

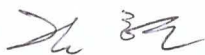
FCC EVALUATION REPORT FOR CERTIFICATION

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: September 1, 2011****Order Number: GETEC-C1-11-192****Test Report Number: GETEC-E3-11-091****Test Site: Gumi College EMC Center****FCC Registration Number: (100749, 443957)****FCC ID. : BEJCF3DATJS****Applicant : LG Electronics Inc.**

Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: LCOS PROJECTOR
Type of Authority	: Certification
Model Name	: CF3DAT-JS
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,**

Soon-Hoon, Jeong, Associate Engineer
GUMI College EMC center



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.** BEJCF3DATJS
- **EUT Type** LCOS PROJECTOR
- **Model Name** CF3DAT-JS
- **Trade Name** LG
- **Serial Number** Prototype
- **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 12 ~ 29, 2011
- **Place of Test** **Gumi College EMC Center** (FCC Registration Number: 100749, 443957)
407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.
- **Test Report Number** GETEC-E3-11-091
- **Dates of Issue** September 1, 2011

EUT Type: LCOS PROJECTOR

FCC ID.: BEJCF3DATJS



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. LCOS PROJECTOR (Model Name: CF3DAT-JS)**

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

The site address is 407, Bugok-dong, Gumi-si, Gyeongbuk, 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 (2003)



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407, Bugok-dong, Gumi-si,
Gyeongbuk 730-711, 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. LCOS PROJECTOR (Model Name: CF3DAT-JS)**
FCC ID.: BEJCF3DATJS

MODELS	CF3DAT (CF3DAT-JS)
Resolution	1920 (H) x 1080 (V) pixels
Aspect ratio	16:9 (H:V)
Panel size (mm)	15.4
Projection distance (Video size)	Wide: 0.88 m - 9.08 m (76.2 cm - 762.0 cm) Tele: 1.14 m - 11.8 m (76.2 cm - 762.0 cm)
Ratio of upward projection	100 %
Working range of the remote control	12 m
Video input	NTSC/PAL/SECAM/NTSC4.43/PAL-M/PAL-N/PAL-60
POWER	AC 110 V - 240 V - 50/60 Hz, 5.5 A
Reception type	DTV-ATSC/TV-NTSC
Reception channels	VHF 2~13 channel, UHF 14~69 channel, Cable 01~135 channel, DTV 2~69 channel, DTV cable 1~135 channel
External Antenna Impedance	75 Ω (VHF/UHF)
Headphone, earphone	Impedance: 16 Ω / Output power: 10mW / Jack thickness: 3.5mm
Height (mm)	190
Width (mm)	501
Length (mm)	560
Weight (kg)	21.1

-. Maximum Frequency Range :667 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	Great Pleasure Electronics Co., Ltd.	GP-M3100UE	S/N: 14036766 FCC ID.: DoC
DVD player	LG Electronics Inc.	DV492H	S/N: 004INLV013640 FCC ID.: Verification
USB memory stick	SAMSUNG	SUM-PSB4	S/N: TBBB202478F FCC ID.: DoC
TV signal generator	FLUKE	54200M01	S/N: 831011 FCC ID.: Verification

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	HANSUNG ELECTRONICS	AKB72914072	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
RGB(Analog) cable	Connected to the EUT and PC	1.80 m shielded with two ferrite cores
HDMI/DVI(Digital) cable	Connected to the EUT and PC	2.00 m shielded
RS-232C (Control & service) cable	Connected to the EUT and PC	1.80 m shielded
Audio(RGB/DVI) in cable	Connected to the EUT and PC	1.50 m shielded
Video in cable	Connected to the EUT and DVD player	1.20 m shielded
Component cable	Connected to the EUT and DVD player	2.00 m shielded
Antenna cable	Connected to the EUT and TV signal generator	10.00 m shielded
LAN cable	Connected to the EUT and Network	10.00 m unshielded

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: 1 920 × 1 080 / 60 Hz (RGB: Analog, HDMI/DVI: Digital)

Conducted emission: 1 920 × 1 080 / 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
- . Settings and control the display via the Network from a PC
- . 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).

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

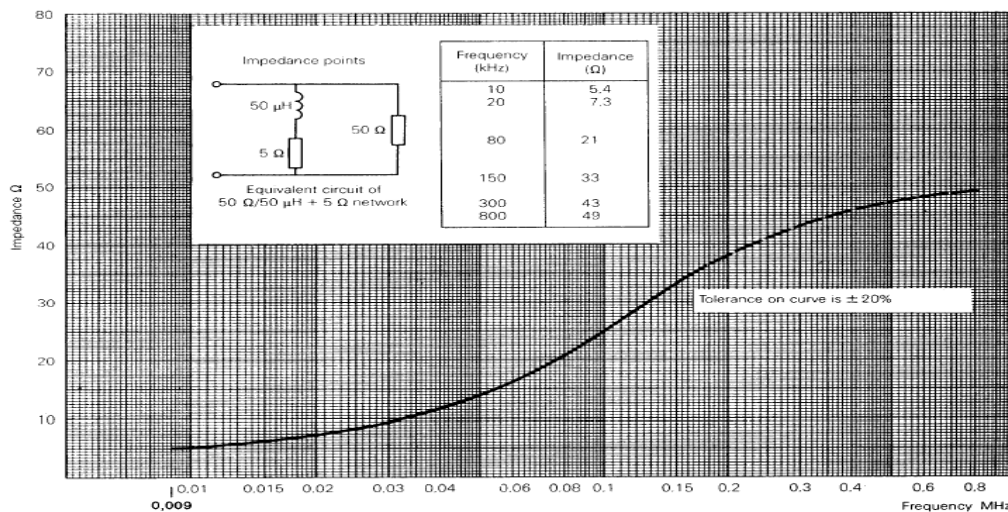


Fig 2. Impedance of LISN



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.

Final measurements were made 3 m chamber (FCC registration No.: 443957) and/or 10 m OATS (FCC registration No.: 100749).

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 test site



5. Conducted Emission

5.1 Operating Environment

Temperature : 25.0 °C
Relative Humidity : 56.0 % 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)	± 2.71 dB	Confidence levels of 95 % ($k = 2$)
Conducted emission (150 kHz ~ 30 MHz)	± 3.34 dB	Confidence levels of 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. 10. 2011
■ - ESH3-Z5	Rohde & Schwarz	LISN	838979/020	12. 10. 2011
■ - ESH2-Z5	Rohde & Schwarz	LISN	829991/009	12. 10. 2011
■ - ISN T8	TESEQ. GmbH	ISN	24568	11. 09. 2011

