

FCC EVALUATION REPORT FOR CERTIFICATION

Applicant : LG Electronics Inc.

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

Pyeongteak-si, Gyeonggi-do, Korea.

Attn: Mr. Myoung-Kyu Lee, Chief research engineer

Date of Issue : November 15, 2010

Order Number: GETEC-C1-10-215

Test Report Number: GETEC-E3-10-111

Test Site: Gumi College EMC Center

FCC Registration Number: (100749, 443957)

FCC ID.: BEJE2770VV

Applicant: LG Electronics Inc.

Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: LED LCD Monitor
Type of Authority	: Certification
Model Name	: E2770VV
Trade Name	: LG

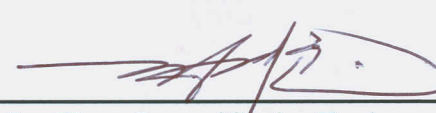
This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003 / Canadian standard ICES-003

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,


Hyoung-Seop Kim / 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	21
6.1 OPERATING ENVIRONMENT	21
6.2 TEST SET-UP	21
6.3 MEASUREMENT UNCERTAINTY.....	21
6.4 LIMIT	22
6.5 TEST EQUIPMENT USED.....	22
6.6 TEST DATA FOR RADIATED EMISSION.....	23
7. SAMPLE CALCULATIONS.....	27
7.1 EXAMPLE 1 :	27
7.2 EXAMPLE 2 :	27
8. RECOMMENDATION & CONCLUSION.....	28
 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. Myoung-Kyu Lee, Chief research engineer

Tel Number: +82-31-610-9623

- **FCC ID.** BEJE2770VV
- **EUT Type** LED LCD Monitor
- **Model Name** E2770VV
- **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** November 8, 2010
- **Place of Test** **Gumi College EMC Center** (FCC Registration Number: 100749, 443957)
407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.
- **Test Report Number** GETEC-E3-10-111
- **Dates of Issue** November 15, 2010



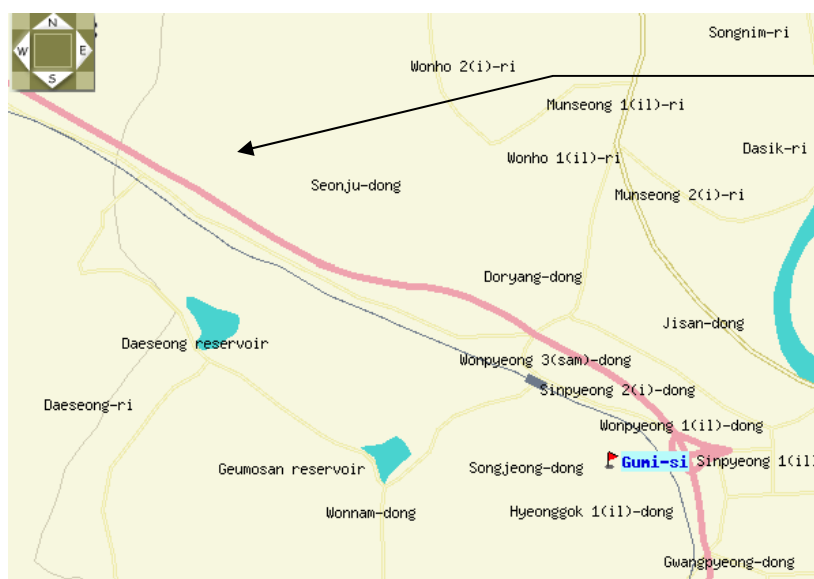
2. Introduction

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. LED LCD Monitor (Model Name: E2770VV)**

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)



GUMI COLLEGE EMC CENTER
407, Bugok-dong, Gumi-si,
Gyeongbuk 730-711, Korea.
Tel: +82-54-440-1195
Fax: +82-54-440-1199

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



3. Product Information

3.1 Description of EUT

The Equipment under Test (EUT) is the **LG Electronics Inc. LED LCD Monitor (Model Name: E2770VV) FCC ID.: BEJE2770VV**

Display	68.6 cm (27 inch) Flat Panel Active matrix-TFT LCD Anti-Glare coating Visible diagonal size : 68.6 cm 0.311 mm x 0.311 mm (Pixel pitch)	
Sync Input	Horizontal Freq.	Analog,Digital: 30 kHz to 83 kHz
	Vertical Freq.	HDMI : 30 kHz to 83 kHz Analog,Digital : 56 Hz to 75 Hz
	Input Form	HDMI : 56 Hz to 61 Hz Separate Sync., Digital
Video Input	Signal Input	15 pin D-Sub Connector DVI-D connector (Digital)
	Input Form	19 pin HDMI Connector Analog (0.7 Vp-p/ 75 ohm), Digital, HDMI
Resolution	Max Recommend	VESA 1920 x 1080 @ 60 Hz VESA 1920 x 1080 @ 60 Hz
Plug&Play	DDC 2B (Analog, Digital, HDMI)	
Power Consumption	On Mode	: 41 W (Typ.)
	Sleep Mode	≤ 1 W
	Off Mode	≤ 0.5 W
Dimensions & Weight	With Stand	Without Stand
	Width 65.46 cm (25.77 inch)	Width 65.46 cm (25.77 inch)
	Height 48.85 cm (19.23 inch)	Height 40.45 cm (15.93 inch)
	Depth 23.08 cm (9.09 inch)	Depth 6.04 cm (2.38 inch)
	Weight(excl. packing)	5.6 kg (12.35 lb)
Range	Tilt : -5° to 15°	
Power Input	AC 100-240 V~ 50 / 60 Hz 0.7 A	

-. Maximum Frequency Range : 400 MHz



3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID.
PC	LG Electronics Inc.	S50PH	S/N: DMST101103-SSH01 FCC ID.: N/A
Video card	NVIDIA	GeForce GT220 1GB	S/N: EBR64423201 FCC ID.: DoC
PS2 keyboard	COMPAQ	166516-AD6	S/N: N/A FCC ID.: AQ6-23K15
PS2 mouse	LOGITECH	M-S69	S/N: 334684-108 FCC ID.: JNZ211443
Joystick	MICROSOFT	X05-92626	S/N: 9262600296169 FCC ID.: DoC
DVD player	LG Electronics Inc	LC-954	S/N: 3850R-Z674K FCC ID.: N/A
Headset	PHILIPS	SBC HL140	S/N: N/A FCC ID.: DoC
Headset	GOWOONSORI	GW-500M	S/N: N/A FCC ID.: DoC
Monitor	LG Electronics Inc.	M2762WSK	S/N: N/A FCC ID.: N/A
Mike	N/A	N/A	S/N: N/A 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.
-	-	-	-



3.2.3 Used Cable(s)

Cable Name	Condition	Description
Power cable	Connected to the EUT	1.80 m unshielded
D-sub (Analog) cable	Connected to the EUT and PC	1.50 m shielded
DVI (Digital) cable	Connected to the EUT and PC	1.50 m shielded
Headset cable	Connected to the EUT and headset	1.20 m shielded
HDMI cable	Connected to the EUT and DVD player	2.00 m shielded

3.3 Modification Item(s)

- None



4. Description of tests

4.1 Test Condition

The EUT was installed, arranged and operated in a manner that is most representative of equipment as typically used.

The measurements were carried out while varying operating modes and cable positions within typically arrangement to determine maximum emission level.

The representative and worst test mode(s) were noted in the test report.

