



FCC EVALUATION REPORT FOR CERTIFICATION

Applicant : LG Electronics Inc.

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

Pyeongteak-si, Gyeonggi-do, Korea.

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

Date of Issue : April 5, 2010

Order Number: GETEC-C1-10-085

Test Report Number: GETEC-E3-10-040

Test Site: Gumi College EMC Center

FCC Registration Number: (100749, 443957)

FCC ID.: BEJ47LD420UA

Applicant: LG Electronics Inc.

Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: LCD TV/Monitor
Type of Authority	: Certification
Model Name	: 47LD420-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 C63.4-2003 / 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 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,

Reviewed by,

Soon Hoon

Soon-Hoon Jeong, 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. Sang-Wook Lee, Chief research engineer

Tel Number: +82-31-610-9623

- **FCC ID.** BEJ47LD420UA
- **EUT Type** LCD TV/Monitor
- **Model Name** 47LD420-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 (2003) / Canadian standard ICES-003
- **Dates of Test** April 2 ~ 3, 2010
- **Place of Test** **Gumi College EMC Center** (FCC Registration Number: 100749, 443957)
407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.
- **Test Report Number** GETEC-E3-10-040
- **Dates of Issue** April 5, 2010



2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ASNI C63.4-2003) was used in determining radiated and conducted emissions emanating from **LG Electronics Inc. LCD TV/Monitor (Model Name: 47LD420-UA)**

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



3. Product Information

3.1 Description of EUT

The Equipment under Test (EUT) is the **LG Electronics Inc. LCD TV/Monitor (Model Name: 47LD420-UA) FCC ID.: BEJ47LD420UA**

MODELS		42LD420 (42LD420-UA)	47LD420 (47LD420-UA)
Dimensions (Width x Height x Depth)	With stand	1028.0 mm x 715.4 mm x 297.0 mm (40.4 inch x 28.1 inch x 11.6 inch)	1140.6 mm x 784.8 mm x 337.4 mm (44.9 inch x 30.8 inch x 13.2 inch)
	Without stand	1028.0 mm x 658.6 mm x 87.8 mm (40.4 inch x 25.9 inch x 3.4 inch)	1140.6 mm x 722.9 mm x 99.0 mm (44.9 inch x 28.4 inch x 3.8 inch)
Weight	With stand	16.6 kg (36.5 lbs)	21.6 kg (47.6 lbs)
	Without stand	14.8 kg (32.6 lbs)	19.0 kg (41.8 lbs)
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 °C to 40 °C (32 °F to 104 °F)	
	Operating Humidity	Less than 80 %	
	Storage Temperature	-20 °C to 60 °C (-4 °F to 140 °F)	
	Storage Humidity	Less than 85 %	

- . Maximum Frequency range : 648 MHz



3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID.
PC	Hewlett Packard	D530	S/N: CNG34800PY FCC ID.: DoC
Video card	ATI	ATI RV360(9600)	S/N: SN0402017176 FCC ID.: DoC
Key board	COMPAQ	16516-AD6	S/N: B13BBOR391006D FCC ID.: AQ6-23K15
PS2 mouse	LOGITECH	M-S69	S/N: 334684-108 FCC ID.: JNZ211443
Joy stick	MICROSOFT	X05-92626	S/N: 9262600296169 FCC ID.: DoC
DVD player	LG Electronics Inc.	LC-954	S/N: 3850R-Z674K FCC ID.: DoC
Headset	GOWOONSORI	GW-500M	S/N: N/A FCC ID.: DoC
Printer	Hewlett Packard	970CXI	S/N: MY9B01F1FG FCC ID.: DoC
TV signal generator	FLUKE	54200	S/N: 831011 FCC ID.: DoC
USB memory stick	SM Electronics	UDD-32M	S/N: N/A FCC ID.: DoC

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.
None	-	-	-



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
Audio(RGB/DVI) in cable	Connected to the EUT and PC	1.80 m shielded
RS-232C in (Control & Service) cable	Connected to the EUT and PC	1.80 m shielded
Component cable	Connected to the EUT and DVD player	2.00 m shielded
Component sound cable	Connected to the EUT and DVD player	3.00 m shielded
AV in cable	Connected to the EUT and DVD player	3.00 m shielded
Antenna cable	Connected to the EUT and TV signal generator	10.00 m shielded
Headphone cable	Connected to the EUT and Headset	2.75 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)

- . **Monitor 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
- . 1 kHz sound tone with winamp player

- . **USB memory stick play mode**

◆ Operating test pattern

- . Continuous playback mode with video files

“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

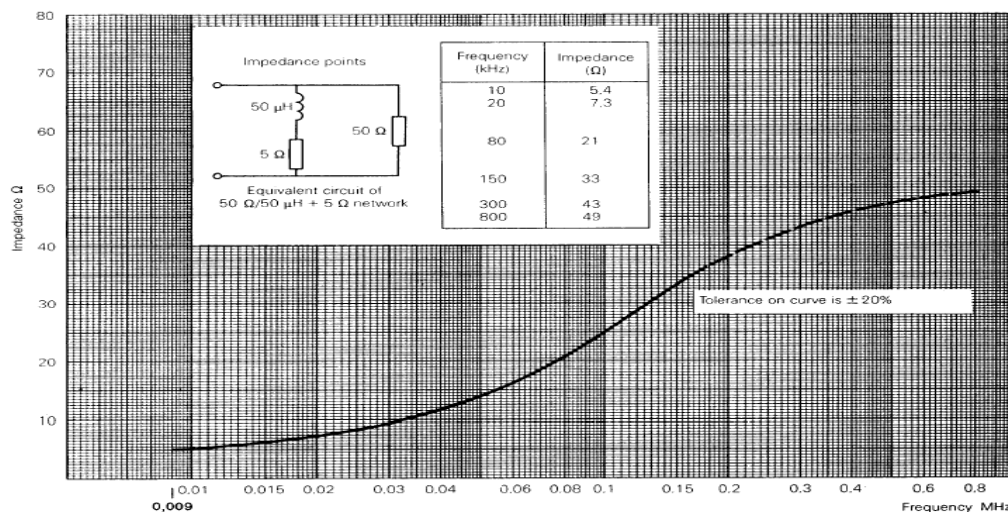


Fig 2. Impedance of LISN



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 : 22 °C
Relative Humidity : 35 % R.H.

5.2 Test Set-up

The conducted emission measurements were performed in the shielded room.

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

AMN is bonded on horizontal reference ground plane.

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

5.3 Measurement Uncertainty

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

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

Test Items	Uncertainty	Remark
Conducted emission (9 kHz ~ 150 kHz)	± 2.69 dB	Confidence levels of 95 % ($k = 2$)
Conducted emission (150 kHz ~ 30 MHz)	± 4.16 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. 2010
■ - ESH3-Z5	Rohde & Schwarz	LISN	838979/020	12. 10. 2010
■ - ESH2-Z5	Rohde & Schwarz	LISN	829991/009	12. 10. 2010
□- ISN T8	TESEQ. GmbH	Impedance Network	24568	10. 16. 2010

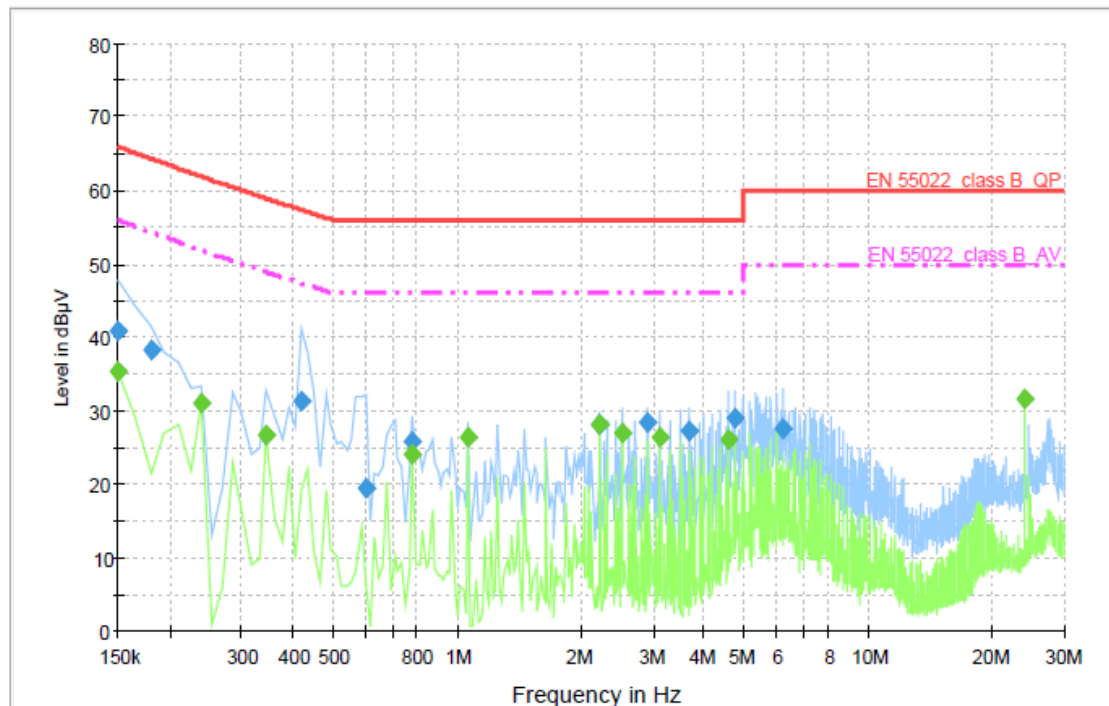
5.6 Test data for Conducted Emission

- . Test Date : April 3, 2010
- . 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
0.150000	41.0	1000.000	9.000	GND	L1	10.0	25.0	66.0	
0.180000	38.2	1000.000	9.000	GND	L1	10.0	26.2	64.4	
0.420000	31.4	1000.000	9.000	GND	L1	10.0	25.9	57.3	
0.600000	19.4	1000.000	9.000	GND	L1	10.0	36.6	56.0	
0.780000	25.8	1000.000	9.000	GND	L1	10.0	30.2	56.0	
2.235000	28.1	1000.000	9.000	GND	L1	10.1	27.9	56.0	
2.910000	28.3	1000.000	9.000	GND	L1	10.1	27.7	56.0	
3.690000	27.4	1000.000	9.000	GND	L1	10.2	28.6	56.0	
4.755000	29.1	1000.000	9.000	GND	L1	10.2	26.9	56.0	
6.210000	27.5	1000.000	9.000	GND	L1	10.3	32.6	60.0	

