

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 : May 3, 2010

Order Number: GETEC-C1-10-115

Test Report Number: GETEC-E3-10-054

Test Site: Gumi College EMC Center

FCC Registration Number: (100749, 443957)

FCC ID.: BEJE2280VV

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	: E2280VV, E2280VXV
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 Jeong, 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. Myoung-Kyu Lee, Chief research engineer

Tel Number: +82-31-610-9623

- **FCC ID.** BEJE2280VV
- **EUT Type** LED LCD Monitor
- **Model Name** E2280VV(basic model), E2280VXV(added with EUT front acrylic panel)
"These model names are given in accordance with customer's requirement that are not effect on EMC performance. All the electrical and mechanical characteristics are the same as basic model except model name designation."
- **Trade Name** LG
- **Serial Number** Prototype
- **Rule Part(s)** FCC Part 15 Subpart B
- **Type of Authority** Certification
- **Test Procedure(s)** ANSI C63.4 (2003) / Canadian standard ICES-003
- **Dates of Test** April 28 ~ 29, 2010
- **Place of Test** **Gumi College EMC Center** (FCC Registration Number: 100749, 443957)
407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.
- **Test Report Number** GETEC-E3-10-054
- **Dates of Issue** May 3, 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: E2280VV, E2280VXV)**

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. LED LCD Monitor (Model Name: E2280VV, E2280VXV) FCC ID.: BEJE2280VV**

- LCD Panel	: 54.686 cm (21.53 inch) Flat Panel Active matrix-TFT LCD Anti-Glare coating Visible diagonal size: 54.686 cm 0.248 mm x 0.248 mm (Pixel Pitch)
- Maximum Resolution	: 1 920 × 1 080 @ 60 Hz
- Sync Input	: Horizontal Freq. Analog, Digital: 30 kHz to 83 kHz (Automatic) HDMI: 30 kHz to 83 kHz (Automatic) Vertical Freq. Analog, Digital: 56 Hz to 75 Hz (Automatic) HDMI: 56 Hz to 61 Hz (Automatic) Input Form Separate Sync., Digital
- Used AC/DC Adapter	: Model name: LCAP07F Manufacturer: Genmao (Suzhou) Electronic Co., Ltd. Input ratings: (100 – 240) V~, (50 / 60) Hz, 1.0 A Output ratings: DC 12 V, 3.0 A Serial number: EA1OQ320086033704(1.4)
- Power Consumption	: 24 W
- Dimensions	: 51.55 cm(W) × 42.65 cm(H) × 19.45 cm(D)
- Weight	: 3.3 kg
- Maximum Frequency range	: 148.5 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	166516-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
Printer	Hewlett Packard	970CXI	S/N: MY9B01F1FG FCC ID.: DoC
Headset	GOWOONSORI	GW-500M	S/N: N/A FCC ID.: -

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 adapter	1.80 m unshielded
Adapter cable	Connected to the EUT	1.25 m shielded with a ferrite core
D-Sub(Analog) in cable	Connected to the EUT and PC	1.80 m shielded with two ferrite cores
DVI-D(Digital) in cable	Connected to the EUT and PC	2.00 m shielded with two ferrite cores
HDMI in cable	Connected to the EUT and DVD player	2.00 m shielded
Headset 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 (D-Sub: Analog, DVI-D: Digital)

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

"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

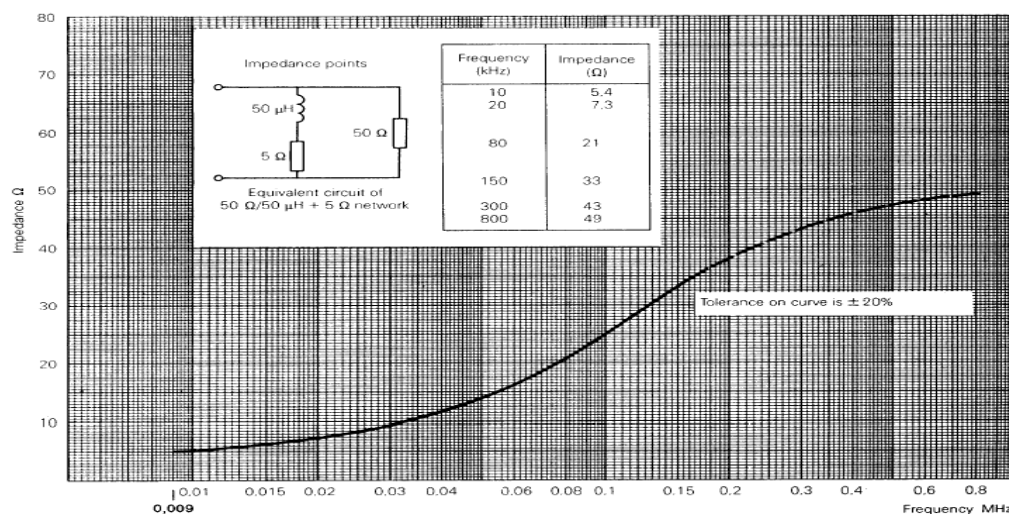


Fig 2. Impedance of LISN



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 : 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

