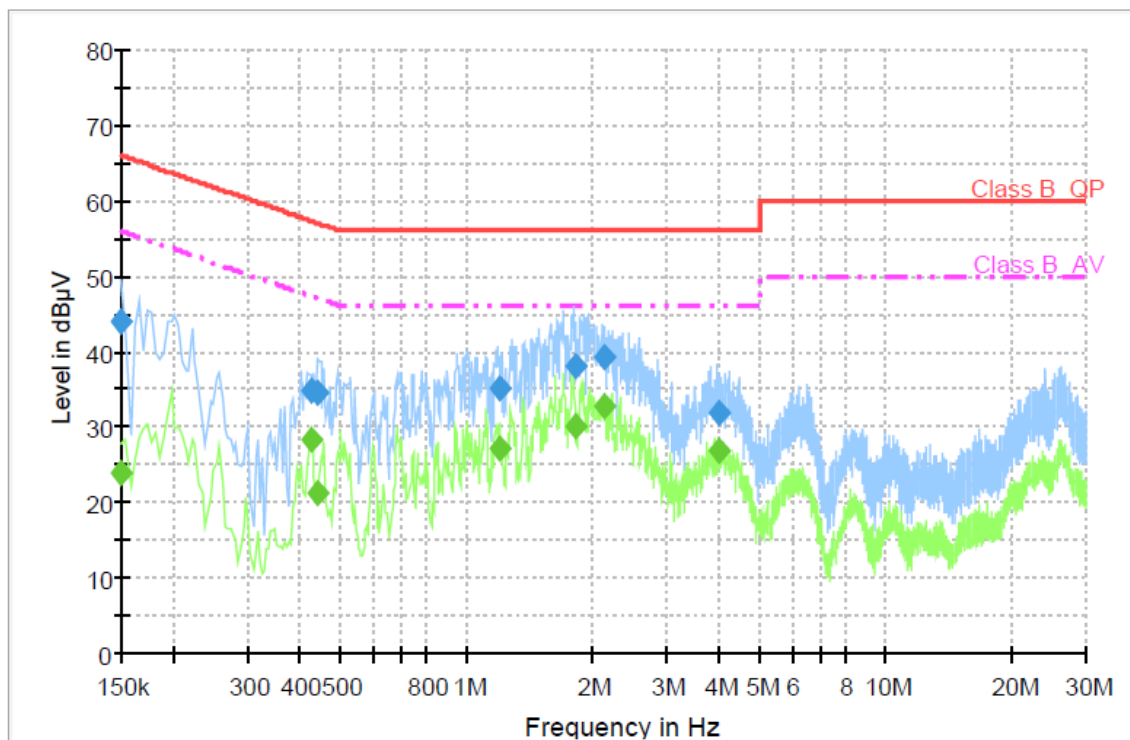
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	24.1	200.0	9.000	GND	L1	10.1	31.9	56.0	
0.432000	25.0	200.0	9.000	GND	L1	10.1	22.2	47.2	
0.684000	28.6	200.0	9.000	GND	L1	10.1	17.4	46.0	
1.064000	26.2	200.0	9.000	GND	N	10.2	19.8	46.0	
1.904000	33.6	200.0	9.000	GND	L1	10.2	12.4	46.0	
2.252000	28.0	200.0	9.000	GND	N	10.2	18.0	46.0	
3.776000	24.7	200.0	9.000	GND	N	10.3	21.3	46.0	

< Fig 6. Conducted emission result >



◆ Operating condition: 640 × 480 / 60 Hz(RGB: Analog)



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	44.0	200.0	9.000	GND	L1	10.1	22.0	66.0	
0.428000	34.9	200.0	9.000	GND	L1	10.1	22.4	57.3	
0.444000	34.6	200.0	9.000	GND	L1	10.1	22.4	57.0	
1.204000	35.0	200.0	9.000	GND	N	10.2	21.0	56.0	
1.824000	38.1	200.0	9.000	GND	L1	10.2	17.9	56.0	
2.124000	39.4	200.0	9.000	GND	N	10.2	16.6	56.0	
4.012000	32.0	200.0	9.000	GND	N	10.3	24.0	56.0	