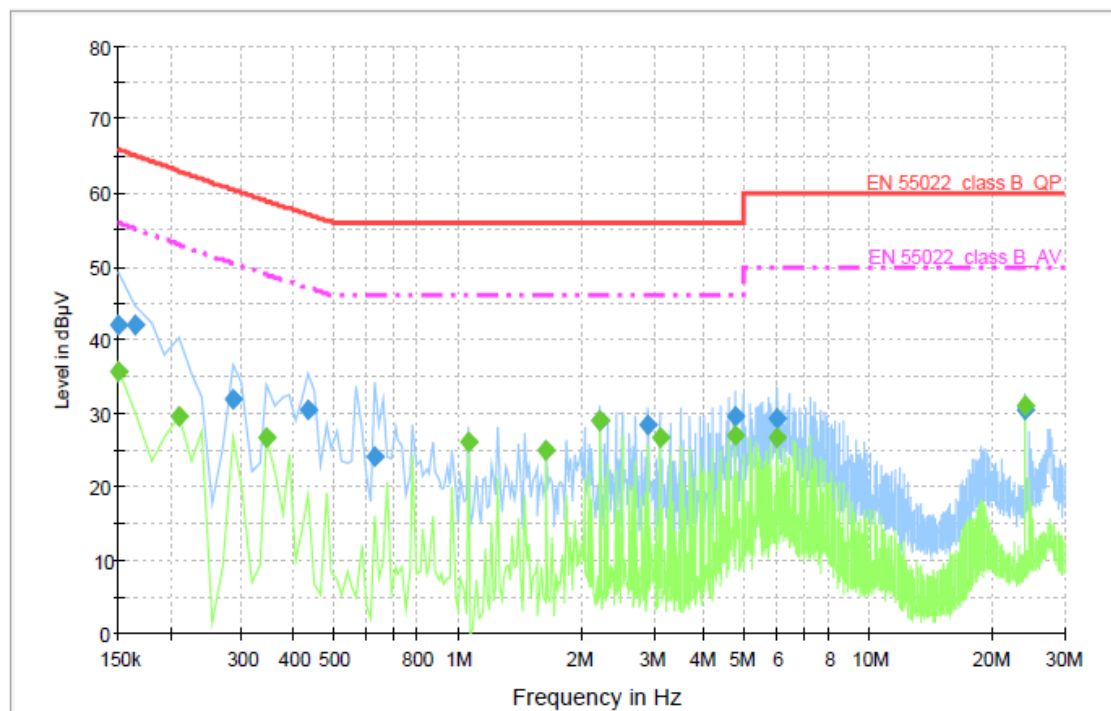
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	35.3	1000.000	9.000	GND	L1	10.0	20.7	56.0	
0.240000	31.0	1000.000	9.000	GND	L1	10.0	20.9	51.9	
0.345000	26.6	1000.000	9.000	GND	L1	10.0	22.3	48.9	
0.780000	24.0	1000.000	9.000	GND	L1	10.0	22.0	46.0	
1.065000	26.3	1000.000	9.000	GND	L1	10.0	19.7	46.0	
2.235000	28.1	1000.000	9.000	GND	L1	10.1	17.9	46.0	
2.520000	27.1	1000.000	9.000	GND	L1	10.1	18.9	46.0	
3.105000	26.4	1000.000	9.000	GND	L1	10.1	19.6	46.0	
4.560000	26.2	1000.000	9.000	GND	L1	10.2	19.8	46.0	
24.000000	31.5	1000.000	9.000	GND	L1	11.2	18.5	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
0.150000	41.9	1000.000	9.000	GND	N	10.0	24.1	66.0	
0.165000	42.1	1000.000	9.000	GND	N	10.0	23.0	65.1	
0.285000	31.8	1000.000	9.000	GND	N	10.0	28.7	60.5	
0.435000	30.4	1000.000	9.000	GND	N	10.0	26.7	57.1	
0.630000	23.9	1000.000	9.000	GND	N	10.0	32.1	56.0	
2.235000	29.0	1000.000	9.000	GND	N	10.1	27.0	56.0	
2.910000	28.4	1000.000	9.000	GND	N	10.1	27.6	56.0	
4.755000	29.6	1000.000	9.000	GND	N	10.2	26.4	56.0	
6.015000	29.3	1000.000	9.000	GND	N	10.2	30.7	60.0	
24.000000	30.3	1000.000	9.000	GND	N	10.8	29.7	60.0	

Final Measurement Detector 2

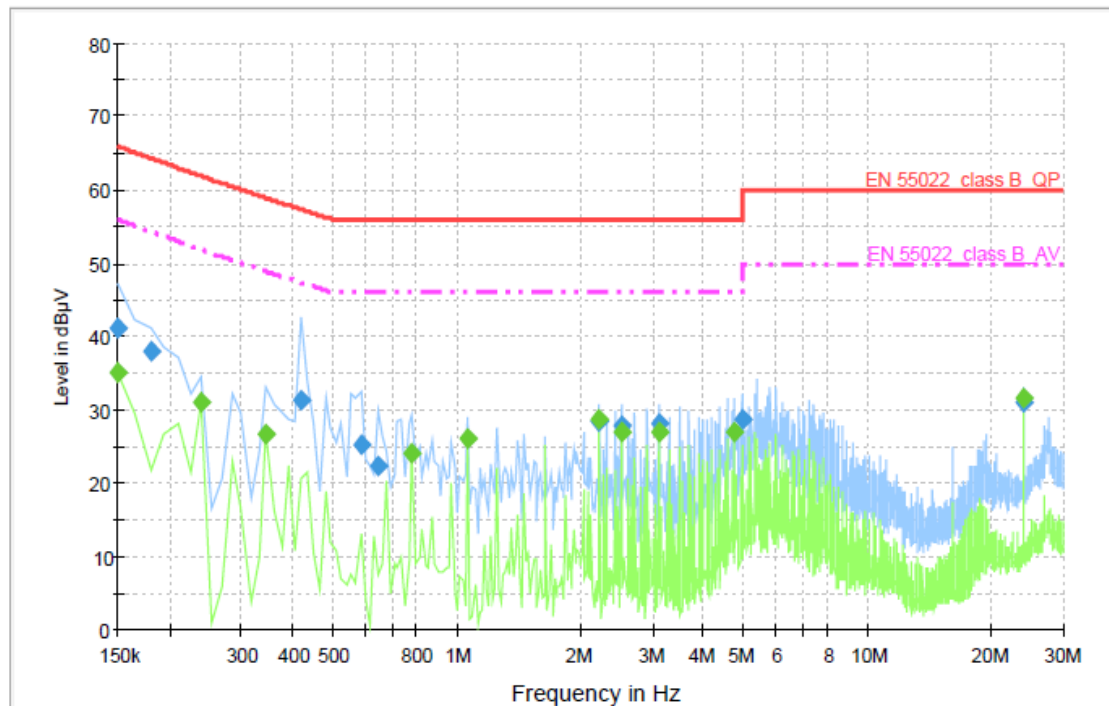
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	35.6	1000.000	9.000	GND	N	10.0	20.4	56.0	
0.210000	29.6	1000.000	9.000	GND	N	10.0	23.4	53.0	
0.345000	26.5	1000.000	9.000	GND	N	10.0	22.4	48.9	
1.065000	26.0	1000.000	9.000	GND	N	10.1	20.0	46.0	
1.650000	24.9	1000.000	9.000	GND	N	10.1	21.1	46.0	
2.235000	29.1	1000.000	9.000	GND	N	10.1	16.9	46.0	
3.105000	26.8	1000.000	9.000	GND	N	10.1	19.2	46.0	
4.755000	27.0	1000.000	9.000	GND	N	10.2	19.0	46.0	
6.015000	26.8	1000.000	9.000	GND	N	10.2	23.2	50.0	
24.000000	31.0	1000.000	9.000	GND	N	10.8	19.0	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
0.150000	41.0	1000.000	9.000	GND	L1	10.0	25.0	66.0	
0.180000	38.0	1000.000	9.000	GND	L1	10.0	26.4	64.4	
0.420000	31.4	1000.000	9.000	GND	L1	10.0	25.9	57.3	
0.585000	25.3	1000.000	9.000	GND	L1	10.0	30.7	56.0	
0.645000	22.5	1000.000	9.000	GND	L1	10.0	33.6	56.0	
2.235000	28.4	1000.000	9.000	GND	L1	10.1	27.6	56.0	
2.520000	27.7	1000.000	9.000	GND	L1	10.1	28.3	56.0	
3.105000	28.2	1000.000	9.000	GND	L1	10.1	27.8	56.0	
4.950000	28.8	1000.000	9.000	GND	L1	10.2	27.2	56.0	
24.000000	31.0	1000.000	9.000	GND	L1	11.2	29.0	60.0	