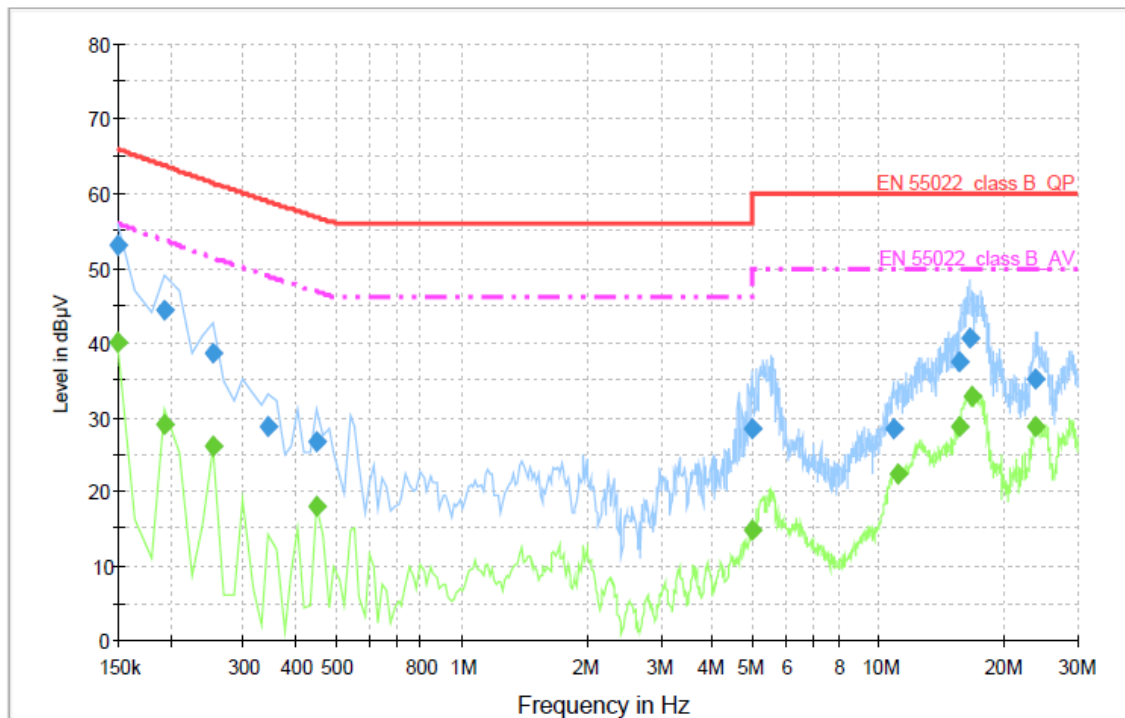
5.6 Test data for Conducted Emission

-. Test Date : April 29, 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	53.2	1000.000	9.000	GND	L1	10.0	12.8	66.0	
0.195000	44.5	1000.000	9.000	GND	L1	10.0	19.2	63.7	
0.255000	38.7	1000.000	9.000	GND	L1	10.0	22.7	61.4	
0.345000	28.8	1000.000	9.000	GND	L1	10.0	30.1	58.9	
0.450000	26.7	1000.000	9.000	GND	L1	10.0	30.1	56.8	
4.950000	28.3	1000.000	9.000	GND	L1	10.2	27.7	56.0	
10.845000	28.4	1000.000	9.000	GND	L1	10.5	31.6	60.0	
15.675000	37.3	1000.000	9.000	GND	L1	10.8	22.7	60.0	
16.500000	40.6	1000.000	9.000	GND	L1	10.8	19.4	60.0	
23.790000	35.0	1000.000	9.000	GND	L1	11.2	25.0	60.0	

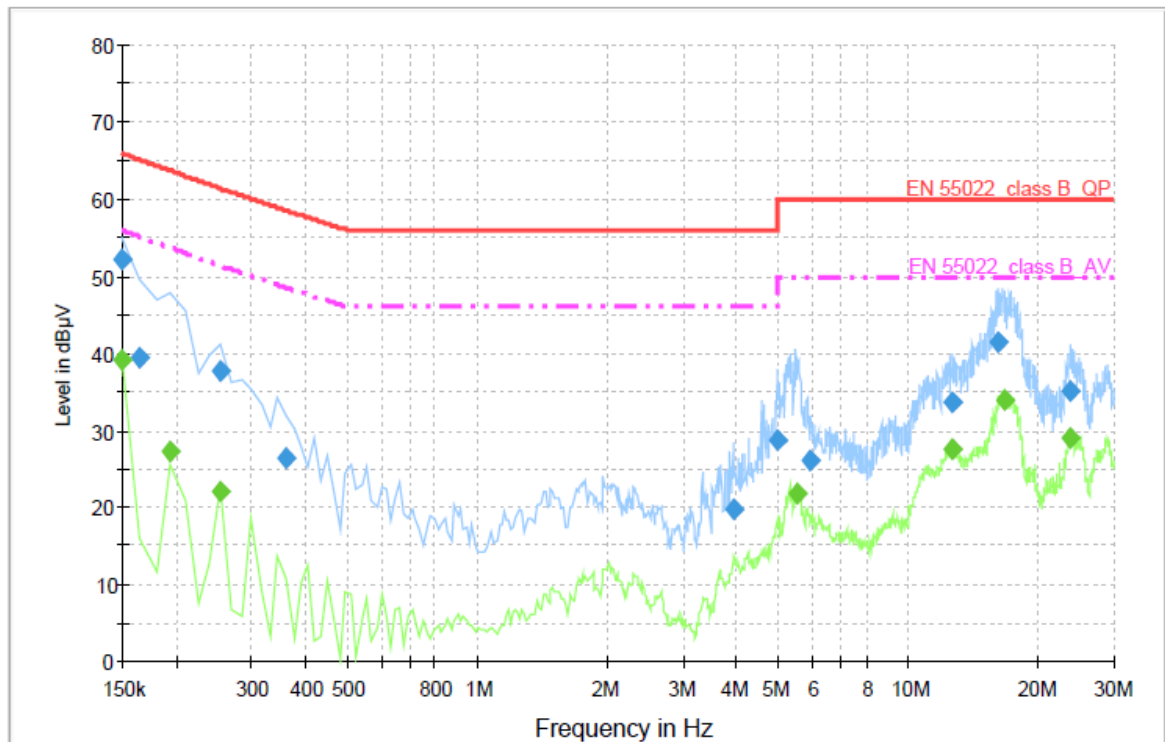
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	40.1	1000.000	9.000	GND	L1	10.0	15.9	56.0	
0.195000	28.9	1000.000	9.000	GND	L1	10.0	24.8	53.7	
0.255000	26.0	1000.000	9.000	GND	L1	10.0	25.3	51.3	
0.450000	17.9	1000.000	9.000	GND	L1	10.0	28.9	46.8	
4.965000	14.9	1000.000	9.000	GND	L1	10.2	31.1	46.0	
11.160000	22.4	1000.000	9.000	GND	L1	10.5	27.6	50.0	
15.585000	28.8	1000.000	9.000	GND	L1	10.7	21.2	50.0	
16.815000	32.8	1000.000	9.000	GND	L1	10.8	17.2	50.0	
23.850000	28.6	1000.000	9.000	GND	L1	11.2	21.4	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	52.1	1000.000	9.000	GND	N	10.0	13.9	66.0	
0.165000	39.3	1000.000	9.000	GND	N	10.0	25.8	65.1	
0.255000	37.6	1000.000	9.000	GND	N	10.0	23.8	61.4	
0.360000	26.3	1000.000	9.000	GND	N	10.0	32.3	58.6	
3.930000	19.8	1000.000	9.000	GND	N	10.2	36.2	56.0	
4.980000	28.7	1000.000	9.000	GND	N	10.2	27.3	56.0	
5.955000	26.1	1000.000	9.000	GND	N	10.2	33.9	60.0	
12.675000	33.6	1000.000	9.000	GND	N	10.5	26.4	60.0	
16.170000	41.4	1000.000	9.000	GND	N	10.6	18.6	60.0	
23.865000	35.2	1000.000	9.000	GND	N	10.8	24.8	60.0	