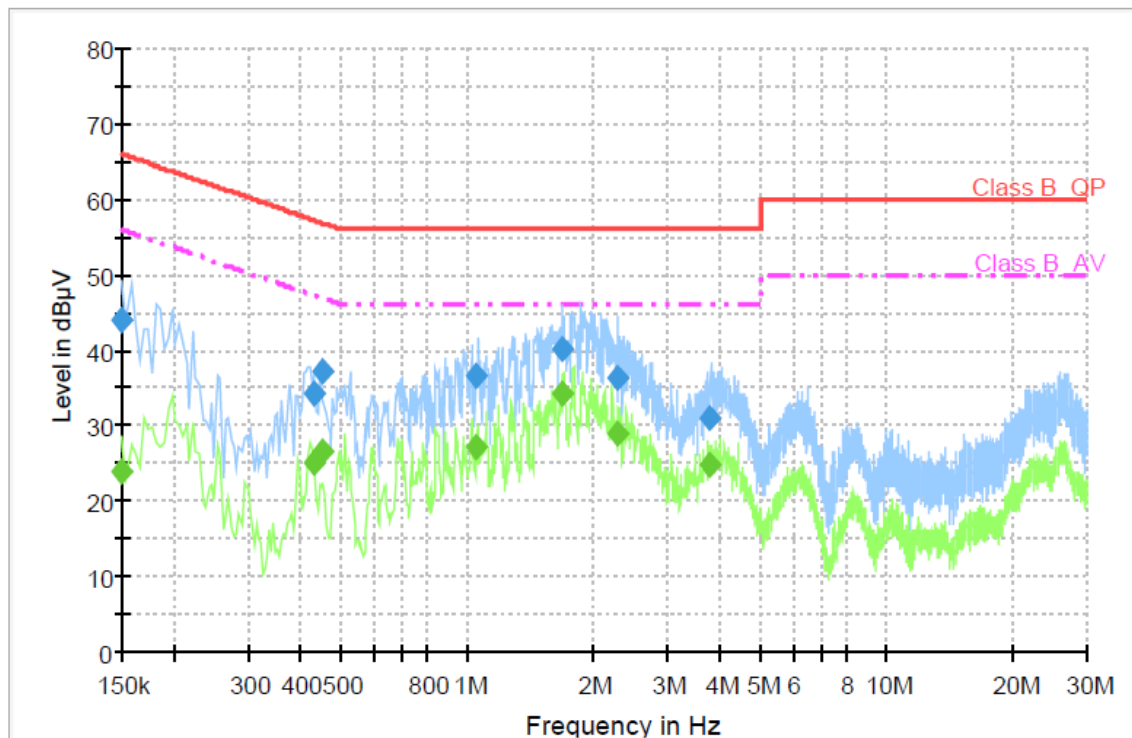
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	24.0	200.0	9.000	GND	L1	10.1	32.0	56.0	
0.428000	28.3	200.0	9.000	GND	L1	10.1	18.9	47.3	
0.444000	21.4	200.0	9.000	GND	L1	10.1	25.6	47.0	
1.204000	27.3	200.0	9.000	GND	N	10.2	18.7	46.0	
1.824000	30.2	200.0	9.000	GND	L1	10.2	15.8	46.0	
2.124000	32.8	200.0	9.000	GND	N	10.2	13.2	46.0	
4.012000	26.9	200.0	9.000	GND	N	10.3	19.1	46.0	

< Fig 7. Conducted emission result >



◆ Operating condition: 1 680 × 1 050 / 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
0.150000	44.1	200.0	9.000	GND	L1	10.1	21.9	66.0	
0.432000	34.3	200.0	9.000	GND	L1	10.1	22.9	57.2	
0.452000	37.1	200.0	9.000	GND	L1	10.1	19.7	56.8	
1.056000	36.5	200.0	9.000	GND	L1	10.2	19.5	56.0	
1.684000	40.1	200.0	9.000	GND	L1	10.2	15.9	56.0	
2.288000	36.2	200.0	9.000	GND	L1	10.2	19.8	56.0	
3.772000	31.0	200.0	9.000	GND	N	10.3	25.0	56.0	

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	23.9	200.0	9.000	GND	L1	10.1	32.1	56.0	
0.432000	25.2	200.0	9.000	GND	L1	10.1	22.0	47.2	
0.452000	26.6	200.0	9.000	GND	L1	10.1	20.2	46.8	
1.056000	27.2	200.0	9.000	GND	L1	10.2	18.8	46.0	
1.684000	34.1	200.0	9.000	GND	L1	10.2	11.9	46.0	
2.288000	28.8	200.0	9.000	GND	L1	10.2	17.2	46.0	
3.772000	24.9	200.0	9.000	GND	N	10.3	21.1	46.0	

< Fig 8. Conducted emission result >



6. Radiated Emission

6.1 Operating Environment

Temperature : 31.0 °C
Relative Humidity : 61.0 % R.H.