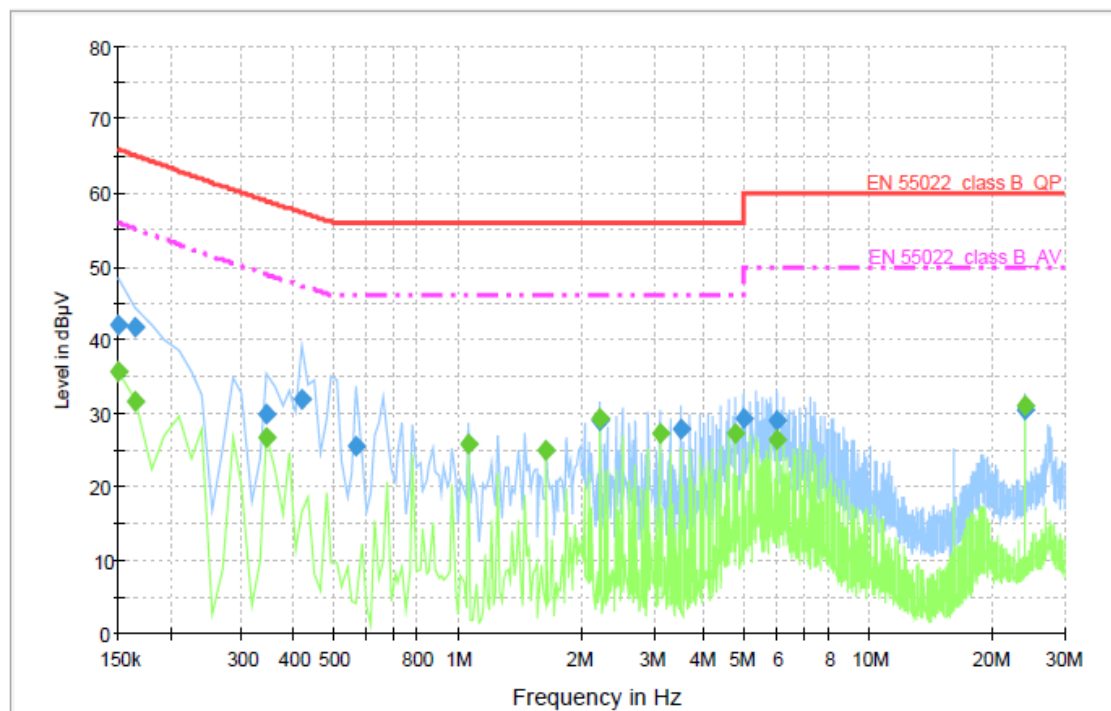
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	35.2	1000.000	9.000	GND	L1	10.0	20.8	56.0	
0.240000	31.1	1000.000	9.000	GND	L1	10.0	20.8	51.9	
0.345000	26.8	1000.000	9.000	GND	L1	10.0	22.1	48.9	
0.780000	24.1	1000.000	9.000	GND	L1	10.0	21.9	46.0	
1.065000	26.0	1000.000	9.000	GND	L1	10.0	20.0	46.0	
2.235000	28.6	1000.000	9.000	GND	L1	10.1	17.4	46.0	
2.520000	27.0	1000.000	9.000	GND	L1	10.1	19.0	46.0	
3.105000	27.1	1000.000	9.000	GND	L1	10.1	18.9	46.0	
4.755000	27.0	1000.000	9.000	GND	L1	10.2	19.0	46.0	
24.000000	31.6	1000.000	9.000	GND	L1	11.2	18.4	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
0.150000	41.9	1000.000	9.000	GND	N	10.0	24.1	66.0	
0.165000	41.9	1000.000	9.000	GND	N	10.0	23.2	65.1	
0.345000	29.8	1000.000	9.000	GND	N	10.0	29.1	58.9	
0.420000	31.8	1000.000	9.000	GND	N	10.0	25.5	57.3	
0.570000	25.6	1000.000	9.000	GND	N	10.0	30.4	56.0	
2.235000	29.0	1000.000	9.000	GND	N	10.1	27.0	56.0	
3.495000	27.9	1000.000	9.000	GND	N	10.1	28.1	56.0	
4.950000	29.3	1000.000	9.000	GND	N	10.2	26.7	56.0	
6.015000	29.0	1000.000	9.000	GND	N	10.2	31.0	60.0	
24.000000	30.4	1000.000	9.000	GND	N	10.8	29.6	60.0	

Final Measurement Detector 2

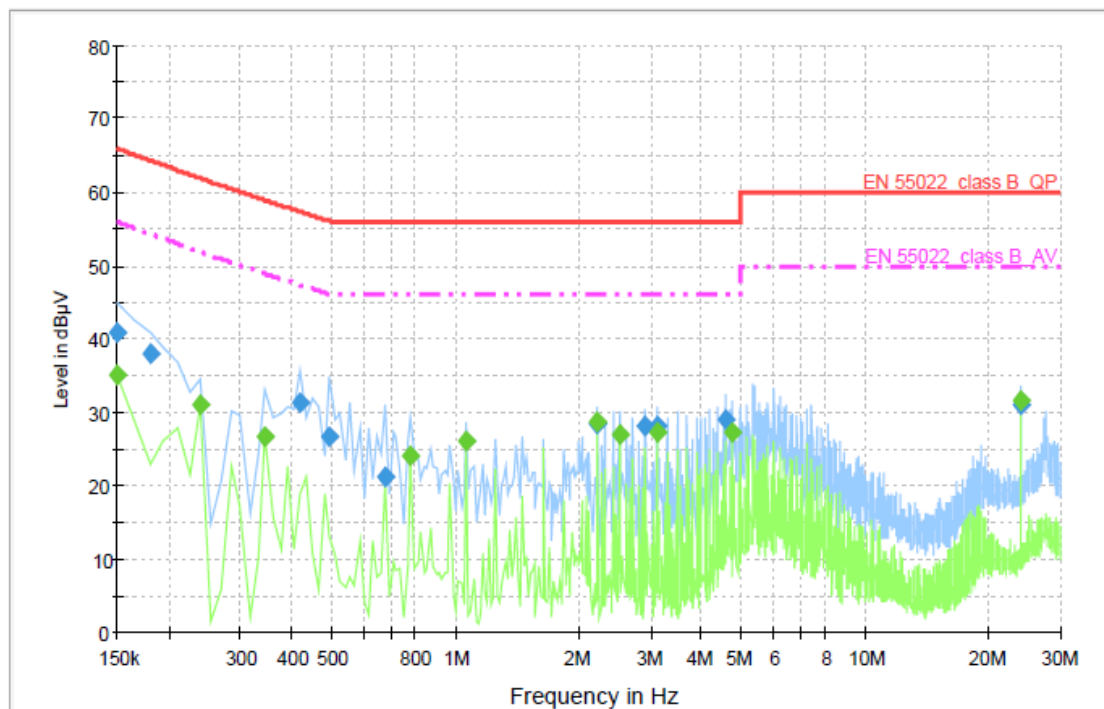
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	35.6	1000.000	9.000	GND	N	10.0	20.4	56.0	
0.165000	31.7	1000.000	9.000	GND	N	10.0	23.4	55.1	
0.345000	26.5	1000.000	9.000	GND	N	10.0	22.4	48.9	
1.065000	25.9	1000.000	9.000	GND	N	10.1	20.1	46.0	
1.650000	24.9	1000.000	9.000	GND	N	10.1	21.1	46.0	
2.235000	29.3	1000.000	9.000	GND	N	10.1	16.7	46.0	
3.105000	27.1	1000.000	9.000	GND	N	10.1	18.9	46.0	
4.755000	27.3	1000.000	9.000	GND	N	10.2	18.7	46.0	
6.015000	26.3	1000.000	9.000	GND	N	10.2	23.7	50.0	
24.000000	31.2	1000.000	9.000	GND	N	10.8	18.8	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
0.150000	41.0	1000.000	9.000	GND	L1	10.0	25.0	66.0	
0.180000	37.9	1000.000	9.000	GND	L1	10.0	26.5	64.4	
0.420000	31.3	1000.000	9.000	GND	L1	10.0	26.1	57.3	
0.495000	26.6	1000.000	9.000	GND	L1	10.0	29.5	56.1	
0.675000	21.2	1000.000	9.000	GND	L1	10.0	34.8	56.0	
2.235000	28.4	1000.000	9.000	GND	L1	10.1	27.6	56.0	
2.910000	28.2	1000.000	9.000	GND	L1	10.1	27.8	56.0	
3.105000	28.1	1000.000	9.000	GND	L1	10.1	27.9	56.0	
4.560000	29.1	1000.000	9.000	GND	L1	10.2	26.9	56.0	
24.000000	31.1	1000.000	9.000	GND	L1	11.2	28.9	60.0	