Final Measurement Detector 2

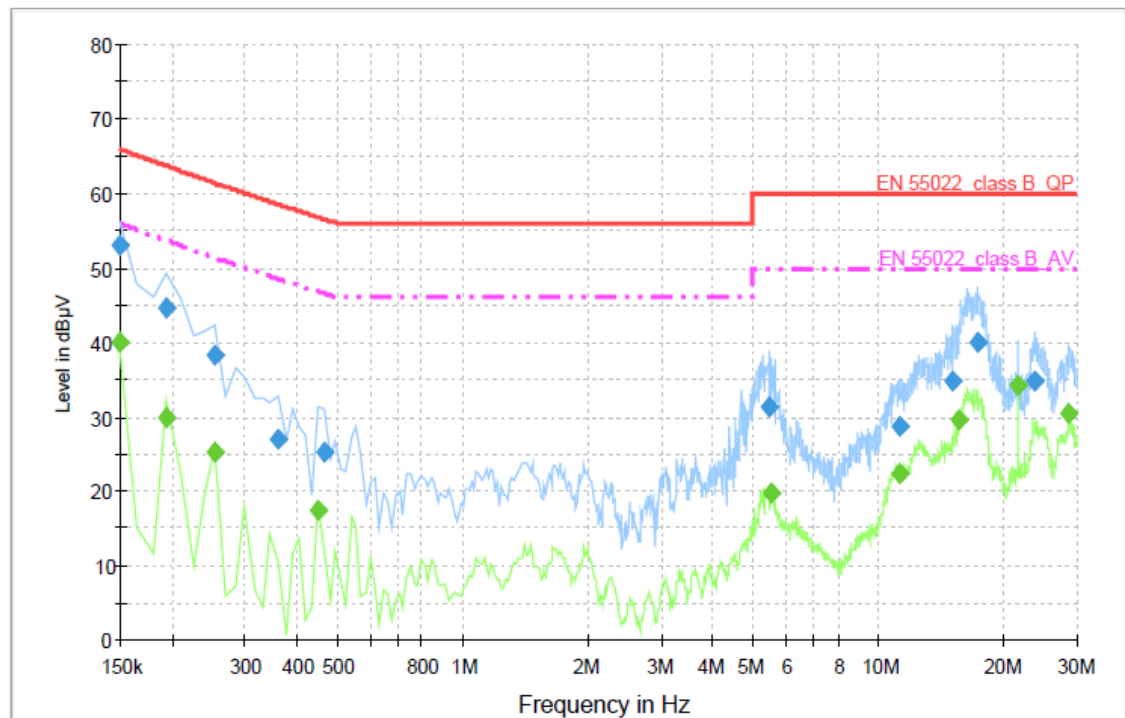
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	39.3	1000.000	9.000	GND	N	10.0	16.7	56.0	
0.195000	27.2	1000.000	9.000	GND	N	10.0	26.5	53.7	
0.255000	22.0	1000.000	9.000	GND	N	10.0	29.3	51.3	
5.505000	21.8	1000.000	9.000	GND	N	10.2	28.2	50.0	
12.690000	27.5	1000.000	9.000	GND	N	10.5	22.5	50.0	
16.695000	34.0	1000.000	9.000	GND	N	10.6	16.0	50.0	
23.865000	29.0	1000.000	9.000	GND	N	10.8	21.0	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	53.1	1000.000	9.000	GND	L1	10.0	12.9	66.0	
0.195000	44.8	1000.000	9.000	GND	L1	10.0	18.9	63.7	
0.255000	38.4	1000.000	9.000	GND	L1	10.0	23.0	61.4	
0.360000	26.9	1000.000	9.000	GND	L1	10.0	31.7	58.6	
0.465000	25.2	1000.000	9.000	GND	L1	10.0	31.4	56.6	
5.460000	31.4	1000.000	9.000	GND	L1	10.2	28.6	60.0	
11.205000	28.8	1000.000	9.000	GND	L1	10.5	31.2	60.0	
15.135000	34.7	1000.000	9.000	GND	L1	10.7	25.3	60.0	
17.340000	40.1	1000.000	9.000	GND	L1	10.9	19.9	60.0	
23.850000	34.8	1000.000	9.000	GND	L1	11.2	25.2	60.0	

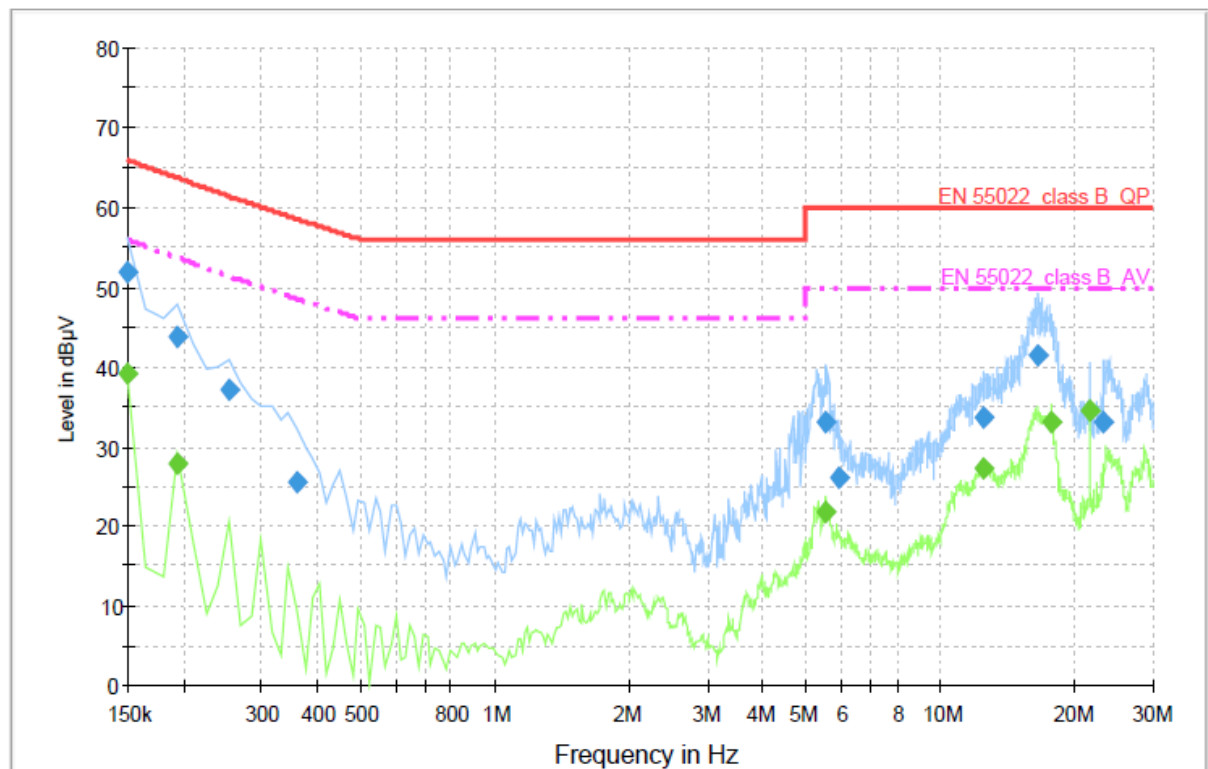
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	40.0	1000.000	9.000	GND	L1	10.0	16.0	56.0	
0.195000	29.8	1000.000	9.000	GND	L1	10.0	23.9	53.7	
0.255000	25.1	1000.000	9.000	GND	L1	10.0	26.2	51.3	
0.450000	17.4	1000.000	9.000	GND	L1	10.0	29.4	46.8	
5.520000	19.8	1000.000	9.000	GND	L1	10.2	30.2	50.0	
11.205000	22.4	1000.000	9.000	GND	L1	10.5	27.6	50.0	
15.675000	29.6	1000.000	9.000	GND	L1	10.8	20.4	50.0	
21.600000	34.3	1000.000	9.000	GND	L1	11.1	15.7	50.0	
28.785000	30.4	1000.000	9.000	GND	L1	11.4	19.6	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	51.9	1000.000	9.000	GND	N	10.0	14.1	66.0	
0.195000	43.8	1000.000	9.000	GND	N	10.0	19.9	63.7	
0.255000	37.2	1000.000	9.000	GND	N	10.0	24.2	61.4	
0.360000	25.6	1000.000	9.000	GND	N	10.0	33.0	58.6	
5.550000	33.2	1000.000	9.000	GND	N	10.2	26.8	60.0	
5.940000	26.2	1000.000	9.000	GND	N	10.2	33.8	60.0	
12.525000	33.5	1000.000	9.000	GND	N	10.5	26.5	60.0	
16.635000	41.5	1000.000	9.000	GND	N	10.6	18.5	60.0	
23.220000	33.0	1000.000	9.000	GND	N	10.8	27.0	60.0	