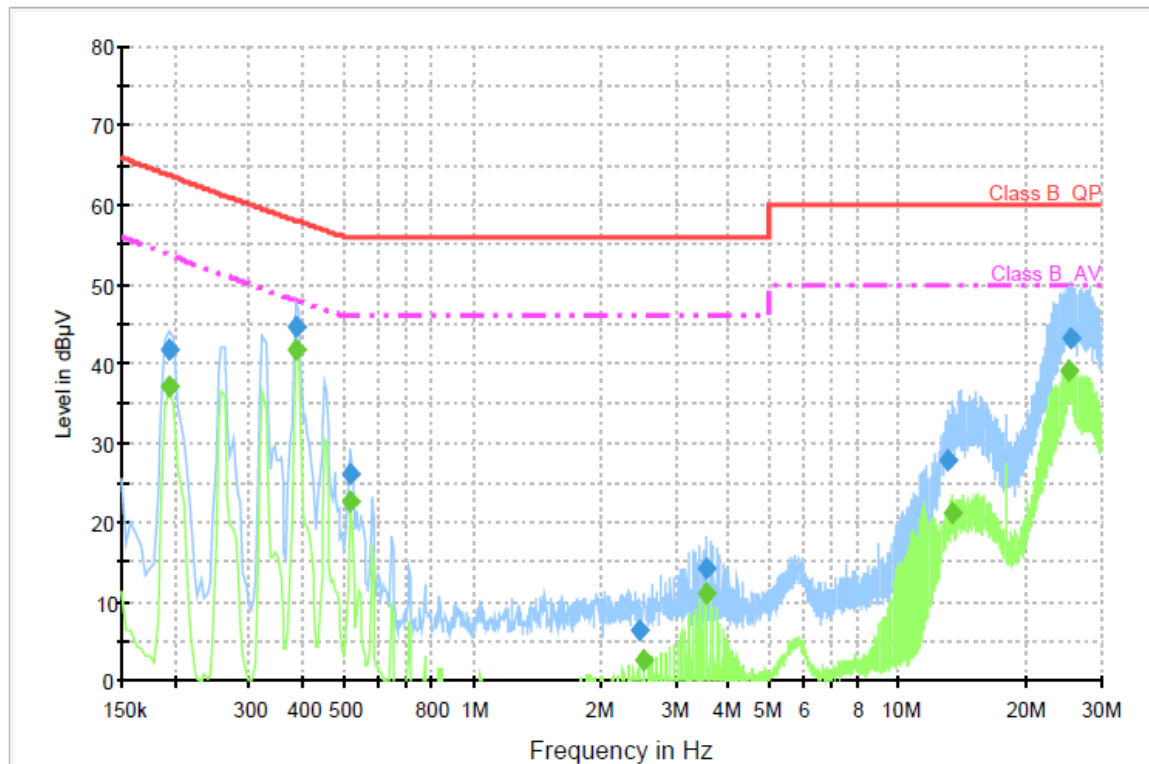
5.6 Test data for Conducted Emission

-. Test Date : August 25, 2011
-. Resolution Bandwidth : 9 kHz
-. Frequency Range : 0.15 MHz ~ 30 MHz



◆ Operating condition: 1 920 × 1 080 / 60 Hz (RGB: Analog)

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	41.7	1000.000	9.000	GND	L1	10.1	22.0	63.7	
0.388000	44.7	1000.000	9.000	GND	L1	10.1	13.3	58.0	
0.516000	26.1	1000.000	9.000	GND	L1	10.1	29.9	56.0	
2.456000	6.5	1000.000	9.000	GND	L1	10.2	49.5	56.0	
3.556000	14.2	1000.000	9.000	GND	L1	10.2	41.8	56.0	
13.116000	28.0	1000.000	9.000	GND	L1	10.7	32.0	60.0	
25.584000	43.3	1000.000	9.000	GND	L1	11.1	16.7	60.0	

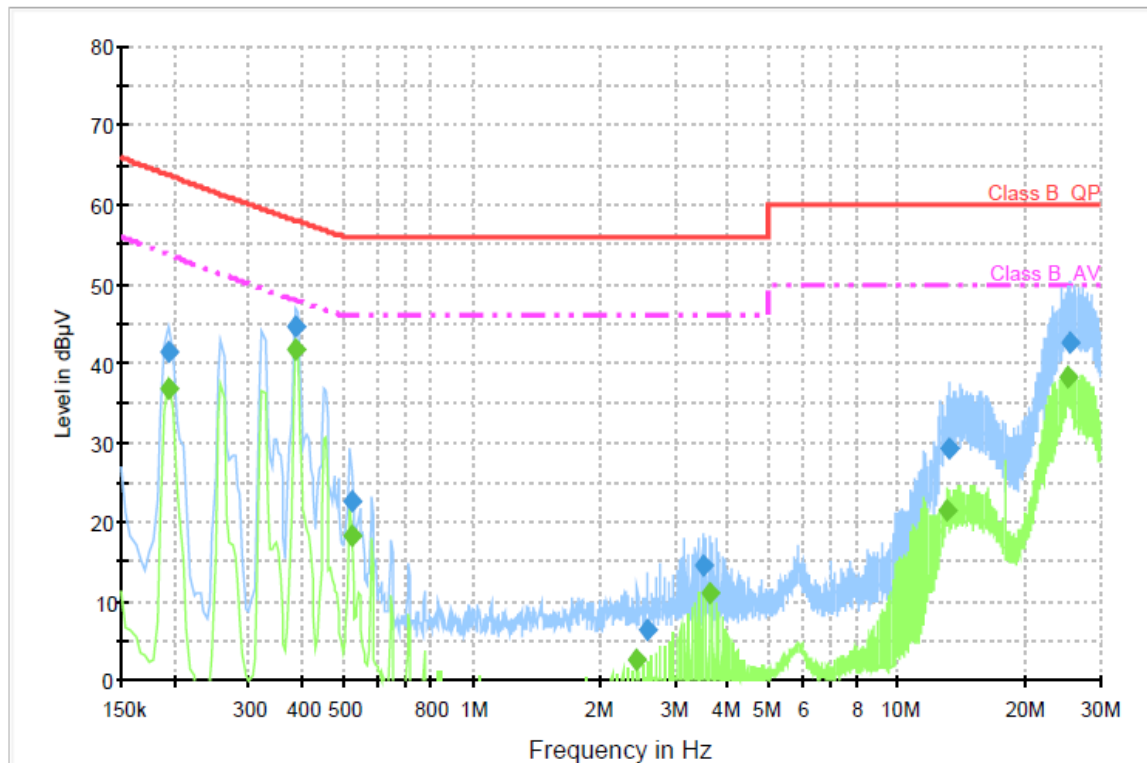
Final Measurement Detector 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	37.1	1000.000	9.000	GND	L1	10.1	16.6	53.7	
0.388000	41.8	1000.000	9.000	GND	L1	10.1	6.1	47.9	
0.516000	22.5	1000.000	9.000	GND	L1	10.1	23.5	46.0	
2.520000	2.5	1000.000	9.000	GND	L1	10.2	43.5	46.0	
3.552000	10.9	1000.000	9.000	GND	L1	10.2	35.1	46.0	
13.356000	21.1	1000.000	9.000	GND	L1	10.7	28.9	50.0	
25.200000	39.2	1000.000	9.000	GND	L1	11.1	10.8	50.0	