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

- Test Mode(s)

-. Monitor mode

Radiated emission: 1 920 × 1 080 / 60 Hz (D-sub: Analog, DVI: Digital)

Conducted emission: 1 920 × 1 080 / 60 Hz (D-sub: Analog, DVI: Digital)

1 024 × 768 / 60 Hz (D-sub: Analog), 640 × 480 / 60 Hz (D-sub: 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 mode of 1 kHz audio sound files with winamp player

"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

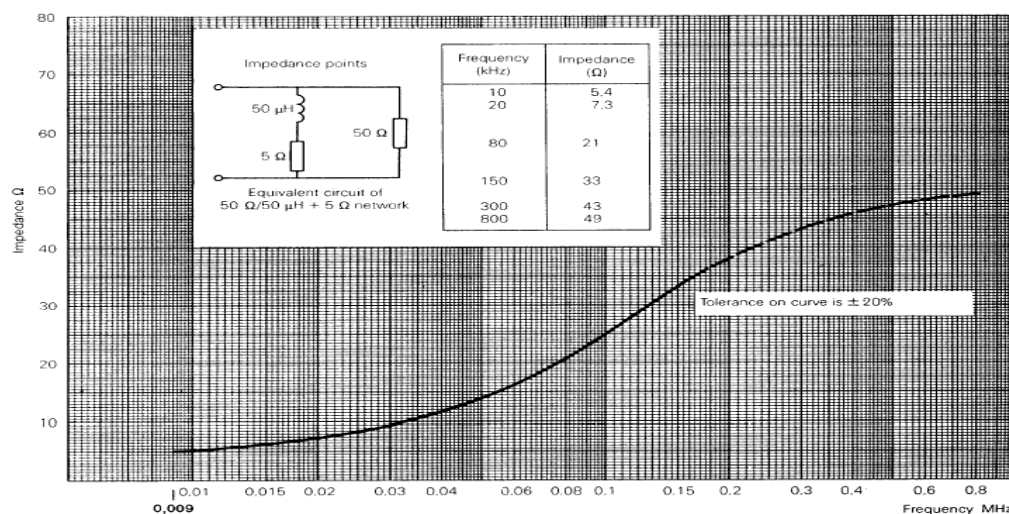


Fig 2. Impedance of LISN



4.3 Radiated Emission

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

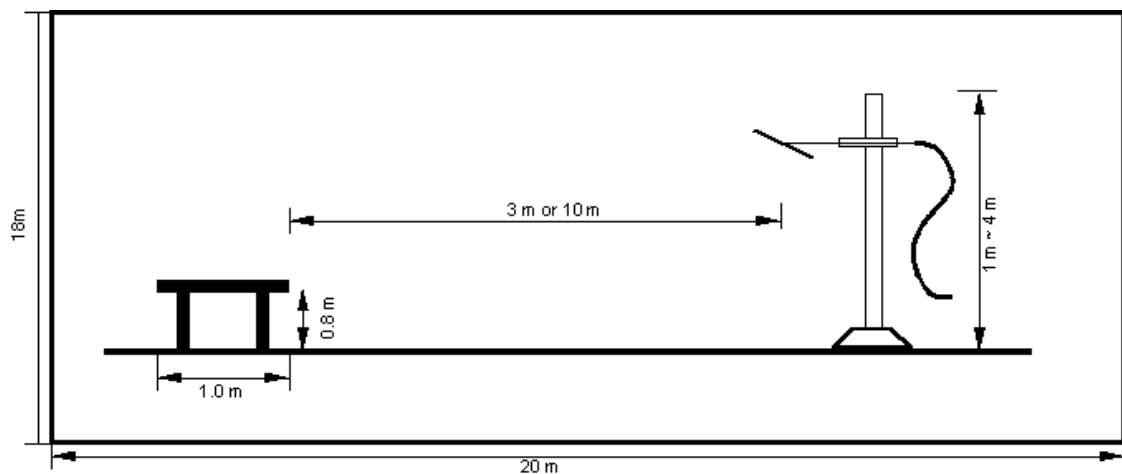


Fig 3. Dimensions of test site.



5. Conducted Emission

5.1 Operating Environment

Temperature : 24 °C
Relative Humidity : 44 % 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)	± 2.69 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	ISN	24568	11. 09. 2011

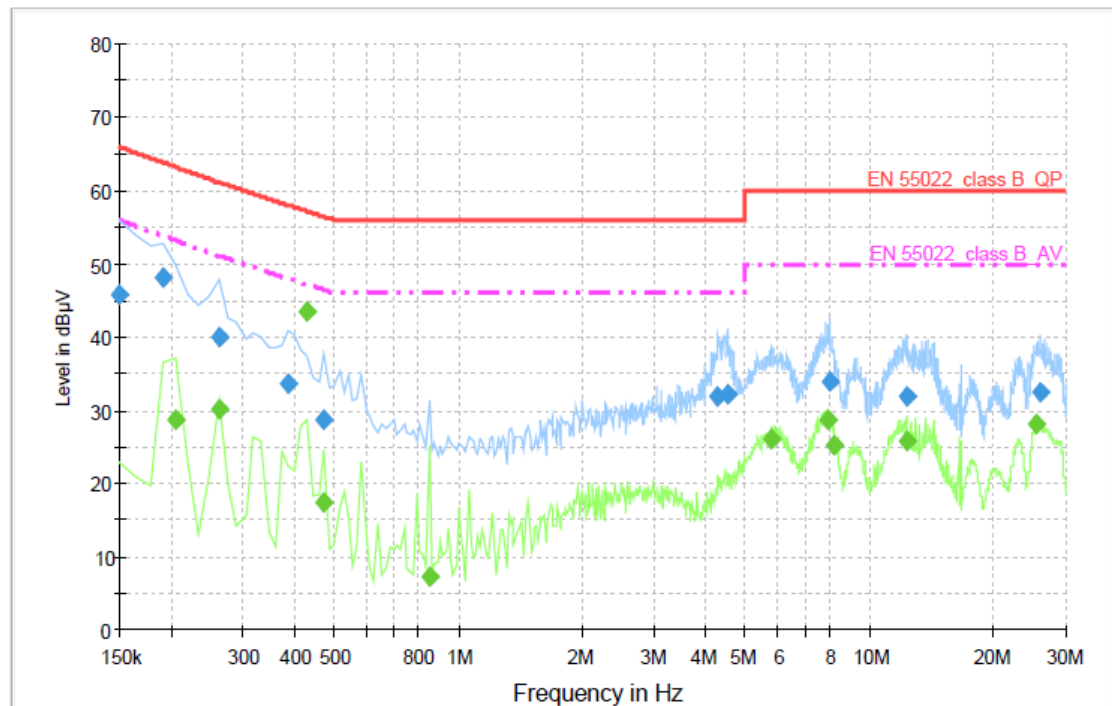
5.6 Test data for Conducted Emission

-. Test Date : November 8, 2010
-. Resolution Bandwidth : 9 kHz
-. Frequency Range : 0.15 MHz ~ 30 MHz



◆ Operating condition: 1 920 × 1 080 / 60 Hz (D-sub: 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	45.8	1000.000	9.000	GND	L1	10.0	20.2	66.0	
0.192000	48.2	1000.000	9.000	GND	L1	10.0	15.6	63.8	
0.262000	40.1	1000.000	9.000	GND	L1	10.0	21.1	61.2	
0.388000	33.5	1000.000	9.000	GND	L1	10.0	24.5	58.0	
0.472000	28.8	1000.000	9.000	GND	L1	10.0	27.6	56.4	
4.252000	31.8	1000.000	9.000	GND	L1	10.2	24.2	56.0	
4.504000	32.1	1000.000	9.000	GND	L1	10.2	23.9	56.0	
8.046000	33.9	1000.000	9.000	GND	L1	10.3	26.1	60.0	
12.372000	31.8	1000.000	9.000	GND	L1	10.5	28.2	60.0	
26.064000	32.6	1000.000	9.000	GND	L1	11.3	27.4	60.0	