Final Measurement Detector 2

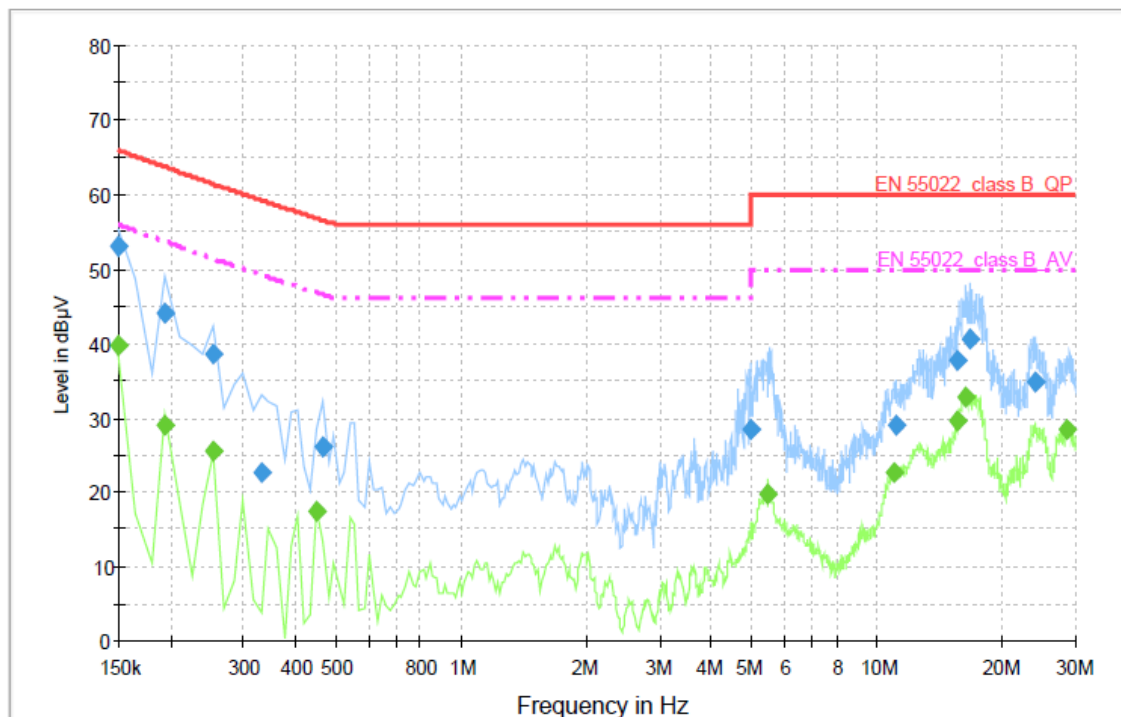
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	39.2	1000.000	9.000	GND	N	10.0	16.8	56.0	
0.195000	27.9	1000.000	9.000	GND	N	10.0	25.8	53.7	
5.550000	21.8	1000.000	9.000	GND	N	10.2	28.2	50.0	
12.570000	27.3	1000.000	9.000	GND	N	10.5	22.7	50.0	
17.715000	32.9	1000.000	9.000	GND	N	10.7	17.1	50.0	
21.600000	34.4	1000.000	9.000	GND	N	10.8	15.6	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	52.9	1000.000	9.000	GND	L1	10.0	13.1	66.0	
0.195000	44.2	1000.000	9.000	GND	L1	10.0	19.5	63.7	
0.255000	38.4	1000.000	9.000	GND	L1	10.0	23.0	61.4	
0.330000	22.7	1000.000	9.000	GND	L1	10.0	36.6	59.3	
0.465000	26.1	1000.000	9.000	GND	L1	10.0	30.5	56.6	
4.980000	28.4	1000.000	9.000	GND	L1	10.2	27.6	56.0	
11.070000	28.9	1000.000	9.000	GND	L1	10.5	31.1	60.0	
15.675000	37.7	1000.000	9.000	GND	L1	10.8	22.3	60.0	
16.815000	40.5	1000.000	9.000	GND	L1	10.8	19.5	60.0	
24.045000	34.6	1000.000	9.000	GND	L1	11.2	25.4	60.0	