< Fig 4. Conducted emission result (Live line) >



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	41.5	1000.000	9.000	GND	N	10.1	22.2	63.7	
0.386000	44.6	1000.000	9.000	GND	N	10.1	13.4	58.0	
0.522000	22.5	1000.000	9.000	GND	N	10.1	33.5	56.0	
2.582000	6.5	1000.000	9.000	GND	N	10.2	49.5	56.0	
3.490000	14.6	1000.000	9.000	GND	N	10.2	41.4	56.0	
13.310000	29.3	1000.000	9.000	GND	N	10.7	30.7	60.0	
25.578000	42.7	1000.000	9.000	GND	N	10.7	17.3	60.0	

Final Measurement Detector 2

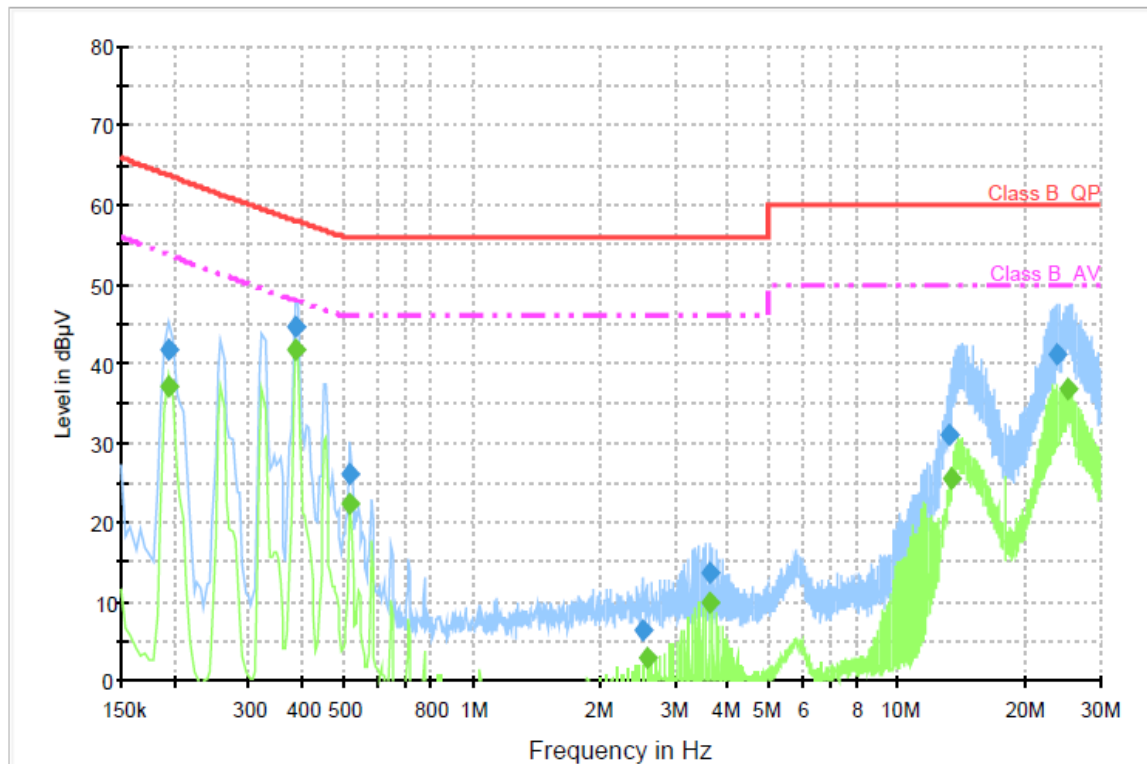
Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	36.8	1000.000	9.000	GND	N	10.1	16.9	53.7	
0.386000	41.7	1000.000	9.000	GND	N	10.1	6.3	48.0	
0.522000	18.3	1000.000	9.000	GND	N	10.1	27.7	46.0	
2.454000	2.6	1000.000	9.000	GND	N	10.2	43.4	46.0	
3.618000	11.1	1000.000	9.000	GND	N	10.3	34.9	46.0	
13.166000	21.3	1000.000	9.000	GND	N	10.6	28.7	50.0	
25.138000	38.3	1000.000	9.000	GND	N	10.7	11.7	50.0	

< Fig 5. Conducted emission result (Neutral line) >



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

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	41.8	1000.000	9.000	GND	L1	10.1	21.9	63.7	
0.388000	44.6	1000.000	9.000	GND	L1	10.1	13.4	58.0	
0.516000	25.9	1000.000	9.000	GND	L1	10.1	30.1	56.0	
2.520000	6.4	1000.000	9.000	GND	L1	10.2	49.6	56.0	
3.620000	13.5	1000.000	9.000	GND	L1	10.3	42.5	56.0	
13.324000	31.1	1000.000	9.000	GND	L1	10.7	28.9	60.0	
23.780000	41.2	1000.000	9.000	GND	L1	11.1	18.8	60.0	

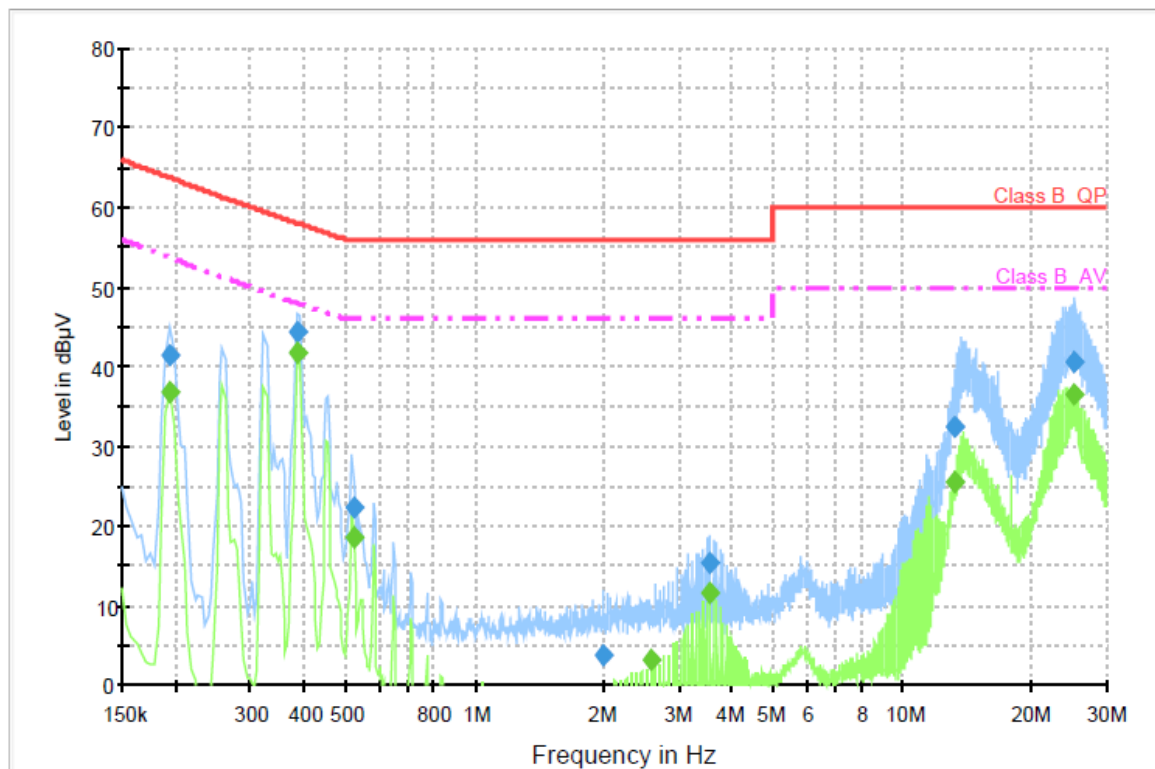
Final Measurement Detector 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	37.1	1000.000	9.000	GND	L1	10.1	16.6	53.7	
0.388000	41.8	1000.000	9.000	GND	L1	10.1	6.1	47.9	
0.516000	22.4	1000.000	9.000	GND	L1	10.1	23.6	46.0	
2.584000	2.8	1000.000	9.000	GND	L1	10.2	43.2	46.0	
3.620000	9.9	1000.000	9.000	GND	L1	10.3	36.1	46.0	
13.368000	25.5	1000.000	9.000	GND	L1	10.7	24.5	50.0	
25.072000	36.7	1000.000	9.000	GND	L1	11.1	13.3	50.0	