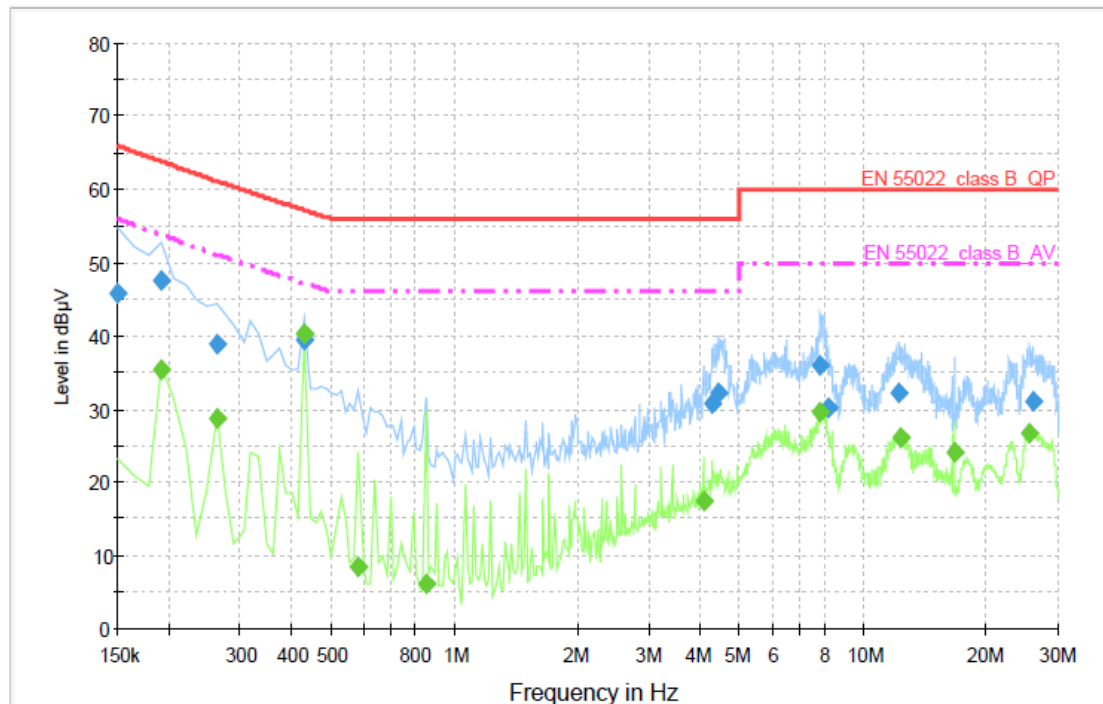
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.206000	28.8	1000.000	9.000	GND	L1	10.0	24.4	53.2	
0.262000	30.1	1000.000	9.000	GND	L1	10.0	21.0	51.1	
0.430000	43.4	1000.000	9.000	GND	L1	10.0	3.7	47.1	
0.472000	17.3	1000.000	9.000	GND	L1	10.0	29.1	46.4	
0.850000	7.1	1000.000	9.000	GND	L1	10.0	38.9	46.0	
5.778000	26.1	1000.000	9.000	GND	L1	10.2	23.9	50.0	
7.906000	28.7	1000.000	9.000	GND	L1	10.3	21.3	50.0	
8.228000	25.2	1000.000	9.000	GND	L1	10.3	24.8	50.0	
12.372000	25.9	1000.000	9.000	GND	L1	10.5	24.1	50.0	
25.448000	28.1	1000.000	9.000	GND	L1	11.3	21.9	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	45.8	1000.000	9.000	GND	N	10.0	20.2	66.0	
0.192000	47.5	1000.000	9.000	GND	N	10.0	16.3	63.8	
0.262000	39.0	1000.000	9.000	GND	N	10.0	22.2	61.2	
0.430000	39.3	1000.000	9.000	GND	N	10.0	17.9	57.2	
4.266000	30.7	1000.000	9.000	GND	N	10.2	25.3	56.0	
4.434000	32.2	1000.000	9.000	GND	N	10.2	23.8	56.0	
7.878000	35.9	1000.000	9.000	GND	N	10.3	24.1	60.0	
8.242000	30.0	1000.000	9.000	GND	N	10.3	30.0	60.0	
12.190000	32.3	1000.000	9.000	GND	N	10.5	27.7	60.0	
25.994000	31.1	1000.000	9.000	GND	N	10.8	28.9	60.0	

Final Measurement Detector 2

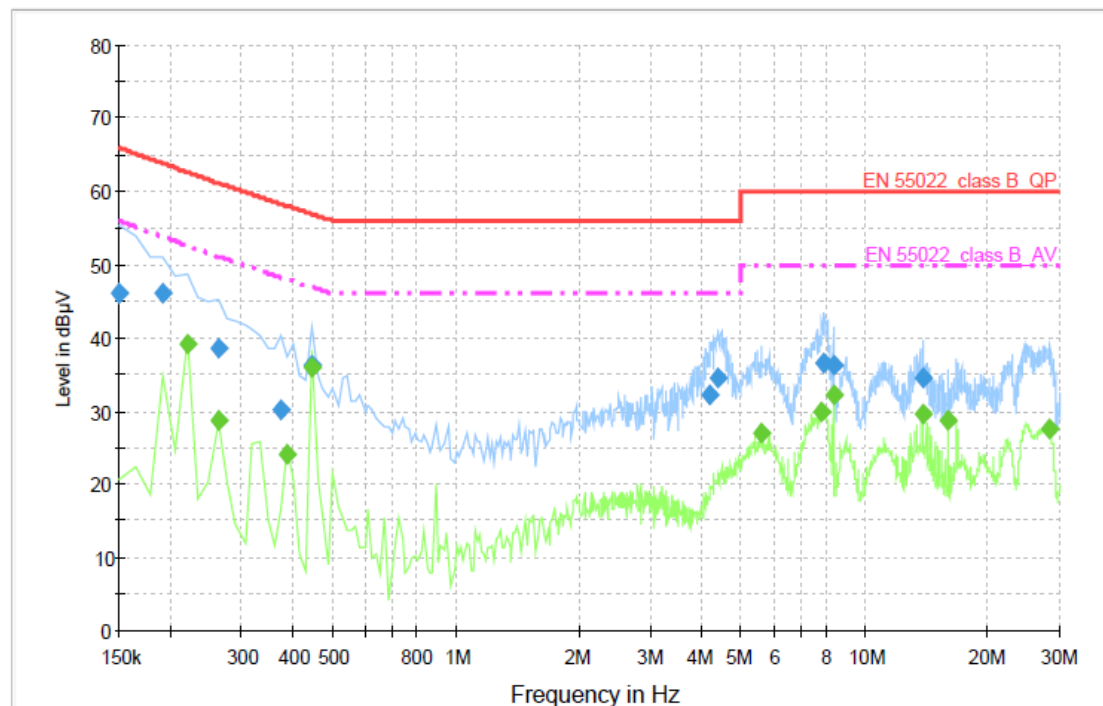
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.192000	35.4	1000.000	9.000	GND	N	10.0	18.4	53.8	
0.262000	28.6	1000.000	9.000	GND	N	10.0	22.5	51.1	
0.430000	40.2	1000.000	9.000	GND	N	10.0	6.9	47.1	
0.584000	8.5	1000.000	9.000	GND	N	10.0	37.5	46.0	
0.850000	6.0	1000.000	9.000	GND	N	10.0	40.0	46.0	
4.056000	17.5	1000.000	9.000	GND	N	10.2	28.5	46.0	
7.878000	29.6	1000.000	9.000	GND	N	10.3	20.4	50.0	
12.302000	26.2	1000.000	9.000	GND	N	10.5	23.8	50.0	
16.796000	24.0	1000.000	9.000	GND	N	10.6	26.0	50.0	
25.504000	26.7	1000.000	9.000	GND	N	10.8	23.3	50.0	

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



◆ Operating condition: 1 024 × 768 / 60 Hz (D-sub: 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	46.2	1000.000	9.000	GND	L1	10.0	19.8	66.0	
0.192000	46.1	1000.000	9.000	GND	L1	10.0	17.7	63.8	
0.262000	38.5	1000.000	9.000	GND	L1	10.0	22.7	61.2	
0.374000	30.2	1000.000	9.000	GND	L1	10.0	28.1	58.3	
0.444000	36.3	1000.000	9.000	GND	L1	10.0	20.6	56.9	
4.168000	32.1	1000.000	9.000	GND	L1	10.2	23.9	56.0	
4.364000	34.6	1000.000	9.000	GND	L1	10.2	21.4	56.0	
7.948000	36.6	1000.000	9.000	GND	L1	10.3	23.4	60.0	
8.368000	36.3	1000.000	9.000	GND	L1	10.3	23.7	60.0	
13.912000	34.4	1000.000	9.000	GND	L1	10.6	25.6	60.0	