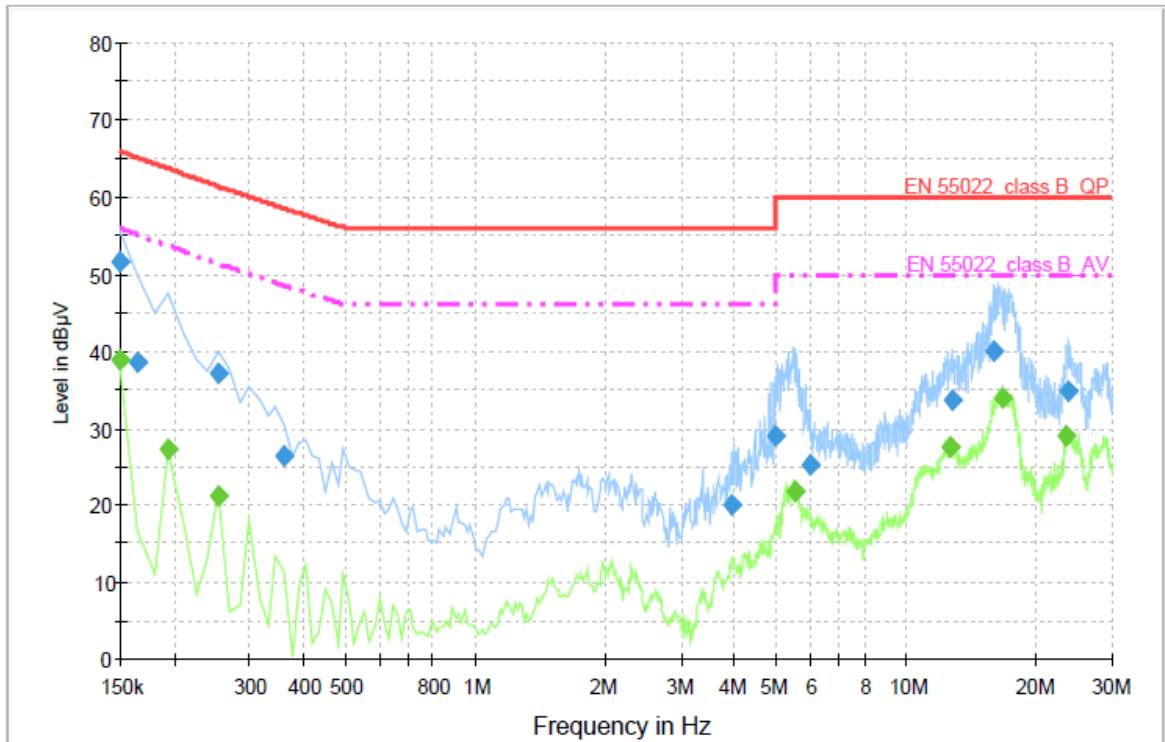
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	39.7	1000.000	9.000	GND	L1	10.0	16.3	56.0	
0.195000	29.0	1000.000	9.000	GND	L1	10.0	24.7	53.7	
0.255000	25.4	1000.000	9.000	GND	L1	10.0	25.9	51.3	
0.450000	17.5	1000.000	9.000	GND	L1	10.0	29.3	46.8	
5.490000	19.7	1000.000	9.000	GND	L1	10.2	30.3	50.0	
10.995000	22.6	1000.000	9.000	GND	L1	10.5	27.4	50.0	
15.675000	29.5	1000.000	9.000	GND	L1	10.8	20.5	50.0	
16.350000	32.8	1000.000	9.000	GND	L1	10.8	17.2	50.0	
28.635000	28.3	1000.000	9.000	GND	L1	11.4	21.7	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	51.7	1000.000	9.000	GND	N	10.0	14.3	66.0	
0.165000	38.6	1000.000	9.000	GND	N	10.0	26.5	65.1	
0.255000	37.0	1000.000	9.000	GND	N	10.0	24.4	61.4	
0.360000	26.2	1000.000	9.000	GND	N	10.0	32.4	58.6	
3.930000	20.1	1000.000	9.000	GND	N	10.2	35.9	56.0	
4.980000	29.1	1000.000	9.000	GND	N	10.2	26.9	56.0	
5.970000	25.3	1000.000	9.000	GND	N	10.2	34.7	60.0	
12.765000	33.6	1000.000	9.000	GND	N	10.5	26.4	60.0	
15.885000	39.9	1000.000	9.000	GND	N	10.6	20.1	60.0	
23.880000	34.8	1000.000	9.000	GND	N	10.8	25.2	60.0	

Final Measurement Detector 2

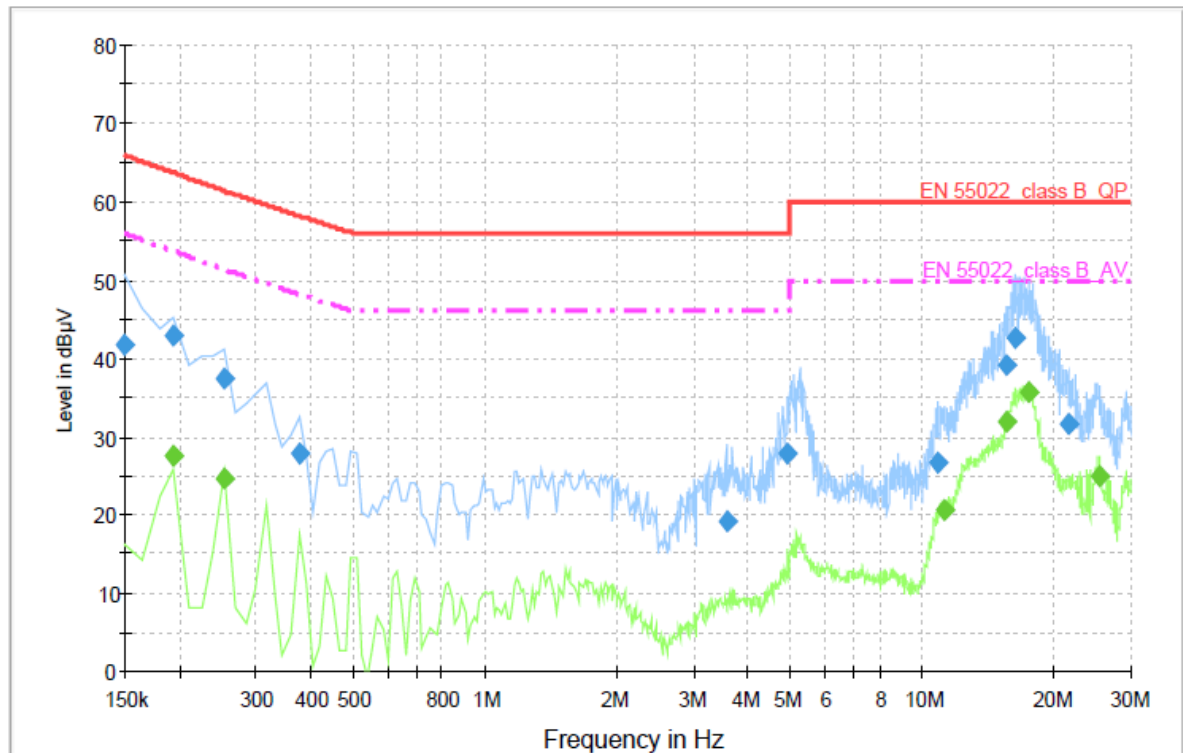
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	38.8	1000.000	9.000	GND	N	10.0	17.2	56.0	
0.195000	27.4	1000.000	9.000	GND	N	10.0	26.3	53.7	
0.255000	21.0	1000.000	9.000	GND	N	10.0	30.3	51.3	
5.505000	21.7	1000.000	9.000	GND	N	10.2	28.3	50.0	
12.615000	27.4	1000.000	9.000	GND	N	10.5	22.6	50.0	
16.740000	33.9	1000.000	9.000	GND	N	10.6	16.1	50.0	
23.580000	28.9	1000.000	9.000	GND	N	10.8	21.1	50.0	