< Fig 6. Conducted emission result (Live line) >



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	41.5	1000.000	9.000	GND	N	10.1	22.2	63.7	
0.386000	44.5	1000.000	9.000	GND	N	10.1	13.5	58.0	
0.522000	22.3	1000.000	9.000	GND	N	10.1	33.7	56.0	
2.006000	3.8	1000.000	9.000	GND	N	10.2	52.2	56.0	
3.554000	15.4	1000.000	9.000	GND	N	10.2	40.6	56.0	
13.294000	32.6	1000.000	9.000	GND	N	10.7	27.4	60.0	
25.326000	40.7	1000.000	9.000	GND	N	10.7	19.3	60.0	

Final Measurement Detector 2

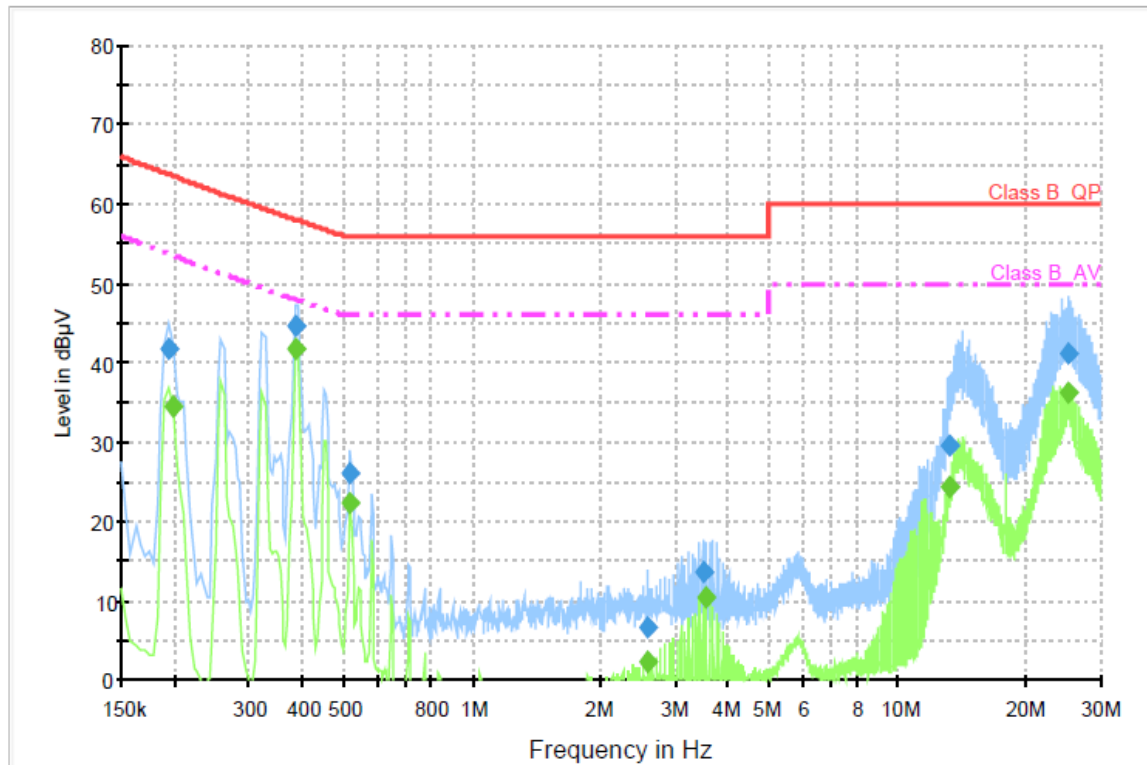
Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	36.7	1000.000	9.000	GND	N	10.1	17.0	53.7	
0.386000	41.6	1000.000	9.000	GND	N	10.1	6.4	48.0	
0.522000	18.4	1000.000	9.000	GND	N	10.1	27.6	46.0	
2.586000	3.1	1000.000	9.000	GND	N	10.2	42.9	46.0	
3.554000	11.5	1000.000	9.000	GND	N	10.2	34.5	46.0	
13.306000	25.6	1000.000	9.000	GND	N	10.7	24.4	50.0	
25.074000	36.5	1000.000	9.000	GND	N	10.7	13.5	50.0	

< Fig 7. Conducted emission result (Neutral line) >



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

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	41.8	1000.000	9.000	GND	L1	10.1	21.9	63.7	
0.388000	44.6	1000.000	9.000	GND	L1	10.1	13.4	58.0	
0.516000	26.0	1000.000	9.000	GND	L1	10.1	30.0	56.0	
2.584000	6.6	1000.000	9.000	GND	L1	10.2	49.4	56.0	
3.488000	13.7	1000.000	9.000	GND	L1	10.2	42.3	56.0	
13.196000	29.6	1000.000	9.000	GND	L1	10.7	30.4	60.0	
25.204000	41.2	1000.000	9.000	GND	L1	11.1	18.8	60.0	