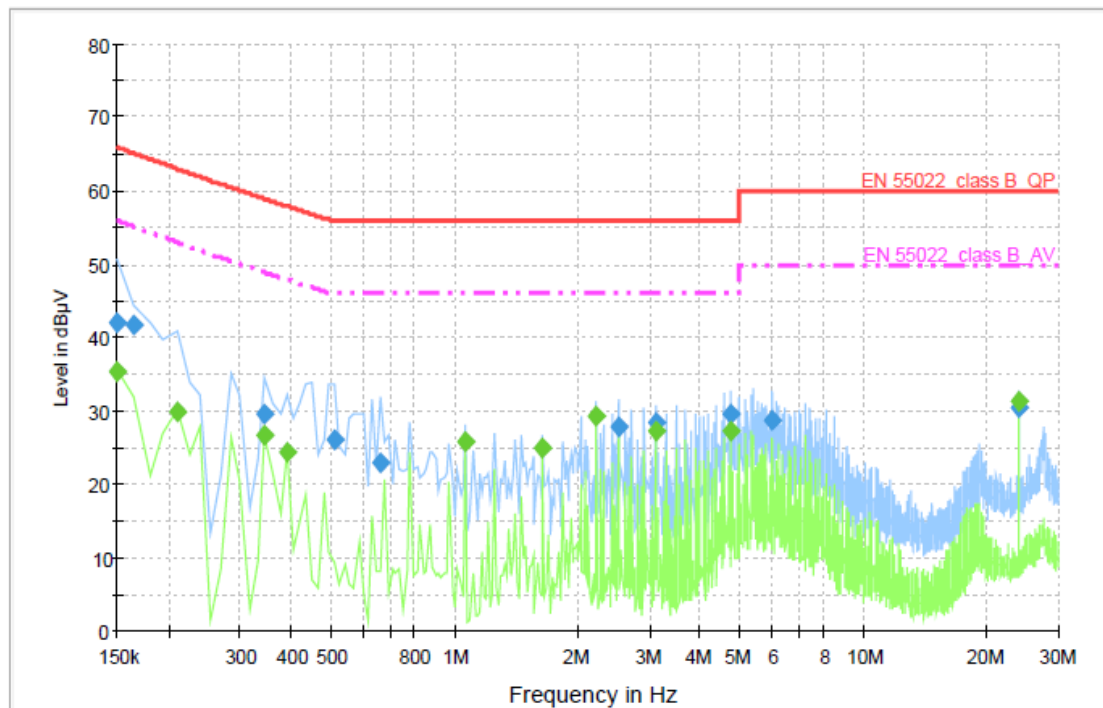
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	35.1	1000.000	9.000	GND	L1	10.0	20.9	56.0	
0.240000	31.1	1000.000	9.000	GND	L1	10.0	20.8	51.9	
0.345000	26.8	1000.000	9.000	GND	L1	10.0	22.1	48.9	
0.780000	24.1	1000.000	9.000	GND	L1	10.0	21.9	46.0	
1.065000	25.9	1000.000	9.000	GND	L1	10.0	20.1	46.0	
2.235000	28.7	1000.000	9.000	GND	L1	10.1	17.3	46.0	
2.520000	26.9	1000.000	9.000	GND	L1	10.1	19.1	46.0	
3.105000	27.2	1000.000	9.000	GND	L1	10.1	18.8	46.0	
4.755000	27.1	1000.000	9.000	GND	L1	10.2	18.9	46.0	
24.000000	31.7	1000.000	9.000	GND	L1	11.2	18.3	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
0.150000	41.9	1000.000	9.000	GND	N	10.0	24.1	66.0	
0.165000	41.8	1000.000	9.000	GND	N	10.0	23.3	65.1	
0.345000	29.7	1000.000	9.000	GND	N	10.0	29.2	58.9	
0.510000	26.2	1000.000	9.000	GND	N	10.0	29.8	56.0	
0.660000	23.0	1000.000	9.000	GND	N	10.0	33.0	56.0	
2.520000	27.7	1000.000	9.000	GND	N	10.1	28.3	56.0	
3.105000	28.3	1000.000	9.000	GND	N	10.1	27.7	56.0	
4.755000	29.5	1000.000	9.000	GND	N	10.2	26.5	56.0	
6.015000	28.8	1000.000	9.000	GND	N	10.2	31.2	60.0	
24.000000	30.5	1000.000	9.000	GND	N	10.8	29.5	60.0	

Final Measurement Detector 2

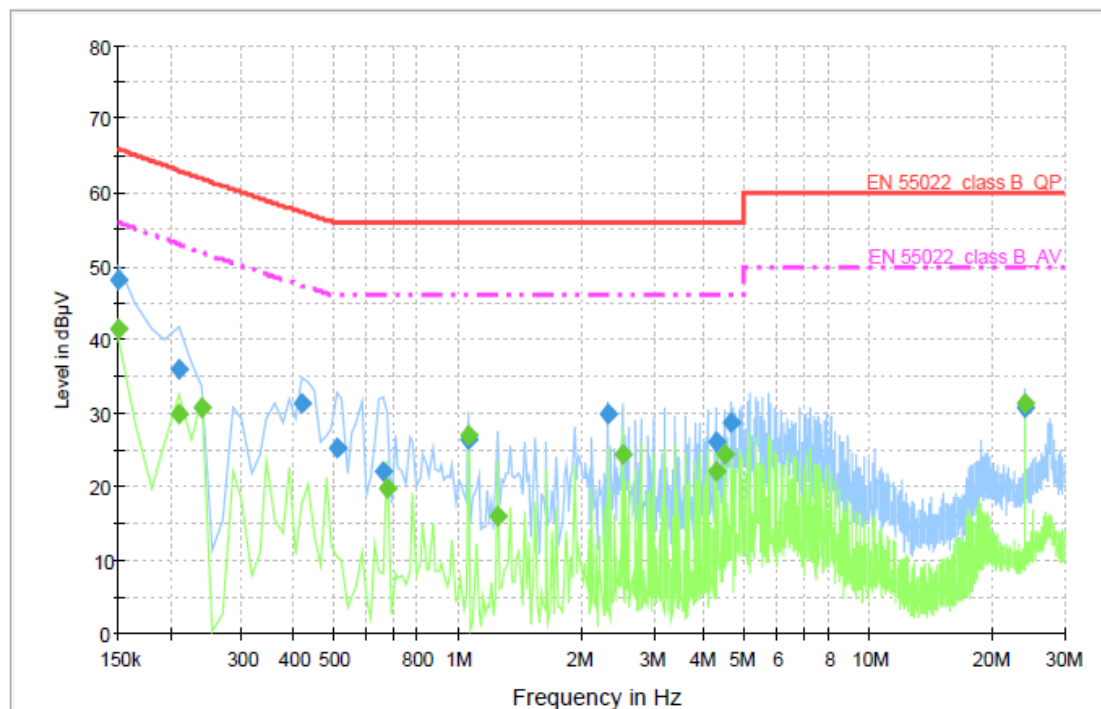
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	35.5	1000.000	9.000	GND	N	10.0	20.5	56.0	
0.210000	29.8	1000.000	9.000	GND	N	10.0	23.2	53.0	
0.345000	26.6	1000.000	9.000	GND	N	10.0	22.3	48.9	
0.390000	24.3	1000.000	9.000	GND	N	10.0	23.6	47.9	
1.065000	25.9	1000.000	9.000	GND	N	10.1	20.1	46.0	
1.650000	25.0	1000.000	9.000	GND	N	10.1	21.0	46.0	
2.235000	29.4	1000.000	9.000	GND	N	10.1	16.6	46.0	
3.105000	27.2	1000.000	9.000	GND	N	10.1	18.8	46.0	
4.755000	27.2	1000.000	9.000	GND	N	10.2	18.8	46.0	
24.000000	31.2	1000.000	9.000	GND	N	10.8	18.8	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
0.150000	48.0	1000.000	9.000	GND	L1	10.0	18.0	66.0	
0.210000	35.9	1000.000	9.000	GND	L1	10.0	27.1	63.0	
0.420000	31.2	1000.000	9.000	GND	L1	10.0	26.1	57.3	
0.510000	25.4	1000.000	9.000	GND	L1	10.0	30.6	56.0	
0.660000	22.0	1000.000	9.000	GND	L1	10.0	34.0	56.0	
1.065000	26.4	1000.000	9.000	GND	L1	10.0	29.6	56.0	
2.325000	29.8	1000.000	9.000	GND	L1	10.1	26.2	56.0	
4.260000	26.0	1000.000	9.000	GND	L1	10.2	30.0	56.0	
4.650000	28.8	1000.000	9.000	GND	L1	10.2	27.2	56.0	
24.000000	30.8	1000.000	9.000	GND	L1	11.2	29.2	60.0	