6.2 Test Set-up

A preliminary scan with peak mode was performed in the semi anechoic chamber and found frequency for test site. The formal radiated emission was measured at 10 m distance open area test site and 3 m distance 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(Open area test site)	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 10 m, Vertical)	± 3.96 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (30 MHz ~ 300 MHz, 10 m, Horizontal)	± 3.44 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Vertical)	± 3.74 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Horizontal)	± 3.88 dB	Confidence level of approximately 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 ~ 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
■ - ESCS30	Rohde & Schwarz	EMI Test Receiver	839809/003	05. 22. 2013
■ - HK116	Rohde & Schwarz	Biconical Antenna	826861/018	01. 29. 2014
■ - HL223	Rohde & Schwarz	Log Periodic Antenna	829228/011	01. 29. 2014
■ - 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
■ - ESIB26	Rohde & Schwarz	EMI Test Receiver	830482/010	05. 23. 2013
■ - 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

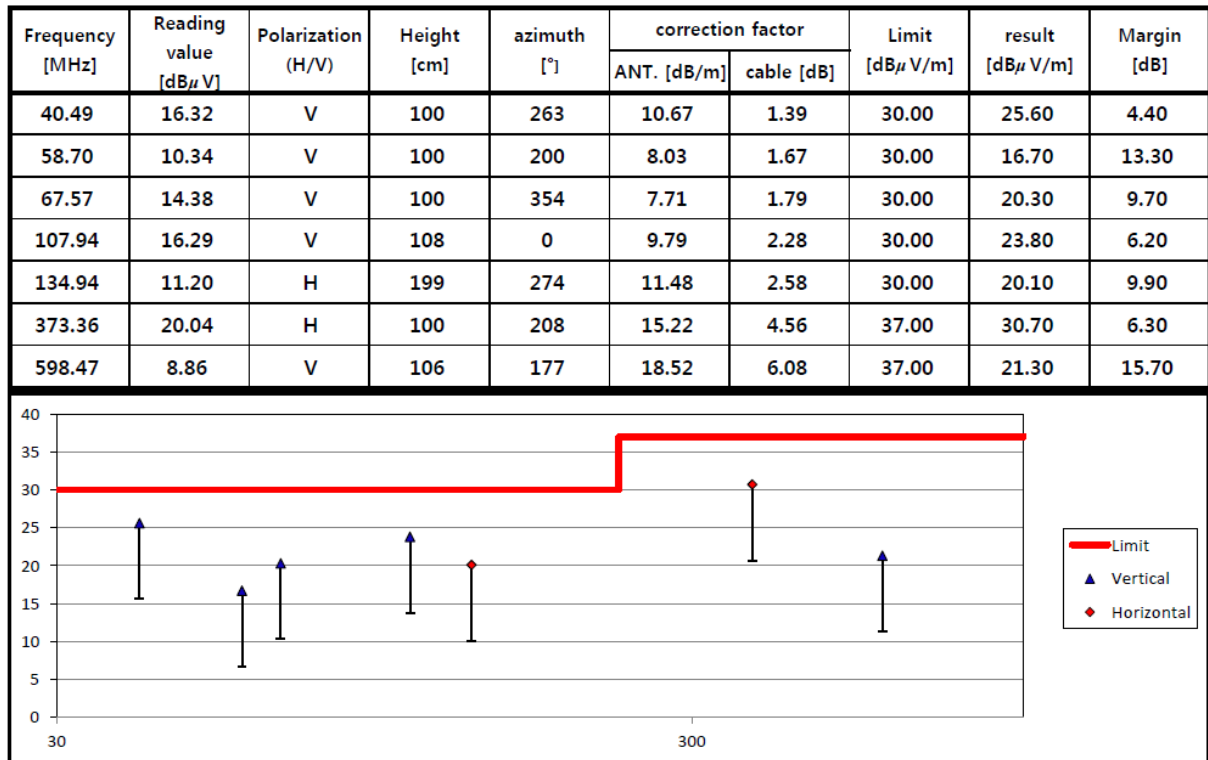
6.6 Test data for Radiated Emission

- Test Date : July 12 ~ 14, 2012
 -. Measurement Distance : 3 m
 -. Note : The highest frequency of the internal source of the EUT is between 500 MHz and 1 000 MHz (667 MHz). The measurement was made up to 5 000 MHz
 -. Measurement