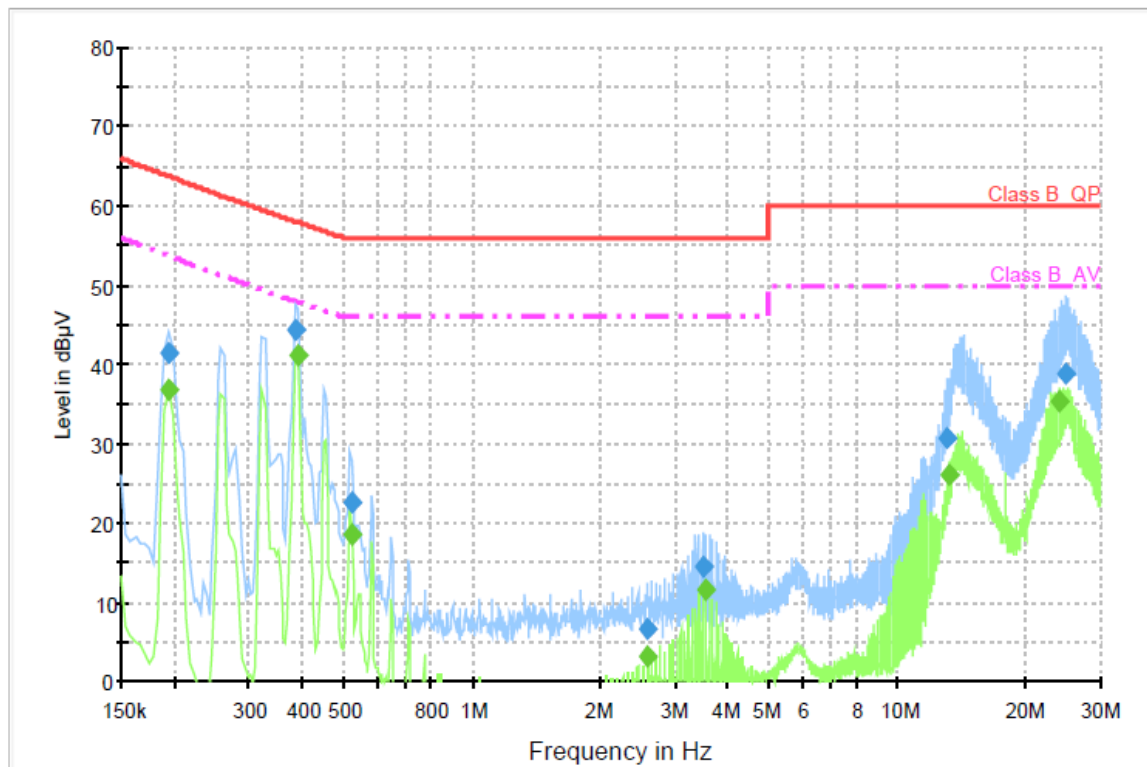
Final Measurement Detector 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.198000	34.5	1000.000	9.000	GND	L1	10.1	19.0	53.5	
0.388000	41.8	1000.000	9.000	GND	L1	10.1	6.1	47.9	
0.516000	22.4	1000.000	9.000	GND	L1	10.1	23.6	46.0	
2.588000	2.4	1000.000	9.000	GND	L1	10.2	43.6	46.0	
3.556000	10.4	1000.000	9.000	GND	L1	10.2	35.6	46.0	
13.304000	24.5	1000.000	9.000	GND	L1	10.7	25.5	50.0	
25.204000	36.1	1000.000	9.000	GND	L1	11.1	13.9	50.0	

< Fig 8. Conducted emission result (Live line) >



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.194000	41.4	1000.000	9.000	GND	N	10.1	22.3	63.7	
0.386000	44.5	1000.000	9.000	GND	N	10.1	13.5	58.0	
0.522000	22.6	1000.000	9.000	GND	N	10.1	33.4	56.0	
2.586000	6.7	1000.000	9.000	GND	N	10.2	49.3	56.0	
3.490000	14.5	1000.000	9.000	GND	N	10.2	41.5	56.0	
13.118000	30.8	1000.000	9.000	GND	N	10.6	29.2	60.0	
24.930000	38.7	1000.000	9.000	GND	N	10.7	21.3	60.0	

Final Measurement Detector 2

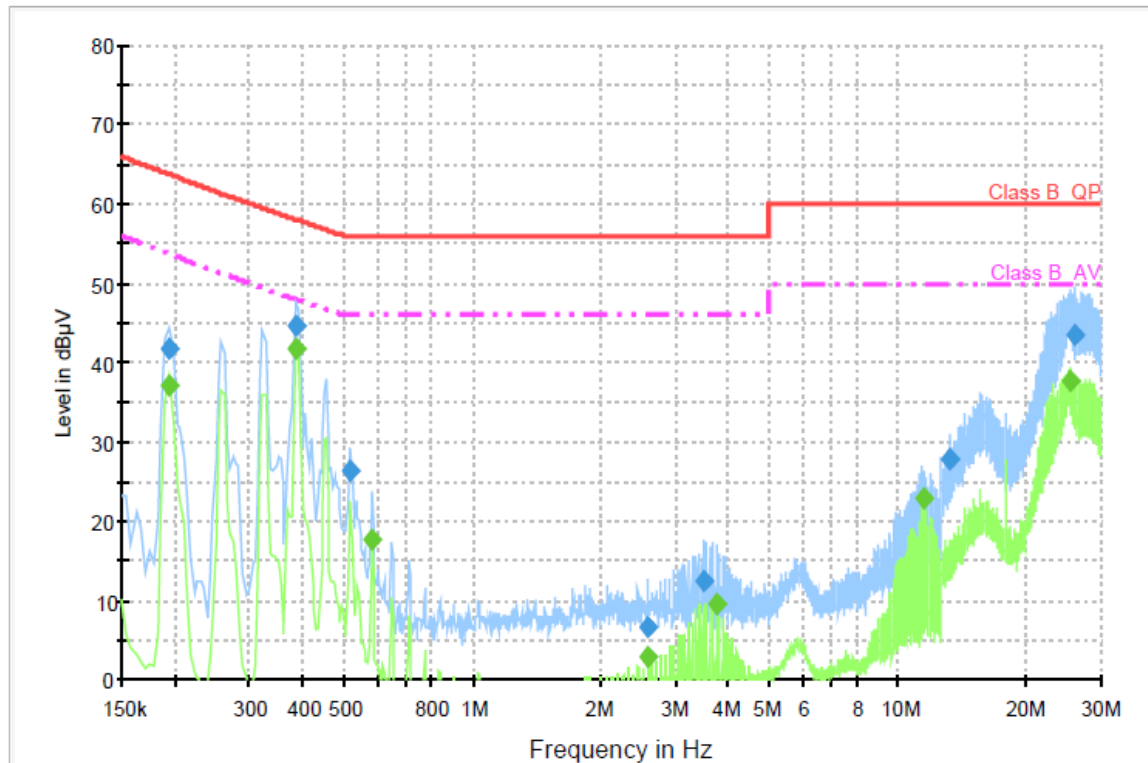
Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.194000	36.7	1000.000	9.000	GND	N	10.1	17.0	53.7	
0.390000	41.3	1000.000	9.000	GND	N	10.1	6.6	47.9	
0.522000	18.5	1000.000	9.000	GND	N	10.1	27.5	46.0	
2.586000	3.1	1000.000	9.000	GND	N	10.2	42.9	46.0	
3.554000	11.5	1000.000	9.000	GND	N	10.2	34.5	46.0	
13.330000	26.0	1000.000	9.000	GND	N	10.7	24.0	50.0	
24.166000	35.3	1000.000	9.000	GND	N	10.7	14.7	50.0	

< Fig 9. Conducted emission result (Neutral line) >



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

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	41.6	1000.000	9.000	GND	L1	10.1	22.1	63.7	
0.388000	44.7	1000.000	9.000	GND	L1	10.1	13.3	58.0	
0.516000	26.3	1000.000	9.000	GND	L1	10.1	29.7	56.0	
2.584000	6.5	1000.000	9.000	GND	L1	10.2	49.5	56.0	
3.484000	12.6	1000.000	9.000	GND	L1	10.2	43.4	56.0	
13.304000	27.8	1000.000	9.000	GND	L1	10.7	32.2	60.0	
26.036000	43.5	1000.000	9.000	GND	L1	11.1	16.5	60.0	