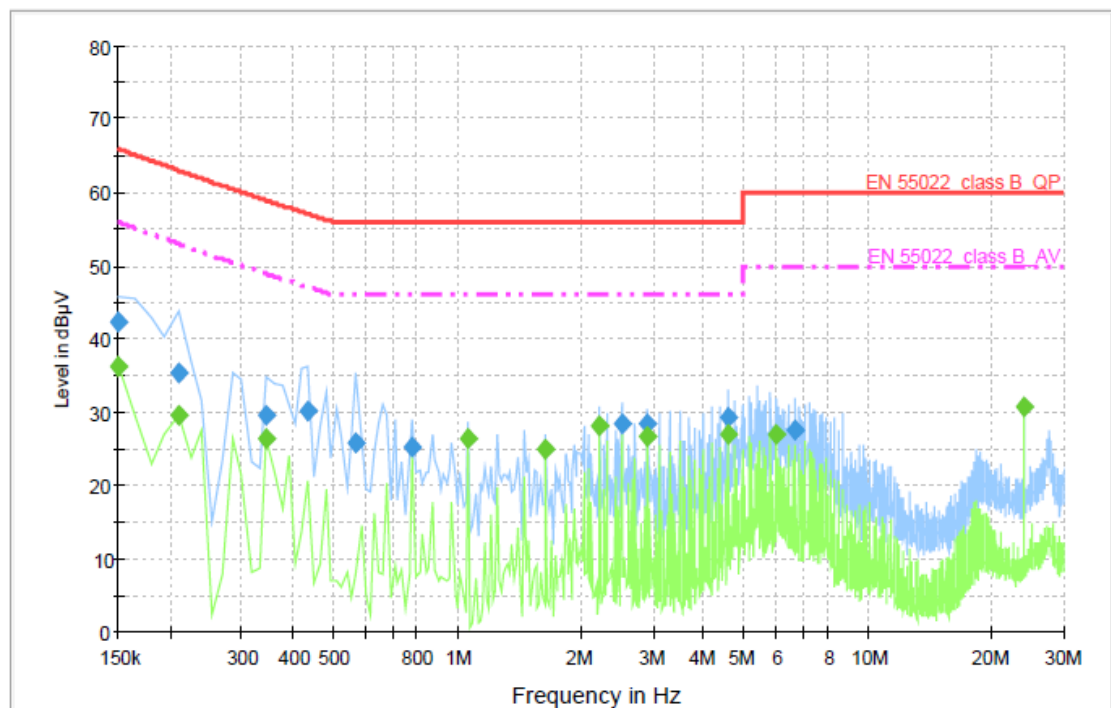
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	41.4	1000.000	9.000	GND	L1	10.0	14.6	56.0	
0.210000	29.8	1000.000	9.000	GND	L1	10.0	23.2	53.0	
0.240000	30.8	1000.000	9.000	GND	L1	10.0	21.1	51.9	
0.675000	19.8	1000.000	9.000	GND	L1	10.0	26.2	46.0	
1.065000	26.8	1000.000	9.000	GND	L1	10.0	19.2	46.0	
1.260000	15.9	1000.000	9.000	GND	L1	10.1	30.1	46.0	
2.520000	24.4	1000.000	9.000	GND	L1	10.1	21.6	46.0	
4.260000	22.1	1000.000	9.000	GND	L1	10.2	23.9	46.0	
4.455000	24.4	1000.000	9.000	GND	L1	10.2	21.6	46.0	
24.000000	31.4	1000.000	9.000	GND	L1	11.2	18.6	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
0.150000	42.2	1000.000	9.000	GND	N	10.0	23.8	66.0	
0.210000	35.4	1000.000	9.000	GND	N	10.0	27.6	63.0	
0.345000	29.4	1000.000	9.000	GND	N	10.0	29.5	58.9	
0.435000	30.1	1000.000	9.000	GND	N	10.0	27.0	57.1	
0.570000	25.8	1000.000	9.000	GND	N	10.0	30.2	56.0	
0.780000	25.3	1000.000	9.000	GND	N	10.0	30.7	56.0	
2.520000	28.5	1000.000	9.000	GND	N	10.1	27.5	56.0	
2.910000	28.3	1000.000	9.000	GND	N	10.1	27.7	56.0	
4.560000	29.4	1000.000	9.000	GND	N	10.2	26.6	56.0	
6.645000	27.6	1000.000	9.000	GND	N	10.3	32.4	60.0	

Final Measurement Detector 2

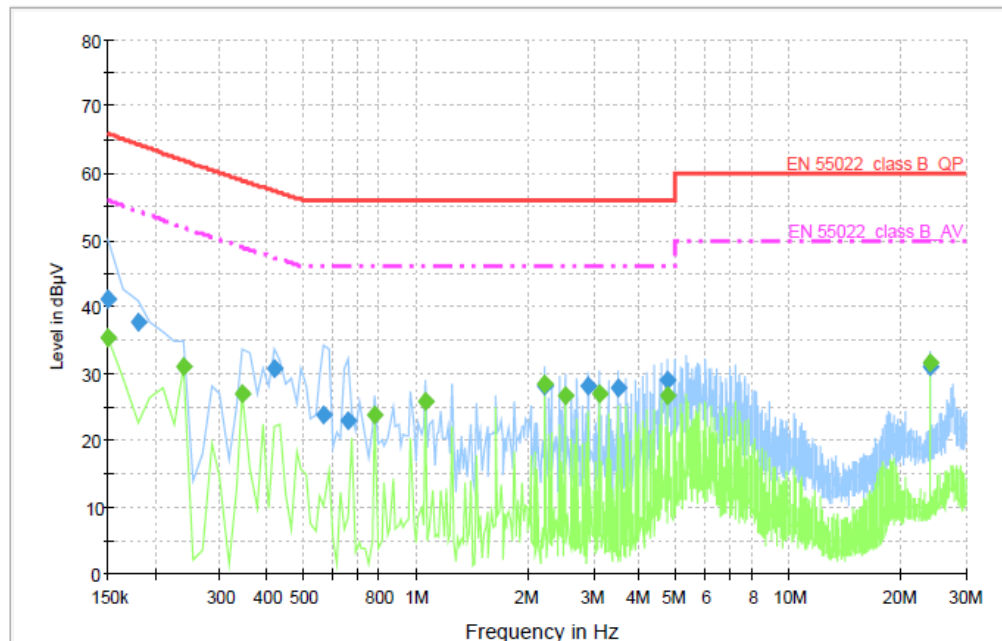
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	36.2	1000.000	9.000	GND	N	10.0	19.8	56.0	
0.210000	29.4	1000.000	9.000	GND	N	10.0	23.6	53.0	
0.345000	26.4	1000.000	9.000	GND	N	10.0	22.5	48.9	
1.065000	26.3	1000.000	9.000	GND	N	10.1	19.7	46.0	
1.650000	24.8	1000.000	9.000	GND	N	10.1	21.2	46.0	
2.235000	28.1	1000.000	9.000	GND	N	10.1	17.9	46.0	
2.910000	26.7	1000.000	9.000	GND	N	10.1	19.3	46.0	
4.560000	26.9	1000.000	9.000	GND	N	10.2	19.1	46.0	
6.015000	26.9	1000.000	9.000	GND	N	10.2	23.1	50.0	
24.000000	30.7	1000.000	9.000	GND	N	10.8	19.3	50.0	

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



◆ Operating condition: USB play mode

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
0.150000	41.1	1000.000	9.000	GND	L1	10.0	24.9	66.0	
0.180000	37.6	1000.000	9.000	GND	L1	10.0	26.8	64.4	
0.420000	30.8	1000.000	9.000	GND	L1	10.0	26.5	57.3	
0.570000	23.8	1000.000	9.000	GND	L1	10.0	32.2	56.0	
0.660000	23.0	1000.000	9.000	GND	L1	10.0	33.0	56.0	
2.235000	28.1	1000.000	9.000	GND	L1	10.1	27.9	56.0	
2.910000	28.1	1000.000	9.000	GND	L1	10.1	27.9	56.0	
3.495000	27.9	1000.000	9.000	GND	L1	10.1	28.1	56.0	
4.755000	29.0	1000.000	9.000	GND	L1	10.2	27.0	56.0	
24.000000	31.0	1000.000	9.000	GND	L1	11.2	29.0	60.0	

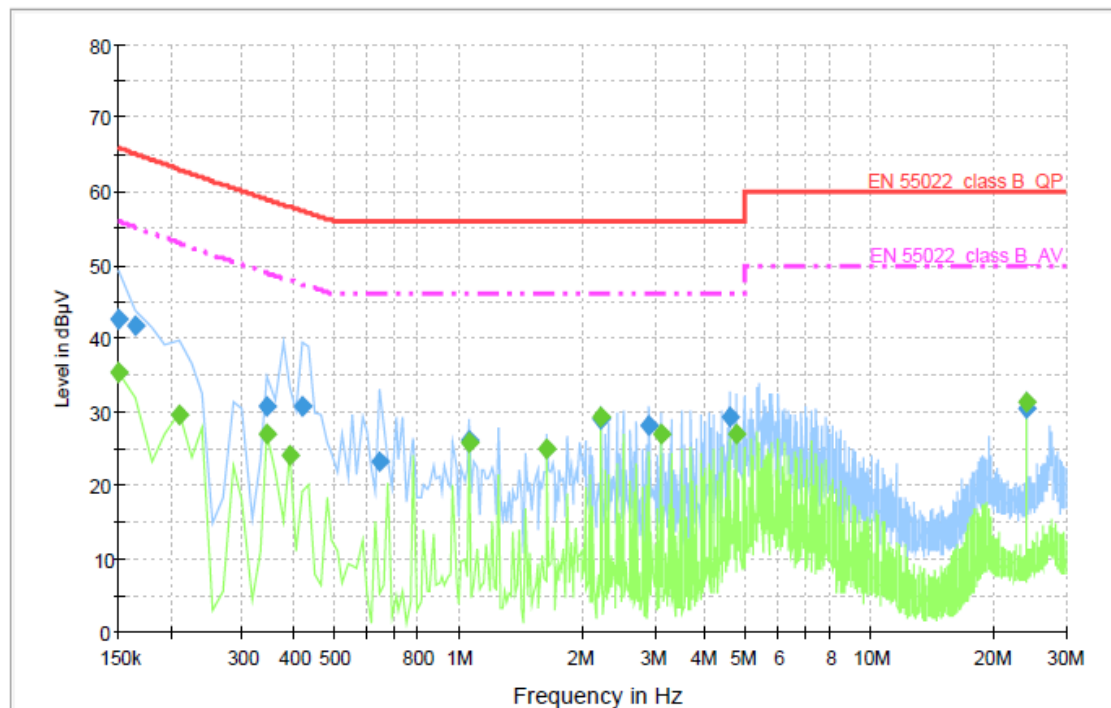
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	35.3	1000.000	9.000	GND	L1	10.0	20.8	56.0	
0.240000	31.1	1000.000	9.000	GND	L1	10.0	20.8	51.9	
0.345000	26.8	1000.000	9.000	GND	L1	10.0	22.1	48.9	
0.780000	23.7	1000.000	9.000	GND	L1	10.0	22.3	46.0	
1.065000	25.8	1000.000	9.000	GND	L1	10.0	20.2	46.0	
2.235000	28.4	1000.000	9.000	GND	L1	10.1	17.6	46.0	
2.520000	26.7	1000.000	9.000	GND	L1	10.1	19.3	46.0	
3.105000	27.1	1000.000	9.000	GND	L1	10.1	18.9	46.0	
4.755000	26.8	1000.000	9.000	GND	L1	10.2	19.2	46.0	
24.000000	31.7	1000.000	9.000	GND	L1	11.2	18.3	50.0	