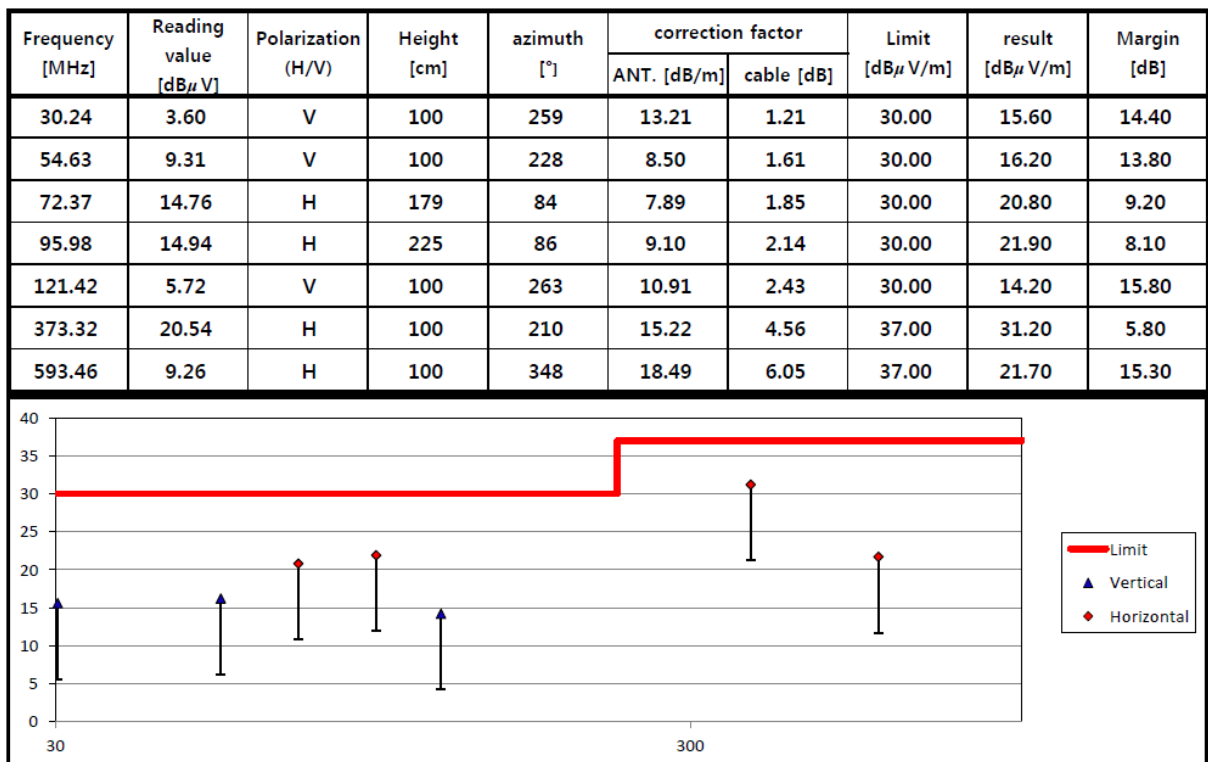
Frequency range	30 MHz ~ 1 GHz	Above 1 GHz
Detector mode	Quasi peak	Peak / Average
Resolution bandwidth	120 kHz	1 MHz



◆ Operating condition: 1 680 × 1 050 / 60 Hz(RGB: Analog)