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



◆ Operating condition: 1 920 × 1 080 / 60 Hz (DVI-D: 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	41.6	1000.000	9.000	GND	L1	10.0	24.4	66.0	
0.195000	42.9	1000.000	9.000	GND	L1	10.0	20.8	63.7	
0.255000	37.5	1000.000	9.000	GND	L1	10.0	23.9	61.4	
0.375000	27.8	1000.000	9.000	GND	L1	10.0	30.4	58.2	
3.570000	19.2	1000.000	9.000	GND	L1	10.2	36.8	56.0	
4.920000	27.9	1000.000	9.000	GND	L1	10.2	28.1	56.0	
10.890000	26.7	1000.000	9.000	GND	L1	10.5	33.3	60.0	
15.630000	39.1	1000.000	9.000	GND	L1	10.8	20.9	60.0	
16.320000	42.6	1000.000	9.000	GND	L1	10.8	17.4	60.0	
21.735000	31.7	1000.000	9.000	GND	L1	11.1	28.3	60.0	

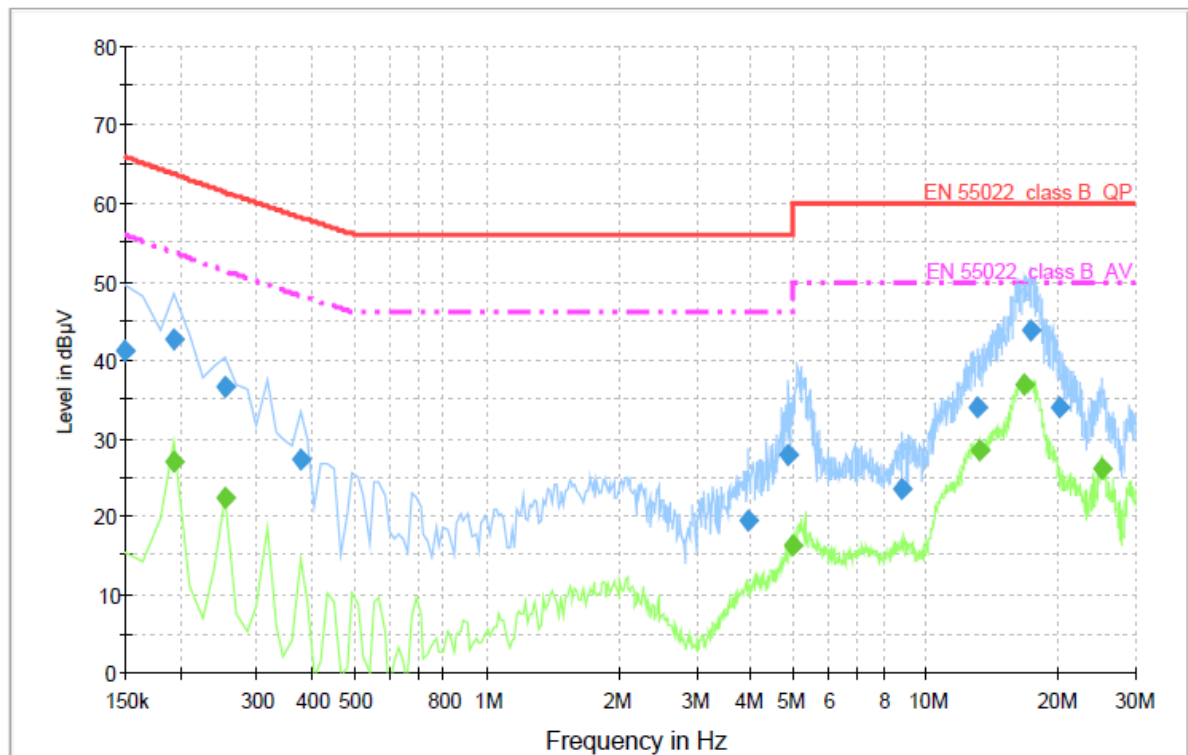
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.195000	27.7	1000.000	9.000	GND	L1	10.0	26.0	53.7	
0.255000	24.8	1000.000	9.000	GND	L1	10.0	26.5	51.3	
11.220000	20.7	1000.000	9.000	GND	L1	10.5	29.3	50.0	
15.660000	32.0	1000.000	9.000	GND	L1	10.8	18.0	50.0	
17.580000	35.5	1000.000	9.000	GND	L1	10.9	14.5	50.0	
25.515000	24.9	1000.000	9.000	GND	L1	11.3	25.1	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	41.2	1000.000	9.000	GND	N	10.0	24.8	66.0	
0.195000	42.5	1000.000	9.000	GND	N	10.0	21.2	63.7	
0.255000	36.6	1000.000	9.000	GND	N	10.0	24.8	61.4	
0.375000	27.1	1000.000	9.000	GND	N	10.0	31.1	58.2	
3.930000	19.6	1000.000	9.000	GND	N	10.2	36.4	56.0	
4.875000	27.8	1000.000	9.000	GND	N	10.2	28.2	56.0	
8.820000	23.5	1000.000	9.000	GND	N	10.3	36.5	60.0	
13.170000	34.0	1000.000	9.000	GND	N	10.5	26.0	60.0	
17.340000	43.8	1000.000	9.000	GND	N	10.7	16.2	60.0	
20.190000	33.8	1000.000	9.000	GND	N	10.8	26.2	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.195000	27.0	1000.000	9.000	GND	N	10.0	26.7	53.7	
0.255000	22.3	1000.000	9.000	GND	N	10.0	29.0	51.3	
4.965000	16.2	1000.000	9.000	GND	N	10.2	29.8	46.0	
13.185000	28.4	1000.000	9.000	GND	N	10.5	21.6	50.0	
16.785000	36.7	1000.000	9.000	GND	N	10.6	13.3	50.0	
25.110000	26.1	1000.000	9.000	GND	N	10.8	23.9	50.0	