< Fig 12. 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
0.150000	42.6	1000.000	9.000	GND	N	10.0	23.4	66.0	
0.165000	41.6	1000.000	9.000	GND	N	10.0	23.5	65.1	
0.345000	30.7	1000.000	9.000	GND	N	10.0	28.2	58.9	
0.420000	30.8	1000.000	9.000	GND	N	10.0	26.5	57.3	
0.645000	23.1	1000.000	9.000	GND	N	10.0	32.9	56.0	
1.065000	26.0	1000.000	9.000	GND	N	10.1	30.0	56.0	
2.235000	28.9	1000.000	9.000	GND	N	10.1	27.1	56.0	
2.910000	28.2	1000.000	9.000	GND	N	10.1	27.8	56.0	
4.560000	29.1	1000.000	9.000	GND	N	10.2	26.9	56.0	
24.000000	30.5	1000.000	9.000	GND	N	10.8	29.5	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	35.5	1000.000	9.000	GND	N	10.0	20.5	56.0	
0.210000	29.5	1000.000	9.000	GND	N	10.0	23.5	53.0	
0.345000	26.9	1000.000	9.000	GND	N	10.0	22.0	48.9	
0.390000	24.1	1000.000	9.000	GND	N	10.0	23.8	47.9	
1.065000	25.7	1000.000	9.000	GND	N	10.1	20.3	46.0	
1.650000	24.8	1000.000	9.000	GND	N	10.1	21.2	46.0	
2.235000	29.2	1000.000	9.000	GND	N	10.1	16.8	46.0	
3.105000	27.1	1000.000	9.000	GND	N	10.1	18.9	46.0	
4.755000	27.0	1000.000	9.000	GND	N	10.2	19.0	46.0	
24.000000	31.2	1000.000	9.000	GND	N	10.8	18.8	50.0	

< Fig 13. Conducted emission result (Neutral line)>



6. Radiated Emission

6.1 Operating Environment

Temperature : 24 °C
Relative Humidity : 41 % 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(Chamber)	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 3 m, Vertical)	± 4.32 dB	Confidence levels of 95 % ($k = 2$)
Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)	± 4.21 dB	Confidence levels of 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)	± 3.96 dB	Confidence levels of 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal)	± 3.97 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

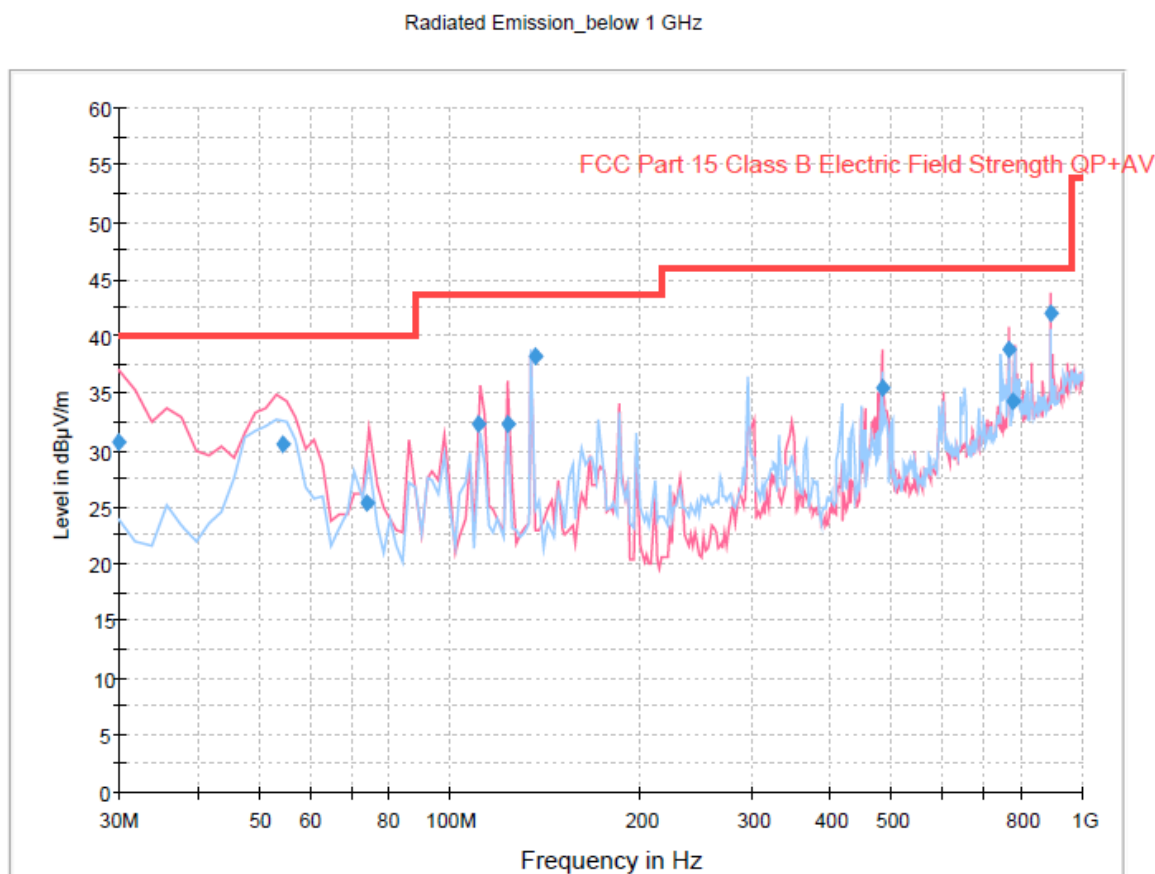
Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESIB26	Rohde & Schwarz	EMI Test Receiver	830482/010	12. 11. 2010
■ - VULB9160	Schwarzbeck	Broadband Test Antenna	3099	07. 21. 2011
■ - BBHA9120D	Schwarzbeck	Horn ANT	207	12. 22. 2011
■ - MCU066	maturo GmbH	Position Controller	1390306	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. 2010

6.6 Test data for Radiated Emission

- Test Date : April 2, 2010
- 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 (648 MHz). The measurement was made up to 5 000 MHz.



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



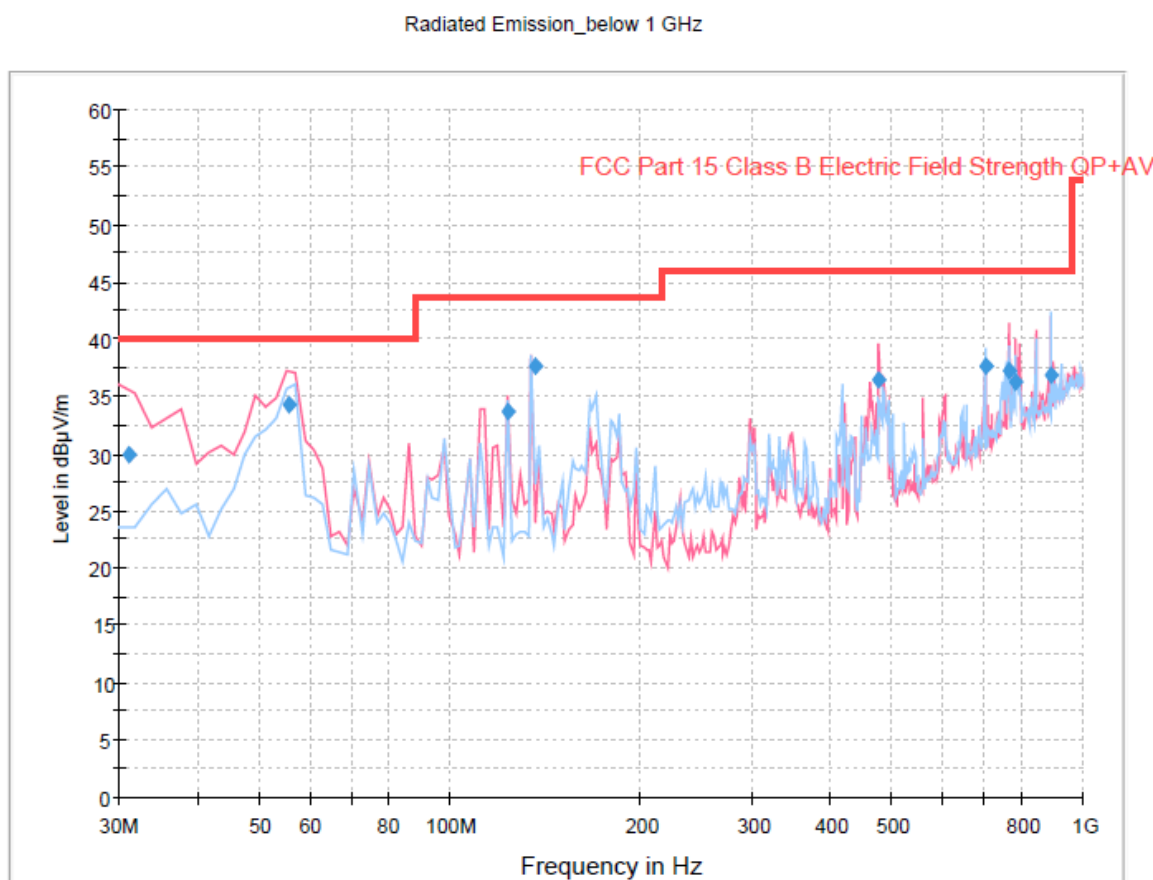
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.080000	30.7	1000.0	120.000	100.0	V	175.0	12.9	9.3	40.0
54.306653	30.5	1000.0	120.000	100.0	V	104.0	13.5	9.5	40.0
74.289419	25.4	1000.0	120.000	100.0	V	0.0	10.7	14.6	40.0
111.343287	32.4	1000.0	120.000	100.0	V	331.0	12.3	11.1	43.5
123.726613	32.3	1000.0	120.000	100.0	V	148.0	13.5	11.2	43.5
136.109940	38.3	1000.0	120.000	200.0	H	141.0	14.4	5.2	43.5
482.905852	35.5	1000.0	120.000	100.0	V	175.0	21.2	10.5	46.0
766.313467	38.8	1000.0	120.000	150.0	V	133.0	27.7	7.2	46.0
779.320681	34.3	1000.0	120.000	100.0	V	201.0	27.9	11.7	46.0
890.962285	42.0	1000.0	120.000	100.0	V	331.0	29.2	4.0	46.0