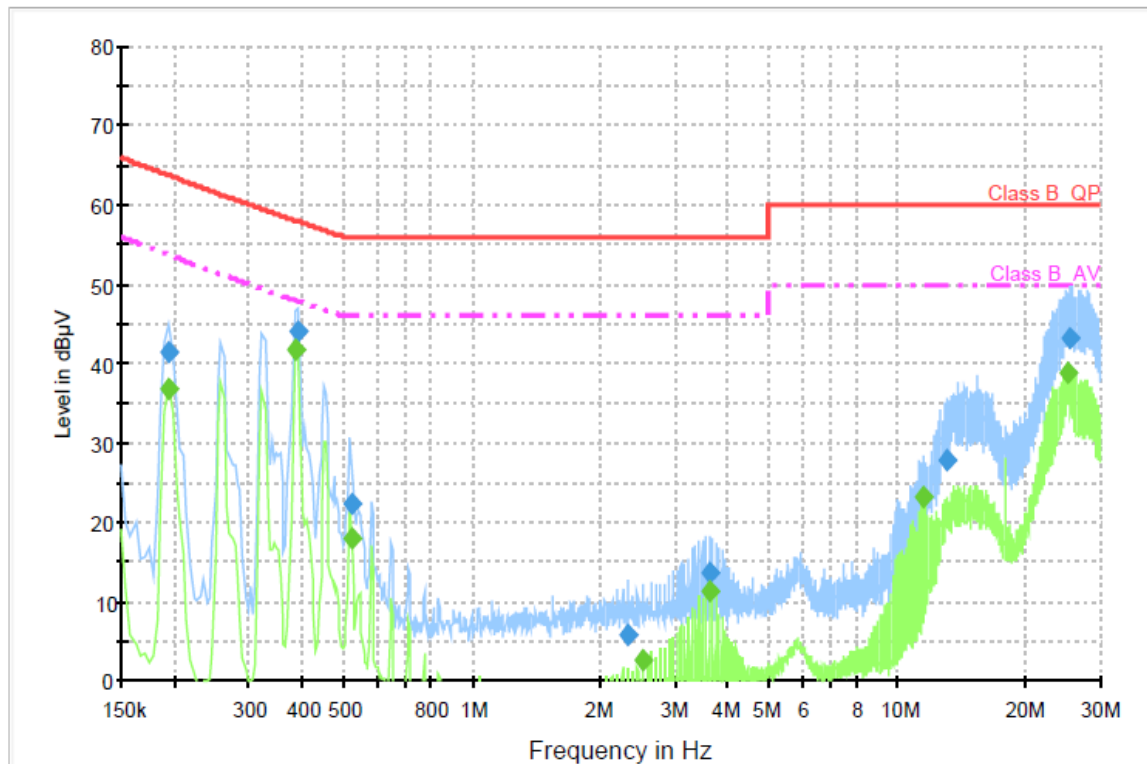
Final Measurement Detector 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	37.0	1000.000	9.000	GND	L1	10.1	16.7	53.7	
0.388000	41.9	1000.000	9.000	GND	L1	10.1	6.0	47.9	
0.580000	17.6	1000.000	9.000	GND	L1	10.1	28.4	46.0	
2.584000	2.9	1000.000	9.000	GND	L1	10.2	43.1	46.0	
3.748000	9.6	1000.000	9.000	GND	L1	10.3	36.4	46.0	
11.512000	22.9	1000.000	9.000	GND	L1	10.6	27.1	50.0	
25.392000	37.7	1000.000	9.000	GND	L1	11.1	12.3	50.0	

< Fig 10. Conducted emission result (Live line) >



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	41.5	1000.000	9.000	GND	N	10.1	22.2	63.7	
0.390000	44.2	1000.000	9.000	GND	N	10.1	13.7	57.9	
0.522000	22.4	1000.000	9.000	GND	N	10.1	33.6	56.0	
2.326000	5.8	1000.000	9.000	GND	N	10.2	50.2	56.0	
3.622000	13.6	1000.000	9.000	GND	N	10.3	42.4	56.0	
13.126000	27.7	1000.000	9.000	GND	N	10.6	32.3	60.0	
25.446000	43.2	1000.000	9.000	GND	N	10.7	16.8	60.0	

Final Measurement Detector 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	36.7	1000.000	9.000	GND	N	10.1	17.0	53.7	
0.386000	41.6	1000.000	9.000	GND	N	10.1	6.4	48.0	
0.522000	18.1	1000.000	9.000	GND	N	10.1	27.9	46.0	
2.518000	2.6	1000.000	9.000	GND	N	10.2	43.4	46.0	
3.618000	11.2	1000.000	9.000	GND	N	10.3	34.8	46.0	
11.510000	23.1	1000.000	9.000	GND	N	10.6	26.9	50.0	
25.198000	38.9	1000.000	9.000	GND	N	10.7	11.2	50.0	

< Fig 11. Conducted emission result (Neutral line) >



6. Radiated Emission

6.1 Operating Environment

Temperature : 28.0 °C
Relative Humidity : 56.0 % 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, 3 m, Vertical)	± 4.03 dB	Confidence levels of 95 % ($k = 2$)
Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)	± 3.96 dB	Confidence levels of 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)	± 4.01 dB	Confidence levels of 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal)	± 3.88 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 ~ 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	12. 10. 2011
■ - HK116	Rohde & Schwarz	Biconical Antenna	832639/007	03. 15. 2012
■ - HL223	Rohde & Schwarz	Log Periodic Antenna	835998/004	03. 15. 2012
■ - 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	12. 11. 2011
■ - BBHA9120D	Schwarzbeck	Horn Antenna	207	12. 22. 2011
■ - 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. 2011

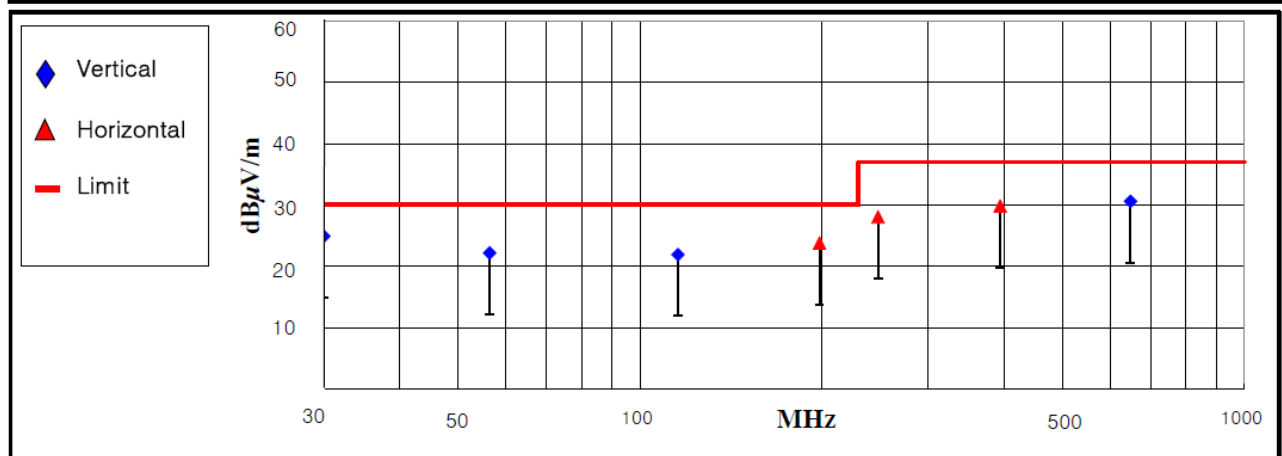


6.6 Test data for Radiated Emission

- Test Date : August 12 ~ 29, 2011
- Resolution Bandwidth : 120 kHz/1 MHz
- Frequency Range : 30 MHz ~ 5 000 MHz
- 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

- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (RGB: Analog)
Red trace: Vertical polarization, Blue trace: Horizontal polarization

Frequency (MHz)	Measurement Level				Limit (dBμ V/m)	Margin (dB)	Positioning System		
	Reading Value(dBμ V)	Antenna Factor(dB/m)	Cable Loss(dB)	Test Result (dBμ V/m)			Pol. (H/V)	Height (cm)	Angle (°)
30.00	9.77	13.78	1.32	24.87	30.00	5.13	V	100	40
56.41	11.80	8.51	1.84	22.15	30.00	7.85	V	104	319
115.58	8.31	10.84	2.73	21.88	30.00	8.12	V	103	38
198.10	5.62	14.42	3.75	23.79	30.00	6.21	H	131	288
247.62	10.41	13.39	4.24	28.04	37.00	8.96	H	148	14
394.59	8.30	16.03	5.49	29.82	37.00	7.18	H	100	187
648.11	3.63	19.58	7.36	30.57	37.00	6.43	V	102	162

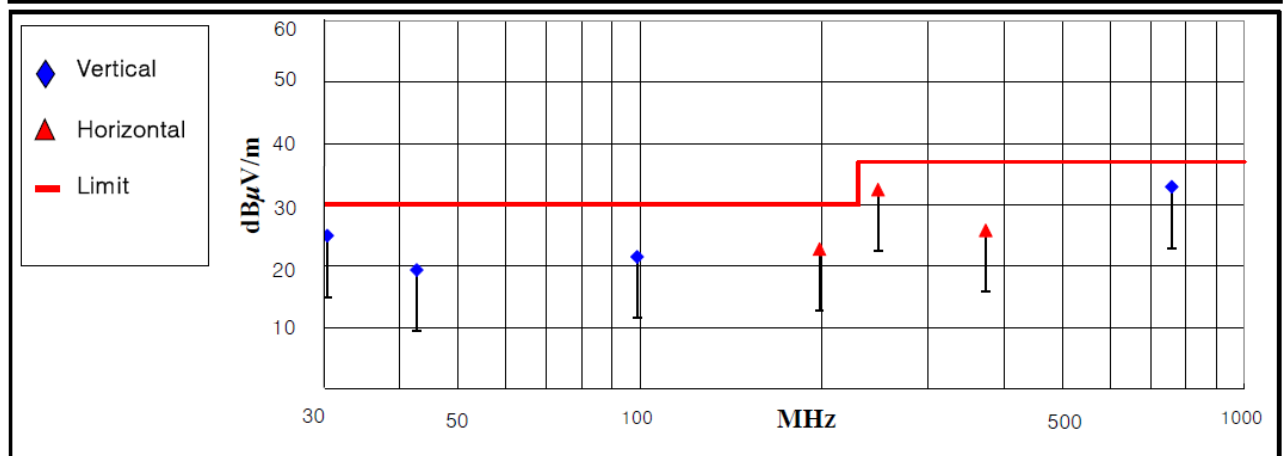


< Fig 12. Radiated emission result (30 MHz ~ 1 000 MHz) >



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (HDMI/DVI: Digital)
Red trace: Vertical polarization, Blue trace: Horizontal polarization

Frequency (MHz)	Measurement Level				Limit (dBμ V/m)	Margin (dB)	Positioning System		
	Reading	Antenna	Cable	Test Result			Pol.	Height	Angle
	Value(dBμ V)	Factor(dB/m)	Loss(dB)	(dBμ V/m)			(H/V)	(cm)	(°)
30.38	10.02	13.62	1.33	24.97	30.00	5.03	V	102	54
42.71	7.07	10.71	1.57	19.35	30.00	10.65	V	102	41
98.94	9.60	9.39	2.52	21.51	30.00	8.49	V	128	220
198.10	4.62	14.42	3.75	22.79	30.00	7.21	H	200	283
247.62	14.85	13.39	4.24	32.48	37.00	4.52	H	153	125
373.21	5.18	15.33	5.33	25.84	37.00	11.16	H	108	217
758.45	4.01	20.85	8.10	32.96	37.00	4.04	V	155	199

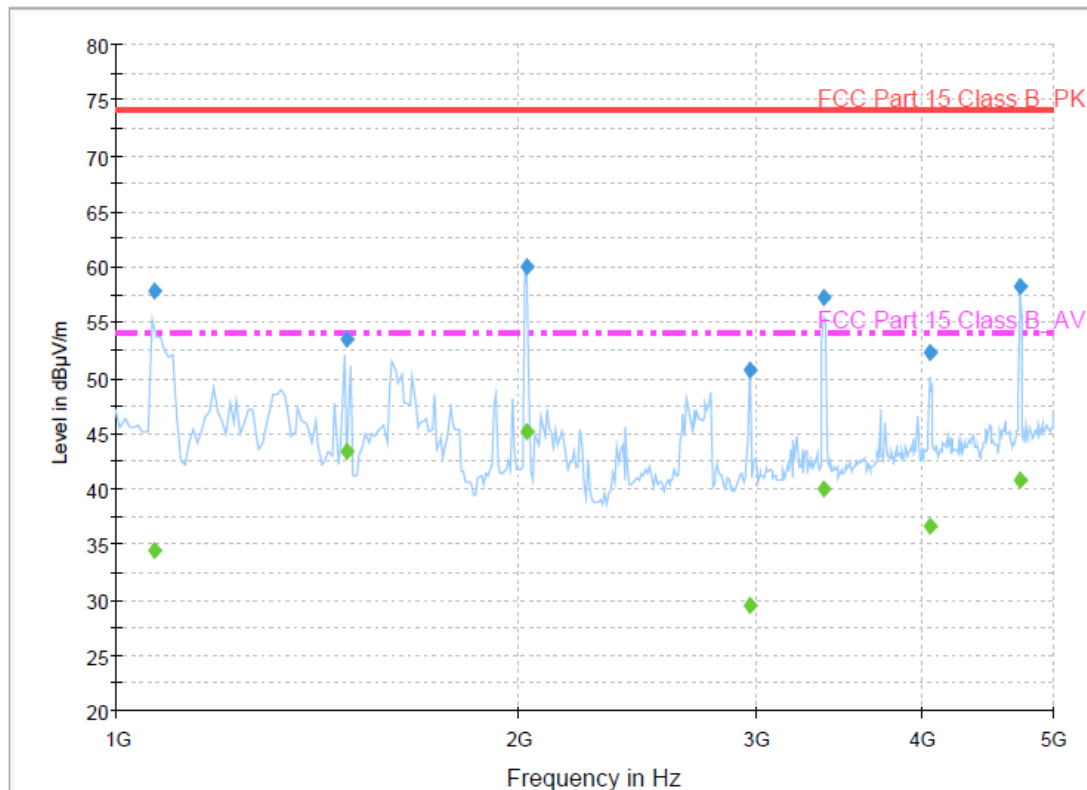


< Fig 13. Radiated emission result (30 MHz ~ 1 000 MHz) >



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (RGB: Analog)
Green market: Average detector, Blue market: Peak detector