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



6. Radiated Emission

6.1 Operating Environment

Temperature : 23 °C
Relative Humidity : 44 % 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

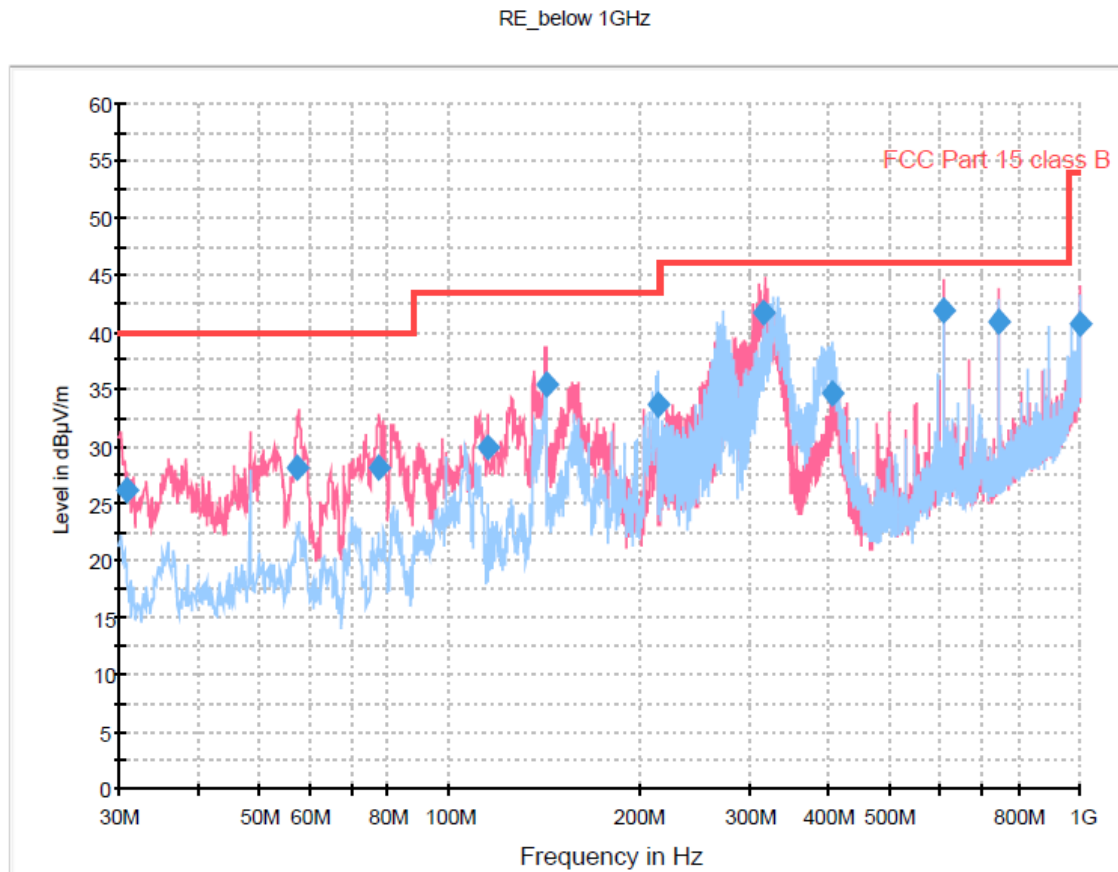
Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESIB26	Rohde & Schwarz	EMI Test Receiver	830482/010	12. 11. 2010
■ - VULB9160	Schwarzbeck	Broadband Test Antenna	3193	03. 11. 2012
■ - BBHA9120D	Schwarzbeck	Horn ANT	207	12. 22. 2011
■ - MCU066	maturo GmbH	Position Controller	1390306	N/A
■ - TT2.5SI	maturo GmbH	Turntable	1390307	N/A
■ - AM 4.0	maturo GmbH	Antenna Mast	1390308	N/A
■ - AFS 44 00101800-25-10P-44	MITEQ	Preamplifier	1258943	11. 12. 2010

6.6 Test data for Radiated Emission

- Test Date : April 28, 2010
- Resolution Bandwidth : 120 kHz/1 MHz
- Frequency Range : 30 MHz ~ 2 000 MHz
- Measurement Distance : 3 m
- Note : The highest frequency of the internal source of the EUT is between 108 MHz and 500 MHz (148.5 MHz). The measurement was made up to 2 000 MHz



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



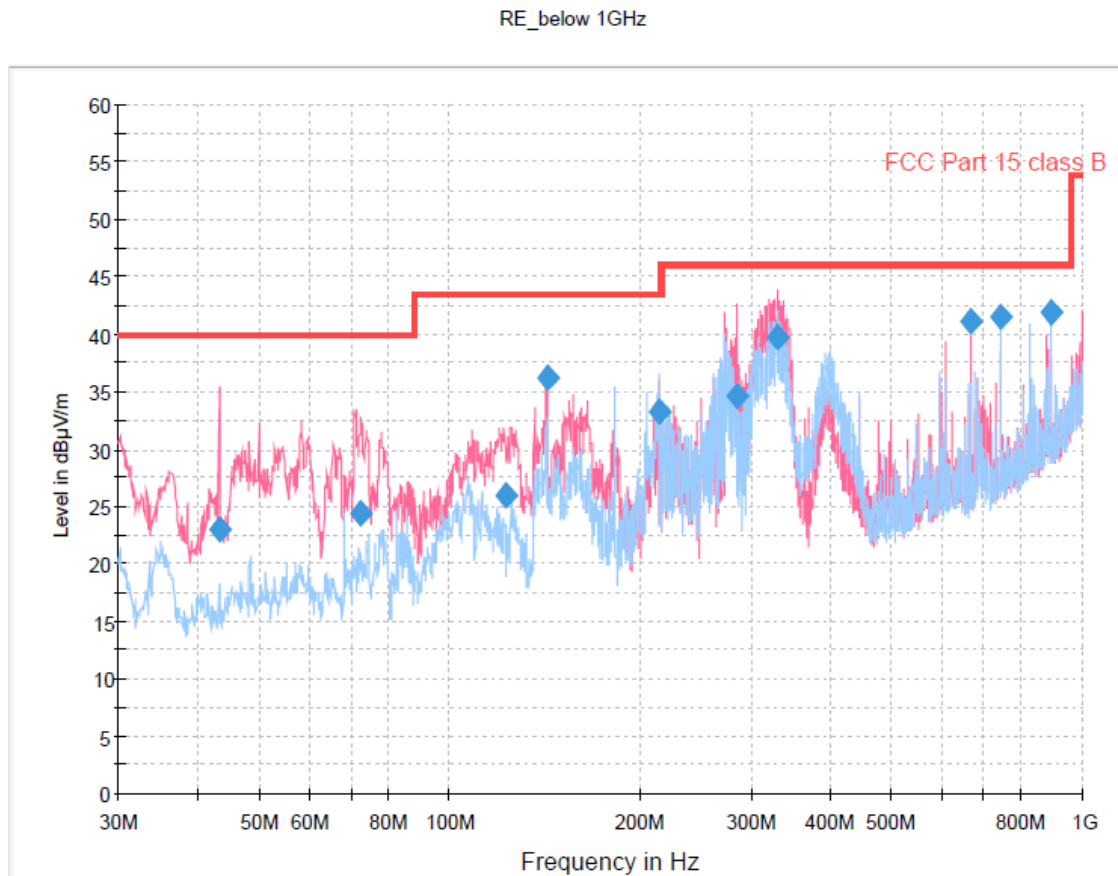
Final Result [1]