< Fig 14. Radiated emission result (30 MHz ~ 1 000 MHz)>



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



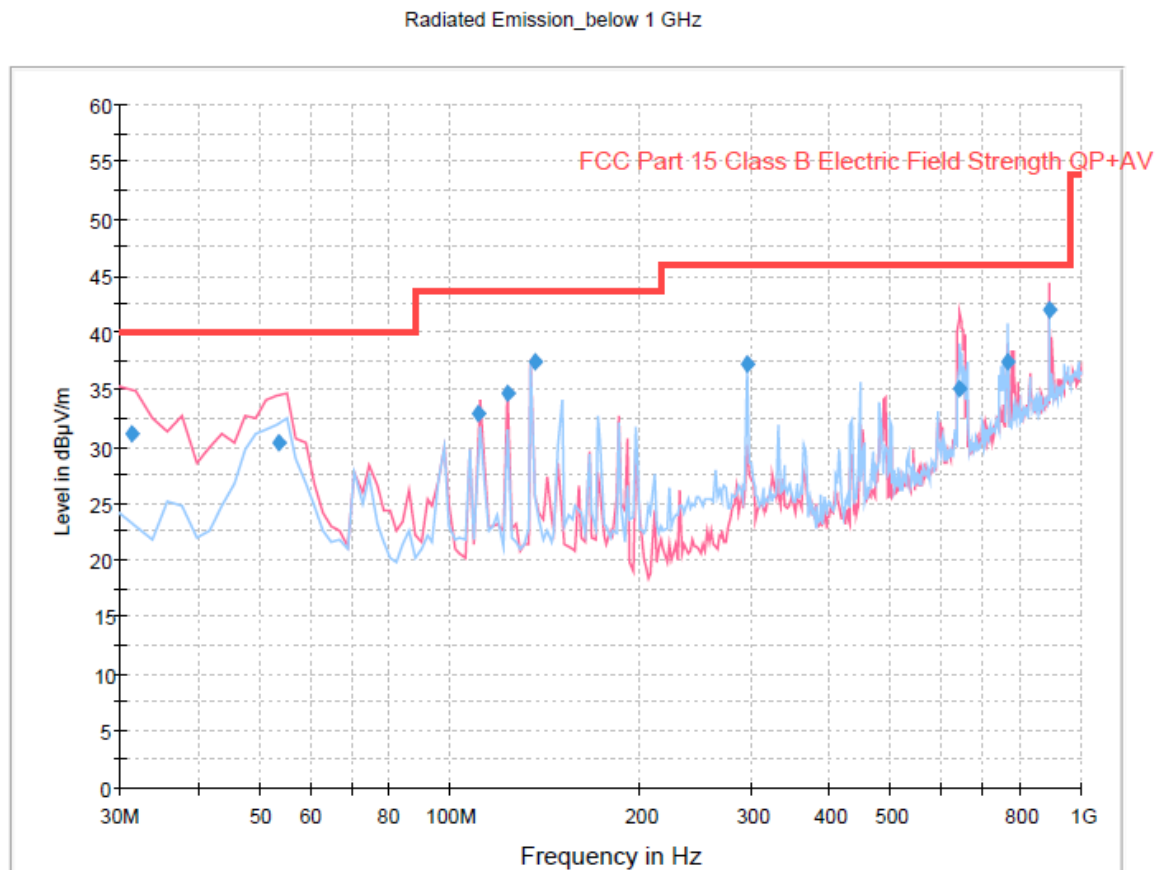
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
31.120000	29.9	1000.0	120.000	150.0	V	192.0	12.9	10.1	40.0
55.850541	34.3	1000.0	120.000	150.0	V	353.0	13.5	5.7	40.0
123.726613	33.8	1000.0	120.000	100.0	V	70.0	13.5	9.7	43.5
136.109940	37.7	1000.0	120.000	150.0	H	108.0	14.4	5.8	43.5
477.234188	36.4	1000.0	120.000	100.0	V	183.0	21.1	9.6	46.0
700.701283	37.7	1000.0	120.000	250.0	H	202.0	26.2	8.3	46.0
766.289579	37.2	1000.0	120.000	150.0	V	238.0	27.7	8.8	46.0
781.384569	36.2	1000.0	120.000	150.0	V	202.0	27.9	9.8	46.0
890.962285	36.8	1000.0	120.000	250.0	H	0.0	29.2	9.2	46.0

< Fig 15. Radiated emission result (30 MHz ~ 1 000 MHz)>



◆ Operating Condition: USB play mode



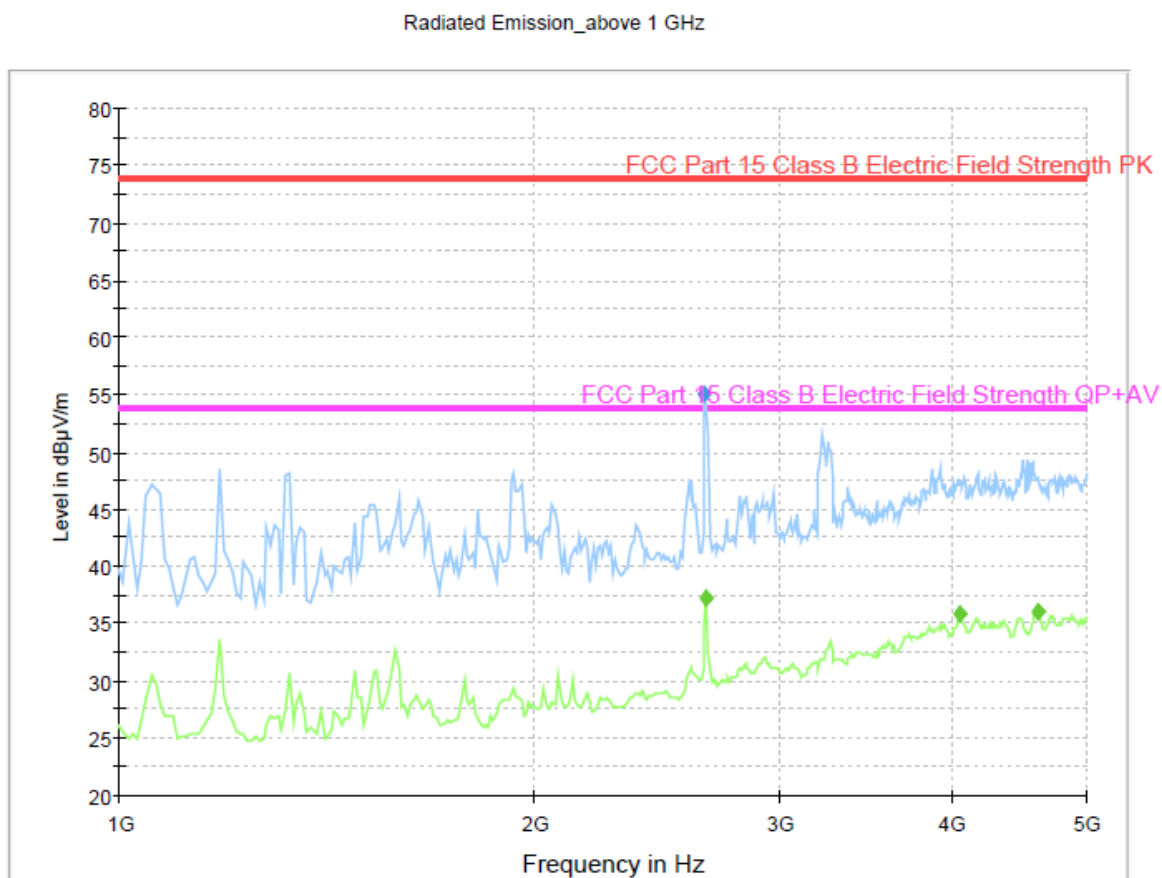
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
31.400000	31.1	1000.0	120.000	100.0	V	184.0	12.9	8.9	40.0
53.770541	30.4	1000.0	120.000	100.0	V	87.0	13.5	9.6	40.0
111.383287	33.0	1000.0	120.000	100.0	V	245.0	12.3	10.5	43.5
123.726613	34.7	1000.0	120.000	100.0	V	166.0	13.5	8.8	43.5
136.109940	37.5	1000.0	120.000	100.0	V	6.0	14.4	6.0	43.5
297.012625	37.1	1000.0	120.000	100.0	H	194.0	16.2	8.9	46.0
641.744649	35.0	1000.0	120.000	150.0	V	194.0	25.3	11.0	46.0
766.353467	37.5	1000.0	120.000	200.0	H	222.0	27.7	8.5	46.0
890.962285	42.0	1000.0	120.000	100.0	V	359.0	29.2	4.0	46.0