Radiated emission_above 1GHz-6GHz



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)
1067.928257	57.7	1000.0	1000.000	208.0	V	186.0	-14.4	16.3	74.0
1485.161924	53.4	1000.0	1000.000	100.0	V	207.0	-13.2	20.6	74.0
2023.036072	59.9	1000.0	1000.000	100.0	H	151.0	-11.4	14.1	74.0
2972.543888	50.7	1000.0	1000.000	100.0	H	54.0	-6.8	23.3	74.0
3370.945491	57.3	1000.0	1000.000	100.0	H	167.0	-5.4	16.7	74.0
4046.292184	52.2	1000.0	1000.000	100.0	V	186.0	-2.8	21.8	74.0
4722.854910	58.2	1000.0	1000.000	100.0	V	234.0	-1.4	15.8	74.0

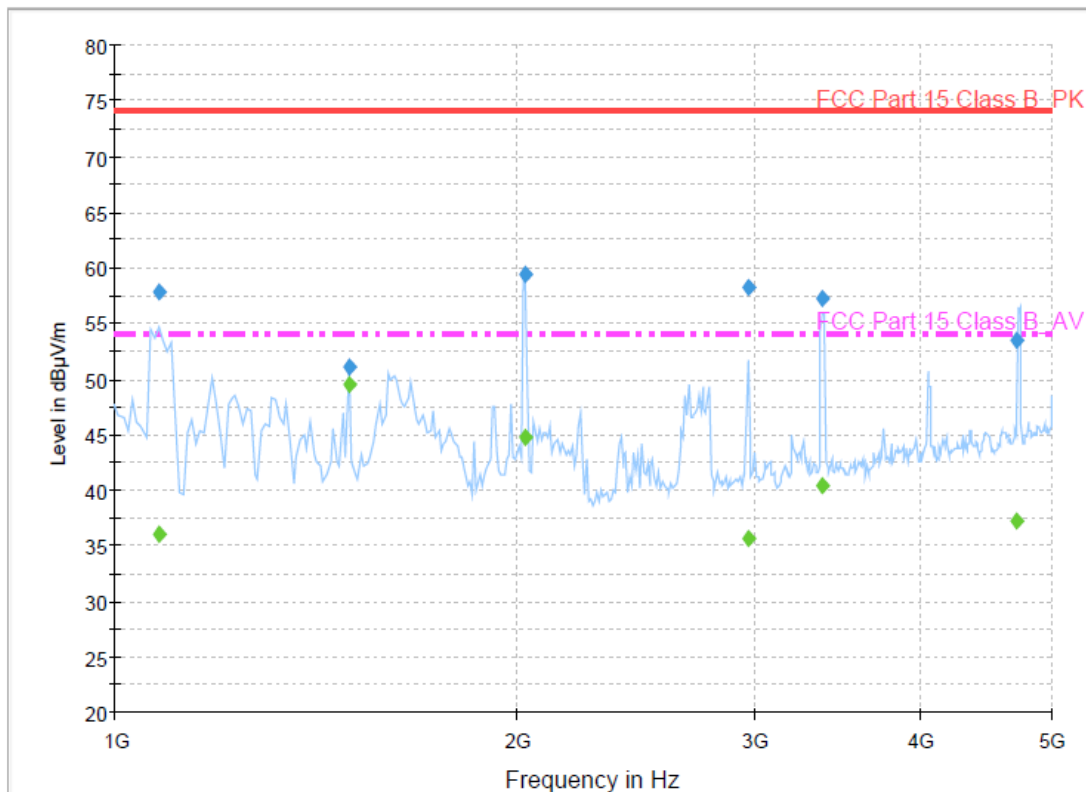
Final Result 2

Frequency (MHz)	CAverage (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1067.928257	34.4	1000.0	1000.000	208.0	V	186.0	-14.4	19.6	54.0
1485.161924	43.3	1000.0	1000.000	100.0	V	207.0	-13.2	10.7	54.0
2023.036072	45.1	1000.0	1000.000	100.0	H	151.0	-11.4	8.9	54.0
2972.543888	29.6	1000.0	1000.000	100.0	H	54.0	-6.8	24.4	54.0
3370.945491	40.1	1000.0	1000.000	100.0	H	167.0	-5.4	13.9	54.0
4046.292184	36.6	1000.0	1000.000	100.0	V	186.0	-2.8	17.4	54.0
4722.854910	40.8	1000.0	1000.000	100.0	V	234.0	-1.4	13.2	54.0

< Fig 14. Radiated emission result (1 000 MHz ~ 5 000 MHz) >



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (HDMI/DVI: Digital)
Green marker: Average detector, Blue marker: Peak detector
Radiated emission_above 1GHz-6GHz



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)
1079.560321	57.9	1000.0	1000.000	209.0	V	188.0	-14.3	16.1	74.0
1500.393988	51.2	1000.0	1000.000	138.0	V	3.0	-13.2	22.8	74.0
2023.036072	59.4	1000.0	1000.000	100.0	H	149.0	-11.4	14.6	74.0
2971.743888	58.2	1000.0	1000.000	137.0	V	205.0	-6.8	15.8	74.0
3371.745491	57.3	1000.0	1000.000	137.0	V	197.0	-5.4	16.7	74.0
4717.638878	53.5	1000.0	1000.000	126.0	V	230.0	-1.4	20.5	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)
1079.560321	36.0	1000.0	1000.000	209.0	V	188.0	-14.3	18.0	54.0
1500.393988	49.5	1000.0	1000.000	138.0	V	3.0	-13.2	4.5	54.0
2023.036072	44.8	1000.0	1000.000	100.0	H	149.0	-11.4	9.2	54.0
2971.743888	35.7	1000.0	1000.000	137.0	V	205.0	-6.8	18.3	54.0
3371.745491	40.4	1000.0	1000.000	137.0	V	197.0	-5.4	13.6	54.0
4717.638878	37.1	1000.0	1000.000	126.0	V	230.0	-1.4	16.9	54.0

< Fig 15. 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. LCOS PROJECTOR (Model Name: CF3DAT-JS)** was complies with §15.107 and 15.109 of the FCC Rules.