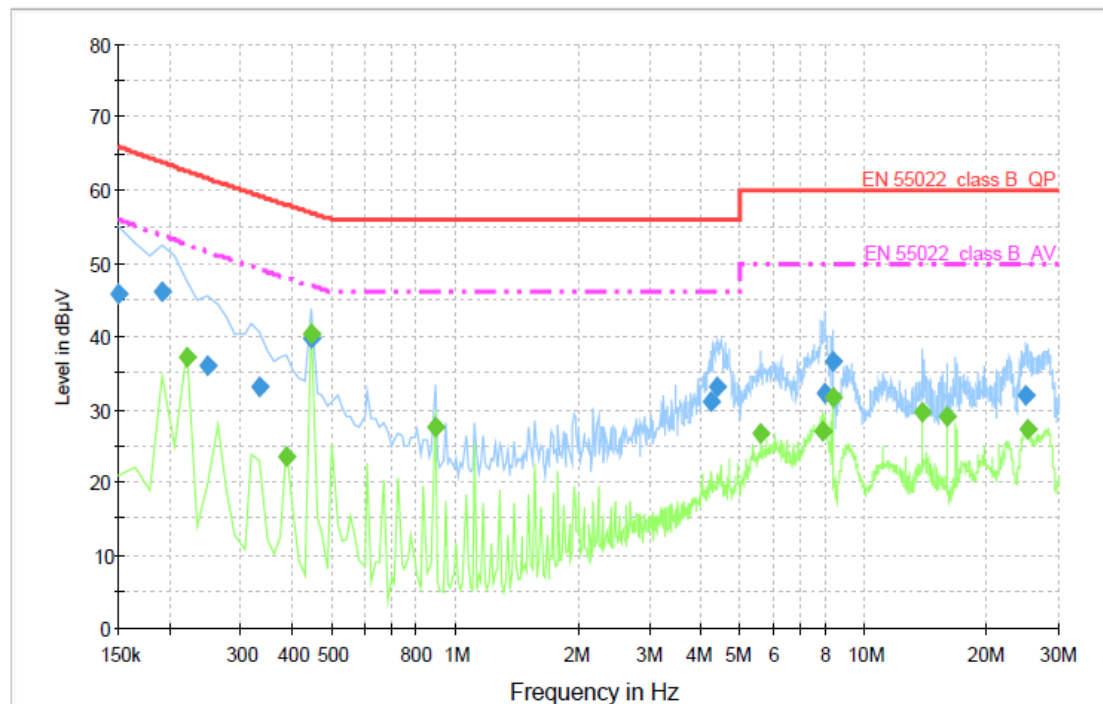
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	39.2	1000.000	9.000	GND	L1	10.0	13.4	52.6	
0.262000	28.7	1000.000	9.000	GND	L1	10.0	22.4	51.1	
0.388000	24.1	1000.000	9.000	GND	L1	10.0	23.8	47.9	
0.444000	35.9	1000.000	9.000	GND	L1	10.0	11.0	46.9	
5.582000	27.1	1000.000	9.000	GND	L1	10.2	22.9	50.0	
7.850000	30.0	1000.000	9.000	GND	L1	10.3	20.0	50.0	
8.368000	32.1	1000.000	9.000	GND	L1	10.3	17.9	50.0	
13.912000	29.5	1000.000	9.000	GND	L1	10.6	20.5	50.0	
16.012000	28.6	1000.000	9.000	GND	L1	10.8	21.4	50.0	
28.220000	27.6	1000.000	9.000	GND	L1	11.4	22.4	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	45.9	1000.000	9.000	GND	N	10.0	20.1	66.0	
0.192000	46.0	1000.000	9.000	GND	N	10.0	17.8	63.8	
0.248000	36.1	1000.000	9.000	GND	N	10.0	25.5	61.6	
0.332000	33.1	1000.000	9.000	GND	N	10.0	26.1	59.2	
0.444000	39.8	1000.000	9.000	GND	N	10.0	17.1	56.9	
4.224000	31.0	1000.000	9.000	GND	N	10.2	25.0	56.0	
4.392000	33.0	1000.000	9.000	GND	N	10.2	23.0	56.0	
8.046000	32.3	1000.000	9.000	GND	N	10.3	27.7	60.0	
8.368000	36.6	1000.000	9.000	GND	N	10.3	23.4	60.0	
24.944000	31.9	1000.000	9.000	GND	N	10.8	28.1	60.0	

Final Measurement Detector 2

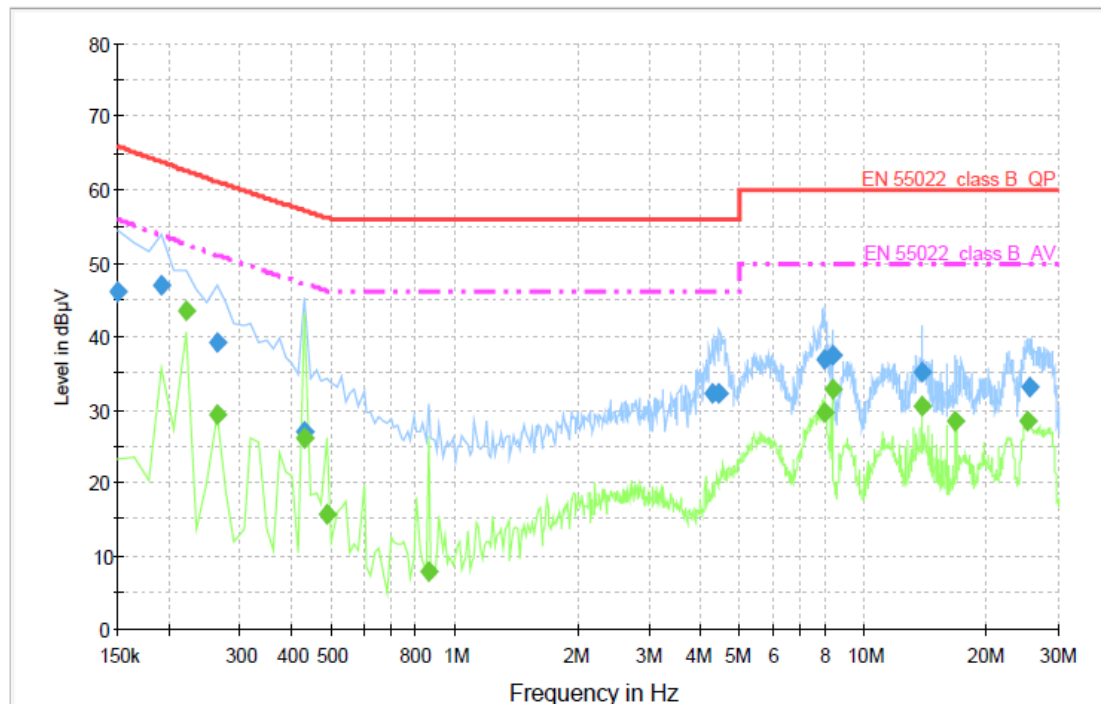
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	37.0	1000.000	9.000	GND	N	10.0	15.6	52.6	
0.388000	23.5	1000.000	9.000	GND	N	10.0	24.4	47.9	
0.444000	40.2	1000.000	9.000	GND	N	10.0	6.7	46.9	
0.892000	27.4	1000.000	9.000	GND	N	10.0	18.6	46.0	
5.582000	26.7	1000.000	9.000	GND	N	10.2	23.3	50.0	
7.934000	27.1	1000.000	9.000	GND	N	10.3	22.9	50.0	
8.368000	31.7	1000.000	9.000	GND	N	10.3	18.3	50.0	
13.912000	29.5	1000.000	9.000	GND	N	10.5	20.5	50.0	
16.012000	28.9	1000.000	9.000	GND	N	10.6	21.1	50.0	
25.308000	27.3	1000.000	9.000	GND	N	10.8	22.7	50.0	