< Fig 16. Radiated emission result (30 MHz ~ 1 000 MHz)>



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



Final Result 1

Frequency (MHz)	MaxPeak-MaxHold (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
2659.302605	55.1	150.0	H	141.0	-9.8	18.8	73.9	

Final Result 2

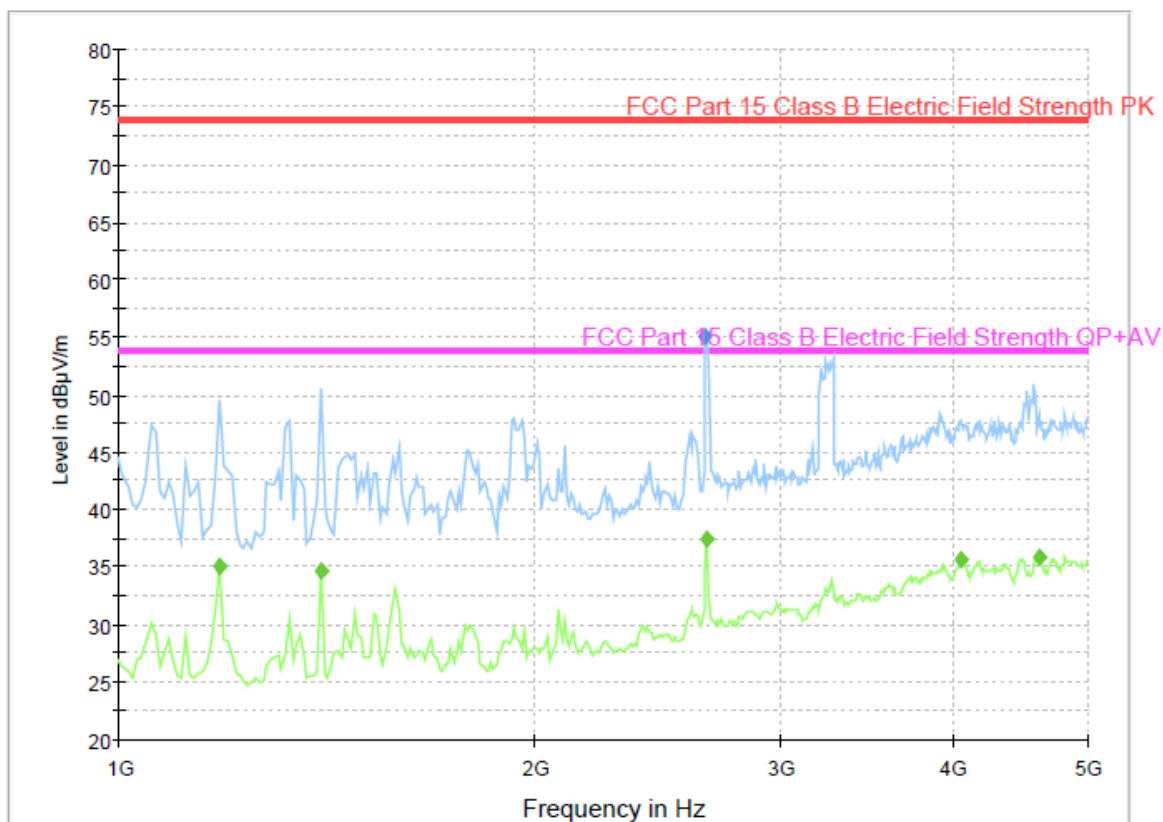
Frequency (MHz)	Average-MaxHold (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
2659.318637	37.2	150.0	H	141.0	-9.7	16.7	53.9	
4054.108216	35.8	100.0	H	218.0	-3.1	18.1	53.9	
4607.214429	35.9	100.0	H	211.0	-3.1	18.0	53.9	

< Fig 17. Radiated emission result (1 000 MHz ~ 5 000 MHz)>



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

Radiated Emission_above 1 GHz



Final Result 1

Frequency (MHz)	MaxPeak-MaxHold (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
2651.302605	55.1	150.0	H	142.0	-9.8	18.8	73.9	

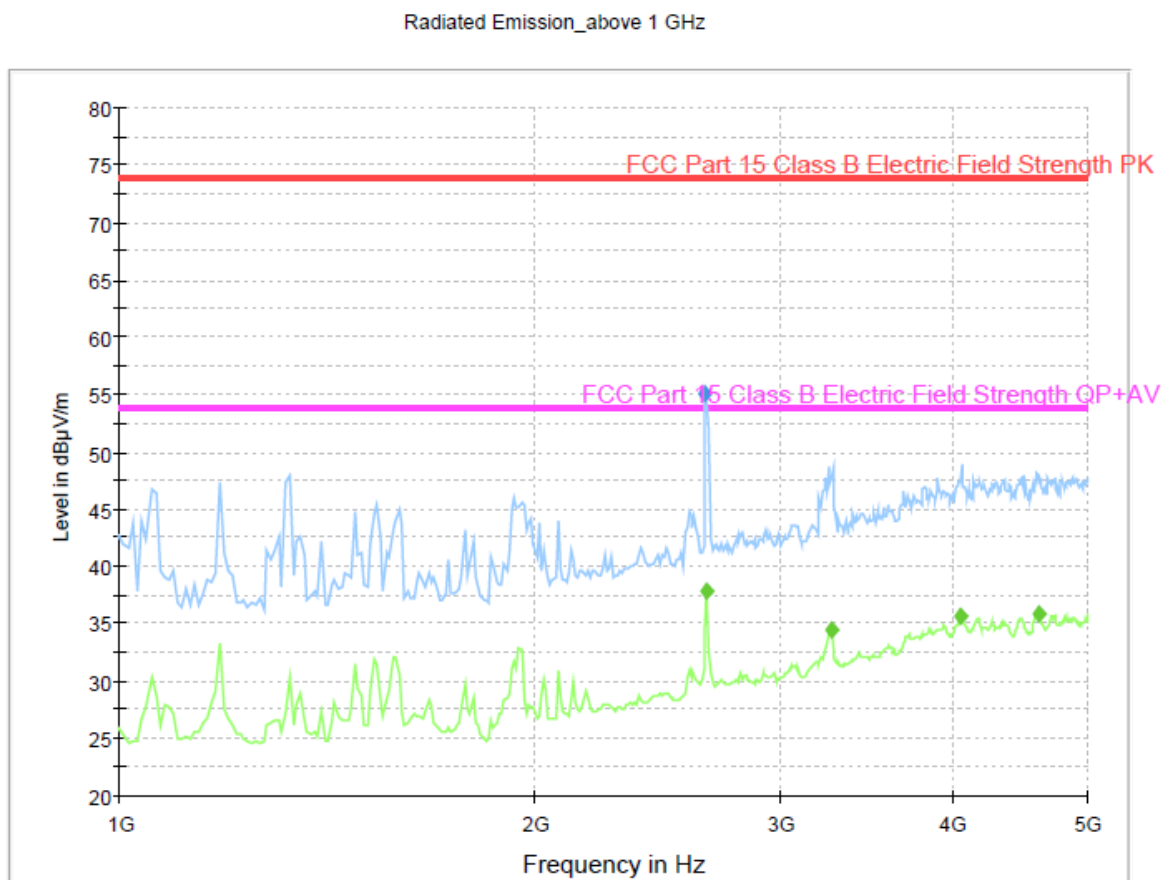
Final Result 2

Frequency (MHz)	Average-MaxHold (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
1184.368738	35.1	200.0	V	342.0	-15.1	18.8	53.9	
1400.801603	34.7	100.0	V	161.0	-14.5	19.2	53.9	
2659.318637	37.4	150.0	H	149.0	-9.7	16.5	53.9	
4054.108216	35.7	150.0	V	92.0	-3.1	18.2	53.9	
4607.214429	35.9	100.0	H	204.0	-3.1	18.0	53.9	

< Fig 18. Radiated emission result (1 000 MHz ~ 5 000 MHz)>



◆ Operating Condition: USB play mode



Final Result 1

Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2651.302605	55.1	100.0	H	124.0	-9.8	18.8	73.9	

Final Result 2

Frequency (MHz)	Average-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
2659.318637	37.8	150.0	H	141.0	-9.7	16.1	53.9	
3268.537074	34.4	150.0	V	195.0	-7.1	19.5	53.9	
4054.108216	35.7	200.0	V	175.0	-3.1	18.2	53.9	
4607.214429	35.9	150.0	H	168.0	-3.1	18.0	53.9	

< Fig 19. 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. LCD TV/Monitor (Model Name: 47LD420-UA)** was complies with §15.107 and 15.109 of the FCC Rules.