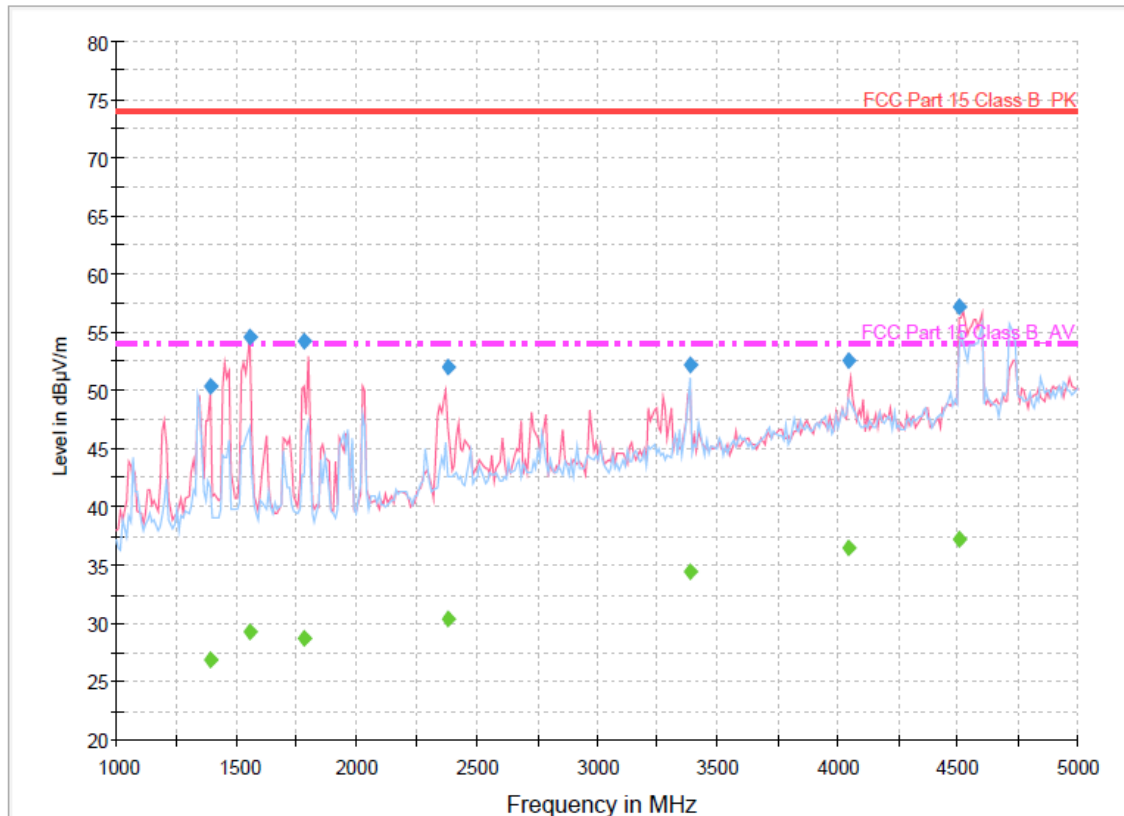


◆ Operating condition: 1 680 × 1 050 / 60 Hz(HDMI/DVI: Digital)





- ◆ Operating condition: 1 680 × 1 050 / 60 Hz (RGB: Analog)
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)
1394.581563	50.4	1000.0	1000.000	100.0	V	40.0	-12.8	23.6	74.0
1555.302204	54.6	1000.0	1000.000	100.0	V	344.0	-12.4	19.4	74.0
1784.603206	54.2	1000.0	1000.000	100.0	V	3.0	-11.7	19.8	74.0
2379.345491	52.0	1000.0	1000.000	100.0	V	3.0	-9.2	22.0	74.0
3384.169539	52.2	1000.0	1000.000	100.0	H	218.0	-5.0	21.8	74.0
4046.312224	52.7	1000.0	1000.000	100.0	V	233.0	-2.4	21.3	74.0
4506.054108	57.2	1000.0	1000.000	100.0	V	169.0	-1.5	16.8	74.0