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



◆ Operating condition: 640 × 480 / 60 Hz (D-sub: 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	46.1	1000.000	9.000	GND	L1	10.0	19.9	66.0	
0.192000	47.0	1000.000	9.000	GND	L1	10.0	16.8	63.8	
0.262000	39.2	1000.000	9.000	GND	L1	10.0	22.0	61.2	
0.430000	27.1	1000.000	9.000	GND	L1	10.0	30.1	57.2	
4.266000	32.3	1000.000	9.000	GND	L1	10.2	23.7	56.0	
4.448000	32.3	1000.000	9.000	GND	L1	10.2	23.7	56.0	
8.018000	37.0	1000.000	9.000	GND	L1	10.3	23.0	60.0	
8.368000	37.5	1000.000	9.000	GND	L1	10.3	22.5	60.0	
13.912000	35.1	1000.000	9.000	GND	L1	10.6	24.9	60.0	
25.434000	33.1	1000.000	9.000	GND	L1	11.3	26.9	60.0	

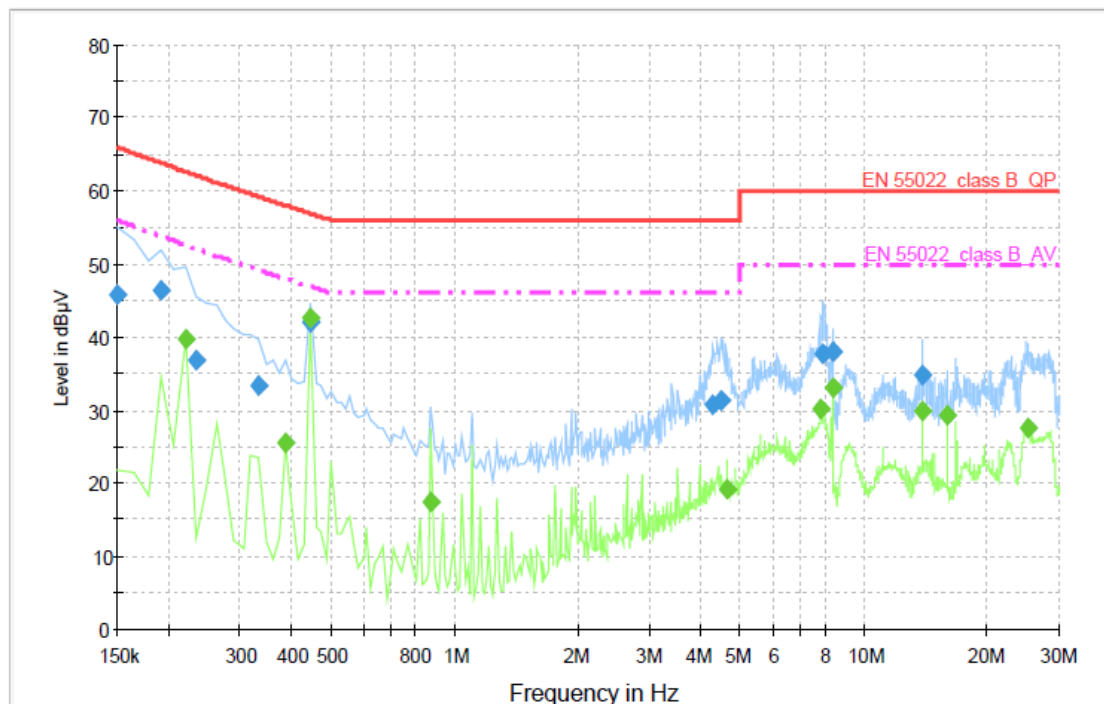
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	43.5	1000.000	9.000	GND	L1	10.0	9.1	52.6	
0.262000	29.2	1000.000	9.000	GND	L1	10.0	21.9	51.1	
0.430000	26.0	1000.000	9.000	GND	L1	10.0	21.1	47.1	
0.486000	15.5	1000.000	9.000	GND	L1	10.0	30.7	46.2	
0.864000	8.0	1000.000	9.000	GND	L1	10.0	38.0	46.0	
8.018000	29.7	1000.000	9.000	GND	L1	10.3	20.3	50.0	
8.368000	32.8	1000.000	9.000	GND	L1	10.3	17.2	50.0	
13.912000	30.5	1000.000	9.000	GND	L1	10.6	19.5	50.0	
16.698000	28.5	1000.000	9.000	GND	L1	10.8	21.5	50.0	
25.308000	28.4	1000.000	9.000	GND	L1	11.3	21.6	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	45.9	1000.000	9.000	GND	N	10.0	20.1	66.0	
0.192000	46.5	1000.000	9.000	GND	N	10.0	17.3	63.8	
0.234000	36.9	1000.000	9.000	GND	N	10.0	25.3	62.1	
0.332000	33.3	1000.000	9.000	GND	N	10.0	25.9	59.2	
0.444000	42.1	1000.000	9.000	GND	N	10.0	14.8	56.9	
4.252000	30.6	1000.000	9.000	GND	N	10.2	25.4	56.0	
4.490000	31.4	1000.000	9.000	GND	N	10.2	24.6	56.0	
7.976000	37.7	1000.000	9.000	GND	N	10.3	22.3	60.0	
8.368000	37.9	1000.000	9.000	GND	N	10.3	22.1	60.0	
13.912000	34.7	1000.000	9.000	GND	N	10.5	25.3	60.0	

Final Measurement Detector 2

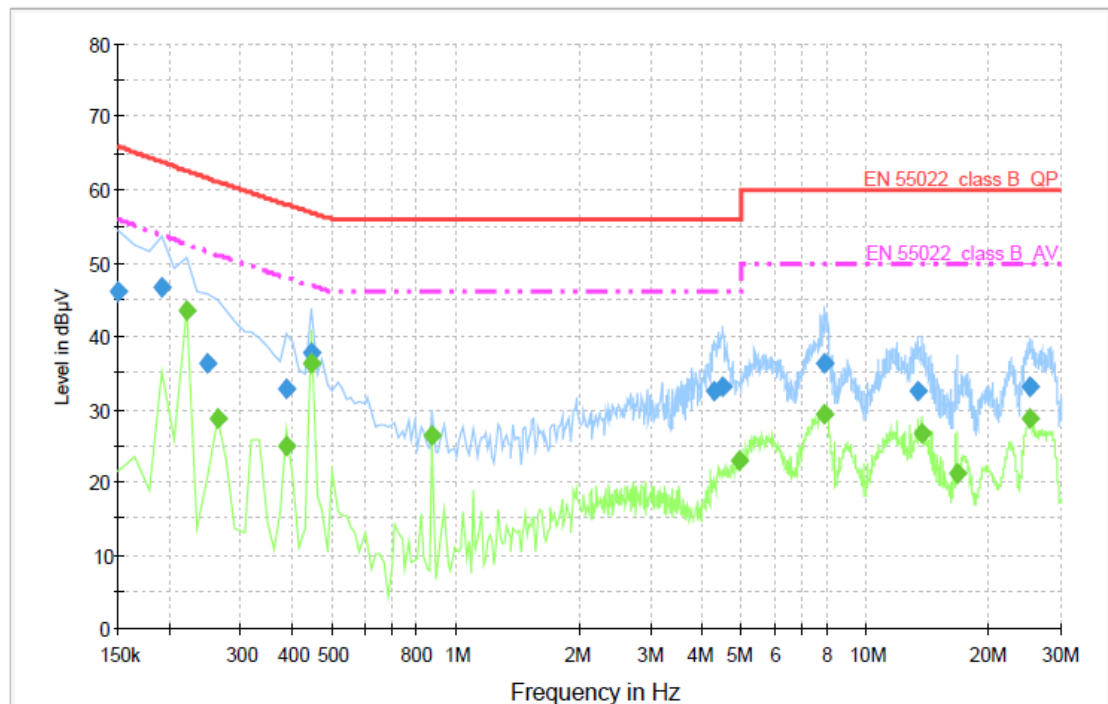
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	39.8	1000.000	9.000	GND	N	10.0	12.8	52.6	
0.388000	25.4	1000.000	9.000	GND	N	10.0	22.5	47.9	
0.444000	42.5	1000.000	9.000	GND	N	10.0	4.4	46.9	
0.878000	17.5	1000.000	9.000	GND	N	10.0	28.5	46.0	
4.630000	19.2	1000.000	9.000	GND	N	10.2	26.8	46.0	
7.878000	30.0	1000.000	9.000	GND	N	10.3	20.0	50.0	
8.368000	33.1	1000.000	9.000	GND	N	10.3	16.9	50.0	
13.912000	29.8	1000.000	9.000	GND	N	10.5	20.2	50.0	
16.012000	29.4	1000.000	9.000	GND	N	10.6	20.6	50.0	
25.308000	27.5	1000.000	9.000	GND	N	10.8	22.5	50.0	

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



◆ Operating condition: 1 920 × 1 080 / 60 Hz (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	46.0	1000.000	9.000	GND	L1	10.0	20.0	66.0	
0.192000	46.6	1000.000	9.000	GND	L1	10.0	17.2	63.8	
0.248000	36.2	1000.000	9.000	GND	L1	10.0	25.4	61.6	
0.388000	32.8	1000.000	9.000	GND	L1	10.0	25.2	58.0	
0.444000	37.8	1000.000	9.000	GND	L1	10.0	19.1	56.9	
4.280000	32.3	1000.000	9.000	GND	L1	10.2	23.7	56.0	
4.490000	33.0	1000.000	9.000	GND	L1	10.2	23.0	56.0	
7.948000	36.2	1000.000	9.000	GND	L1	10.3	23.8	60.0	
13.436000	32.5	1000.000	9.000	GND	L1	10.6	27.5	60.0	
25.154000	33.1	1000.000	9.000	GND	L1	11.2	26.9	60.0	

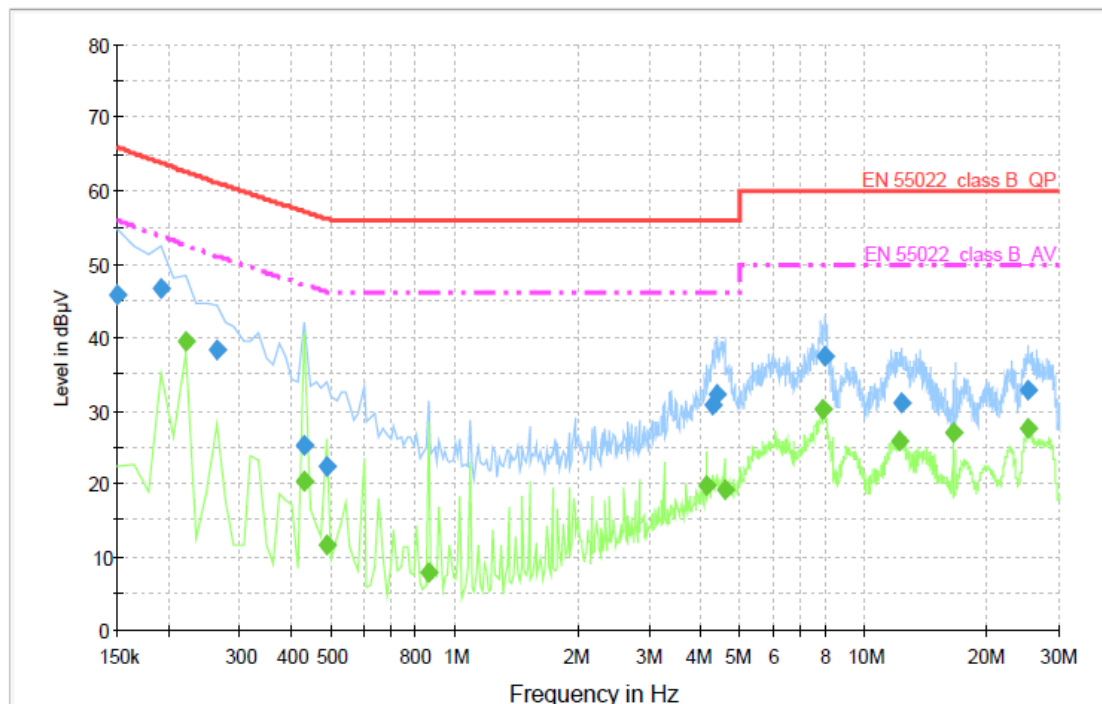
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	43.3	1000.000	9.000	GND	L1	10.0	9.3	52.6	
0.262000	28.8	1000.000	9.000	GND	L1	10.0	22.3	51.1	
0.388000	24.8	1000.000	9.000	GND	L1	10.0	23.1	47.9	
0.444000	36.4	1000.000	9.000	GND	L1	10.0	10.5	46.9	
0.878000	26.4	1000.000	9.000	GND	L1	10.0	19.6	46.0	
4.924000	23.0	1000.000	9.000	GND	L1	10.2	23.0	46.0	
7.962000	29.3	1000.000	9.000	GND	L1	10.3	20.7	50.0	
13.660000	26.6	1000.000	9.000	GND	L1	10.6	23.4	50.0	
16.768000	21.0	1000.000	9.000	GND	L1	10.8	29.0	50.0	
25.182000	28.6	1000.000	9.000	GND	L1	11.2	21.4	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	45.9	1000.000	9.000	GND	N	10.0	20.1	66.0	
0.192000	46.8	1000.000	9.000	GND	N	10.0	17.0	63.8	
0.262000	38.2	1000.000	9.000	GND	N	10.0	23.0	61.2	
0.430000	25.2	1000.000	9.000	GND	N	10.0	32.0	57.2	
0.486000	22.2	1000.000	9.000	GND	N	10.0	34.0	56.2	
4.280000	30.8	1000.000	9.000	GND	N	10.2	25.2	56.0	
4.350000	32.2	1000.000	9.000	GND	N	10.2	23.8	56.0	
8.060000	37.3	1000.000	9.000	GND	N	10.3	22.7	60.0	
12.414000	30.9	1000.000	9.000	GND	N	10.5	29.1	60.0	
25.182000	32.8	1000.000	9.000	GND	N	10.8	27.2	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	39.3	1000.000	9.000	GND	N	10.0	13.3	52.6	
0.430000	20.4	1000.000	9.000	GND	N	10.0	26.7	47.1	
0.486000	11.7	1000.000	9.000	GND	N	10.0	34.5	46.2	
0.864000	7.9	1000.000	9.000	GND	N	10.0	38.1	46.0	
4.126000	19.8	1000.000	9.000	GND	N	10.2	26.2	46.0	
4.560000	19.3	1000.000	9.000	GND	N	10.2	26.7	46.0	
7.962000	30.1	1000.000	9.000	GND	N	10.3	19.9	50.0	
12.204000	25.8	1000.000	9.000	GND	N	10.5	24.2	50.0	
16.474000	27.0	1000.000	9.000	GND	N	10.6	23.0	50.0	
25.182000	27.6	1000.000	9.000	GND	N	10.8	22.4	50.0	

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



6. Radiated Emission

6.1 Operating Environment

Temperature : 12 °C
Relative Humidity : 32 % R.H.

6.2 Test Set-up

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

The EUT was placed on a non-conductive turntable approximately 0.8 m above the ground plane.

The turntable with EUT was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels.