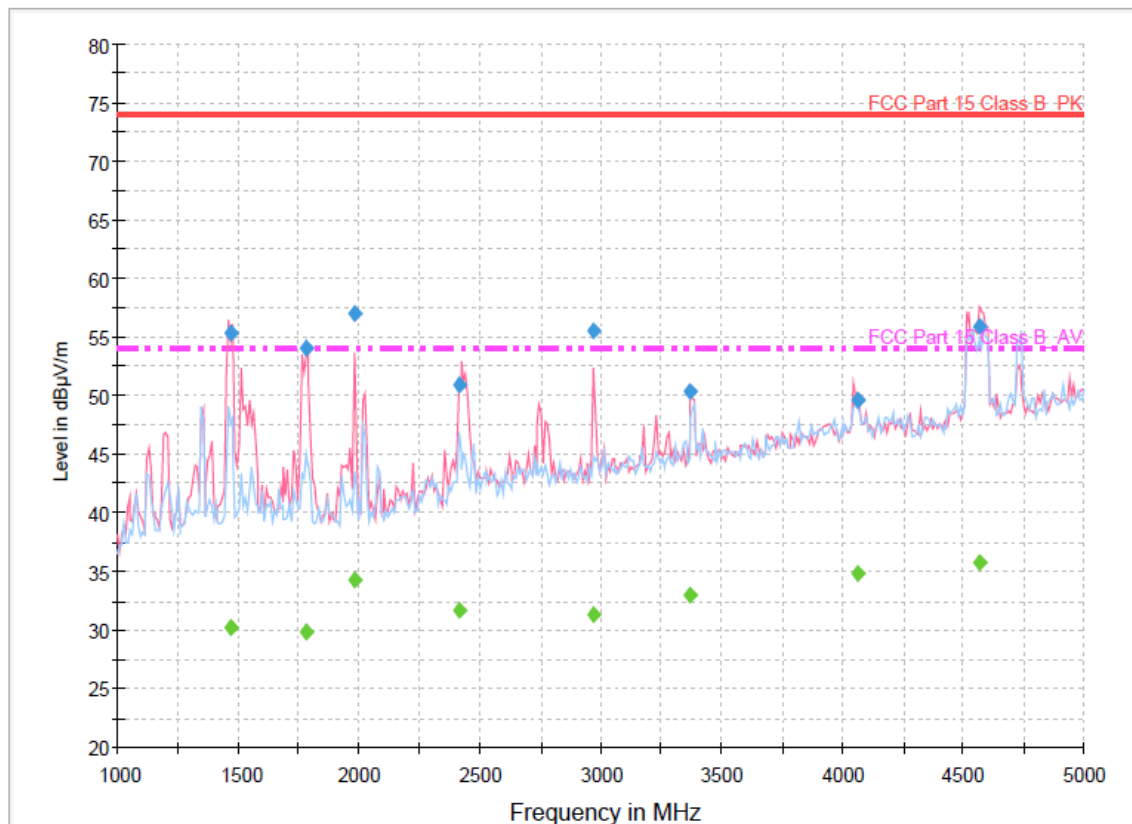
Final Result 2

Frequency (MHz)	CAverage (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1394.581563	26.8	1000.0	1000.000	100.0	V	40.0	-12.8	27.2	54.0
1555.302204	29.3	1000.0	1000.000	100.0	V	344.0	-12.4	24.7	54.0
1784.603206	28.7	1000.0	1000.000	100.0	V	3.0	-11.7	25.3	54.0
2379.345491	30.5	1000.0	1000.000	100.0	V	3.0	-9.2	23.5	54.0
3384.169539	34.4	1000.0	1000.000	100.0	H	218.0	-5.0	19.6	54.0
4046.312224	36.6	1000.0	1000.000	100.0	V	233.0	-2.4	17.4	54.0
4506.054108	37.3	1000.0	1000.000	100.0	V	169.0	-1.5	16.7	54.0

< Fig 11. Radiated emission result (1 000 MHz ~ 5 000 MHz) >



- ◆ Operating condition: 1 680 × 1 050 / 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)
1468.313828	55.5	1000.0	1000.000	100.0	V	321.0	-12.7	18.5	74.0
1780.571142	54.1	1000.0	1000.000	100.0	V	8.0	-11.7	19.9	74.0
1980.955912	57.0	1000.0	1000.000	196.0	V	327.0	-11.3	17.0	74.0
2416.653707	51.0	1000.0	1000.000	100.0	V	-2.0	-9.0	23.0	74.0
2971.743888	55.6	1000.0	1000.000	100.0	V	177.0	-6.5	18.4	74.0
3368.145491	50.4	1000.0	1000.000	100.0	V	291.0	-5.1	23.6	74.0
4060.292184	49.7	1000.0	1000.000	100.0	V	212.0	-2.3	24.3	74.0
4565.734269	56.0	1000.0	1000.000	100.0	V	236.0	-1.4	18.0	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)
1468.313828	30.2	1000.0	1000.000	100.0	V	321.0	-12.7	23.8	54.0
1780.571142	29.9	1000.0	1000.000	100.0	V	8.0	-11.7	24.1	54.0
1980.955912	34.2	1000.0	1000.000	196.0	V	327.0	-11.3	19.8	54.0
2416.653707	31.6	1000.0	1000.000	100.0	V	-2.0	-9.0	22.4	54.0
2971.743888	31.3	1000.0	1000.000	100.0	V	177.0	-6.5	22.7	54.0
3368.145491	33.0	1000.0	1000.000	100.0	V	291.0	-5.1	21.0	54.0
4060.292184	34.9	1000.0	1000.000	100.0	V	212.0	-2.3	19.1	54.0
4565.734269	35.8	1000.0	1000.000	100.0	V	236.0	-1.4	18.2	54.0

< Fig 12. Radiated emission result (1 000 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. DLP PROJECTOR (Model Name: PA72G-JE, PA72B-JE)** was complies with §15.107 and 15.109 of the FCC Rules.

- The end -