This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

6.3 Measurement Uncertainty

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

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

Test Items(Anechoic Chamber)	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 3 m, Vertical)	± 4.32 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 Receiver	830482/010	12. 11. 2010
■ - VULB9160	Schwarzbeck	Broadband Test Antenna	3193	03. 15. 2012
■ - 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
■ - AFS44-00101800-25-10P-44	MITEQ	Preamplifier(inside rack)	1258943	11. 12. 2010
■ - ESCS30	Rohde & Schwarz	EMI Test Receiver	839809/003	12. 10. 2010
■ - 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



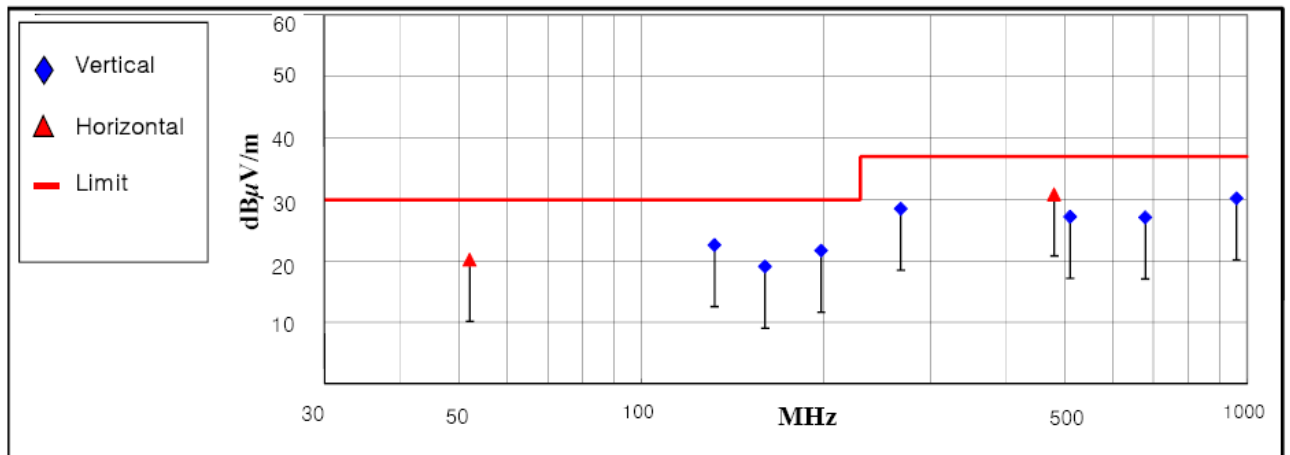
6.6 Test data for Radiated Emission

- Test Date : November 8, 2010
- Resolution Bandwidth : 120 kHz/1 MHz
- Frequency Range : 30 MHz ~ 2 000 MHz
- Measurement Distance : 10 m/3 m
- Note : The highest frequency of the internal source of the EUT is between 108 MHz and 500 MHz (400 MHz). The measurement was made up to 2 000 MHz

◆ Operating Condition: 1 920 × 1 080 / 60 Hz (D-sub: Analog)

Detector mode: Quasi-peak detector mode

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 (°)
52.05	8.79	9.07	2.34	20.20	30.00	9.80	H	200	85
131.99	7.52	11.60	3.48	22.60	30.00	7.40	V	125	124
159.95	3.20	12.08	3.82	19.10	30.00	10.90	V	142	321
197.99	3.02	14.42	4.26	21.70	30.00	8.30	V	100	145
267.95	8.42	14.89	5.19	28.50	37.00	8.50	V	165	15
480.02	6.50	17.27	7.08	30.85	37.00	6.15	H	258	285
510.01	2.48	17.68	7.04	27.20	37.00	9.80	V	132	100
678.78	-0.70	19.95	7.85	27.10	37.00	9.90	V	154	326
960.18	-2.45	23.06	9.59	30.20	37.00	6.80	V	100	90

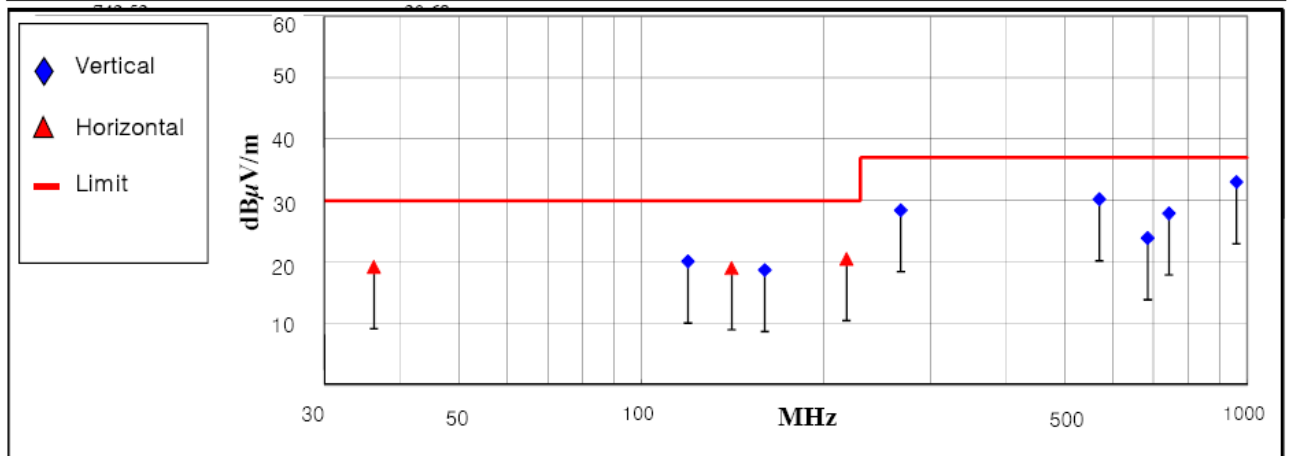


< Fig 12. Radiated emission result (30 MHz ~ 1 000 MHz)>



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (DVI: Digital)
Detector mode: Quasi-peak detector mode

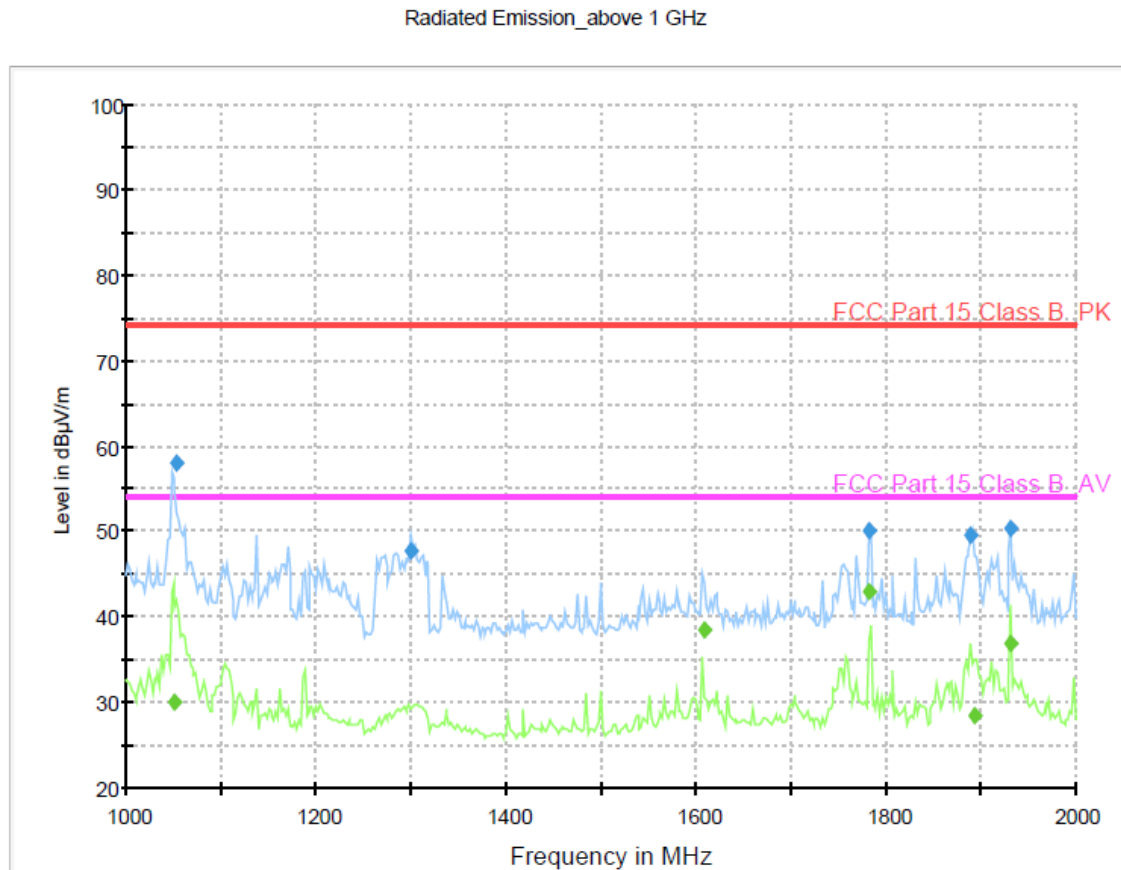
Frequency (MHz)	Measurement Level				Limit (dBμ V/m)	Margin (dB)	Positioning System		
	Reading	Antenna	Cable	Test Result			Pol.	Height	Angle
	Value(dBμ V)	Factor(dB/m)	Loss(dB)	(dBμ V/m)			(H/V)	(cm)	(°)
36.15	5.57	11.62	2.01	19.20	30.00	10.80	H	225	30
119.31	5.60	11.17	3.33	20.10	30.00	9.90	V	124	164
140.85	3.57	11.85	3.58	19.00	30.00	11.00	H	205	180
159.78	2.80	12.08	3.82	18.70	30.00	11.30	V	145	284
218.00	1.88	14.09	4.53	20.50	30.00	9.50	H	210	100
267.95	8.32	14.89	5.19	28.40	37.00	8.60	V	130	265
570.05	4.38	18.57	7.25	30.20	37.00	6.80	V	100	187
684.81	-4.00	20.02	7.88	23.90	37.00	13.10	V	154	100
742.56	-1.04	20.68	8.26	27.90	37.00	9.10	V	195	325
960.15	0.36	23.05	9.59	33.00	37.00	4.00	V	100	182



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



- ◆ Operating Condition: 1 920 × 1080 / 60 Hz (D-sub: Analog)
Green trace: Average detector, Blue trace: 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)
1052.696192	58.0	100.0	1000.000	197.0	V	0.0	-15.6	16.0	74.0
1299.201202	47.8	100.0	1000.000	100.0	V	189.0	-14.3	26.2	74.0
1782.167134	50.0	100.0	1000.000	140.0	V	182.0	-13.2	24.0	74.0
1888.383567	49.6	100.0	1000.000	150.0	H	195.0	-13.1	24.4	74.0
1930.463727	50.5	100.0	1000.000	140.0	V	204.0	-13.0	23.5	74.0

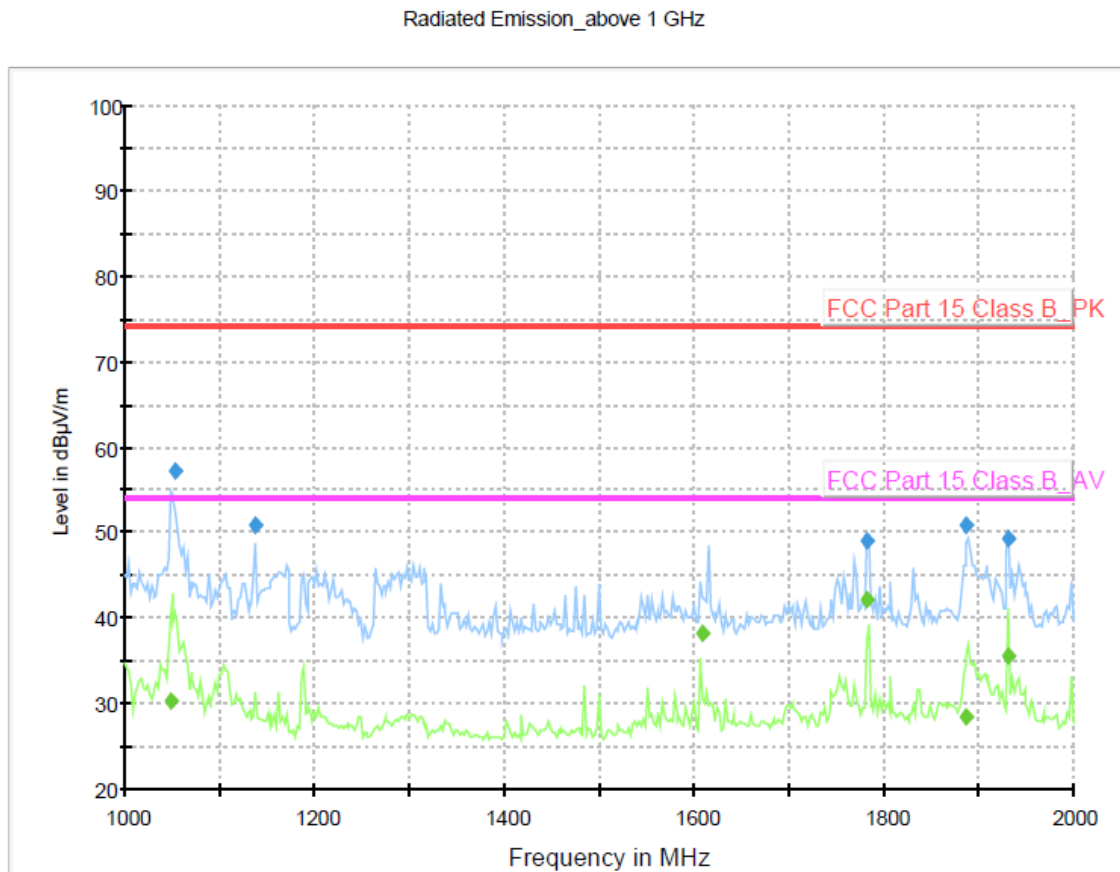
Final Result 2

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1050.700200	30.0	100.0	1000.000	198.0	V	0.0	-15.6	24.0	54.0
1607.814429	38.6	100.0	1000.000	100.0	V	189.0	-13.6	15.4	54.0
1782.167134	43.0	100.0	1000.000	150.0	H	140.0	-13.2	11.0	54.0
1893.179559	28.6	100.0	1000.000	150.0	H	195.0	-13.1	25.4	54.0
1930.463727	36.9	100.0	1000.000	140.0	V	204.0	-13.0	17.1	54.0

< Fig 14. Radiated emission result (1 000 MHz ~ 2 000 MHz)>



- ◆ Operating Condition: 1 920 × 1080 / 60 Hz (DVI: Digital)
Green trace: Average detector, Blue trace: 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)
1052.696192	57.3	100.0	1000.000	216.0	V	0.0	-15.6	16.7	74.0
1138.476553	51.0	100.0	1000.000	150.0	V	153.0	-15.2	23.0	74.0
1782.567134	49.0	100.0	1000.000	143.0	V	186.0	-13.2	25.0	74.0
1885.579559	51.0	100.0	1000.000	122.0	H	205.0	-13.1	23.0	74.0
1930.463727	49.2	100.0	1000.000	131.0	V	186.0	-13.0	24.8	74.0

Final Result 2

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1049.900200	30.2	100.0	1000.000	211.0	V	0.0	-15.6	23.8	54.0
1607.814429	38.1	100.0	1000.000	100.0	V	186.0	-13.6	15.9	54.0
1782.167134	42.1	100.0	1000.000	100.0	V	186.0	-13.2	11.9	54.0
1887.579559	28.4	100.0	1000.000	150.0	H	209.0	-13.1	25.6	54.0
1930.463727	35.6	100.0	1000.000	150.0	V	214.0	-13.0	18.4	54.0

< Fig 15. Radiated emission result (1 000 MHz ~ 2 000 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. LED LCD Monitor (Model Name: E2770VV)** was complies with §15.107 and 15.109 of the FCC Rules.