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.880000	26.2	1000.0	120.000	100.0	V	93.0	11.3	13.78	40.00
57.546250	28.1	1000.0	120.000	100.0	V	174.0	12.9	11.92	40.00
77.552500	28.1	1000.0	120.000	150.0	V	139.0	9.7	11.94	40.00
115.501250	30.0	1000.0	120.000	100.0	V	222.0	13.2	13.51	43.50
142.658750	35.5	1000.0	120.000	100.0	V	0.0	14.5	8.03	43.50
213.836250	33.6	1000.0	120.000	100.0	H	167.0	12.5	9.89	43.50
315.488750	41.8	1000.0	120.000	100.0	V	244.0	17.1	4.20	46.00
404.128750	34.6	1000.0	120.000	100.0	H	288.0	17.9	11.37	46.00
607.615000	41.9	1000.0	120.000	100.0	V	322.0	22.8	4.10	46.00
742.526250	41.0	1000.0	120.000	200.0	V	195.0	24.5	5.00	46.00
997.882500	40.7	1000.0	120.000	100.0	V	19.0	31.6	13.27	54.00

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



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



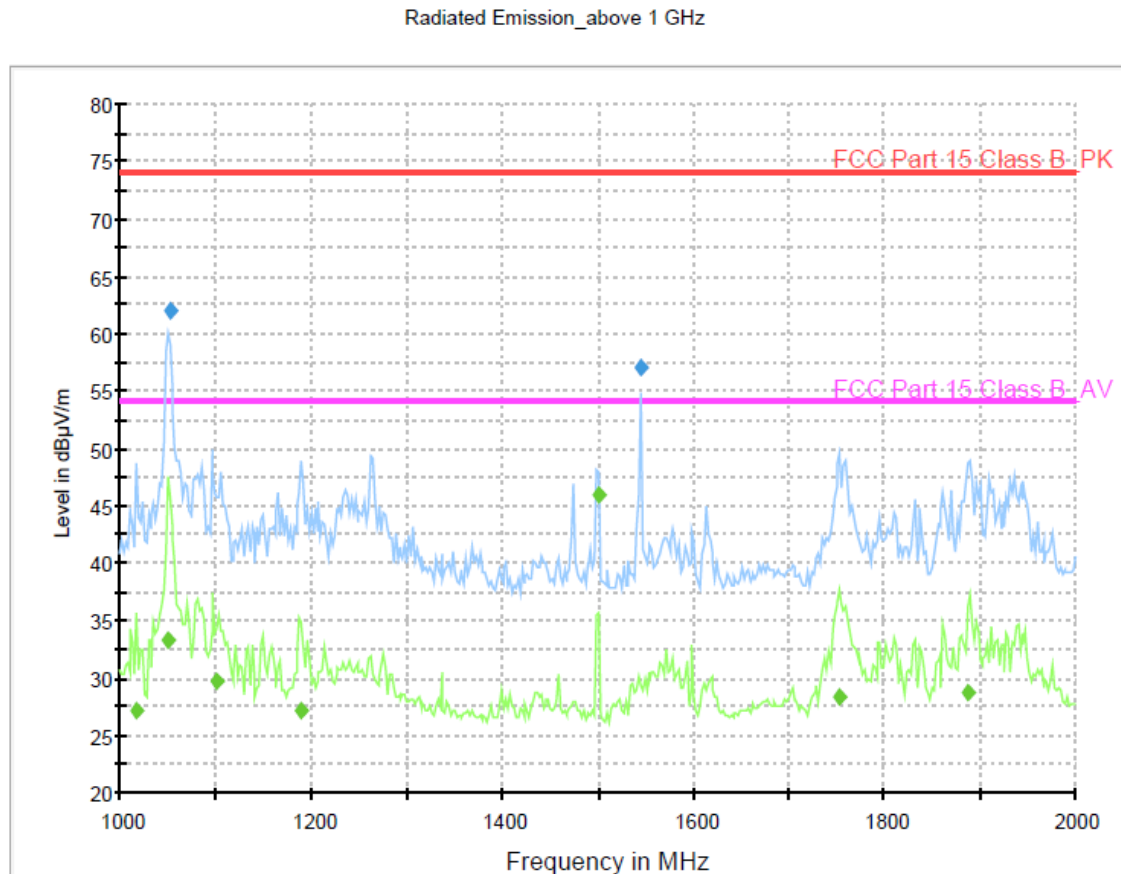
Final Result [1]

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
43.196250	22.9	1000.0	120.000	100.0	V	95.0	12.5	17.06	40.00
72.165000	24.3	1000.0	120.000	100.0	V	142.0	11.0	15.65	40.00
123.086250	25.9	1000.0	120.000	100.0	V	237.0	13.8	17.60	43.50
142.621250	36.2	1000.0	120.000	100.0	V	0.0	14.5	7.28	43.50
213.996250	33.3	1000.0	120.000	120.0	H	284.0	12.5	10.22	43.50
285.413750	34.5	1000.0	120.000	191.0	V	353.0	16.1	11.46	46.00
330.270000	39.8	1000.0	120.000	100.0	V	271.0	17.3	6.25	46.00
668.401250	41.2	1000.0	120.000	100.0	V	47.0	23.1	4.79	46.00
742.526250	41.6	1000.0	120.000	100.0	H	211.0	24.5	4.40	46.00
891.017500	42.0	1000.0	120.000	100.0	H	176.0	27.4	4.00	46.00

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



- ◆ Operating Condition: 1 920 × 1 080 / 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)
1053.500200	61.9	100.0	1000.000	100.0	V	167.0	-15.6	12.1	74.0
1544.490180	57.0	100.0	1000.000	155.0	V	0.0	-14.0	17.0	74.0

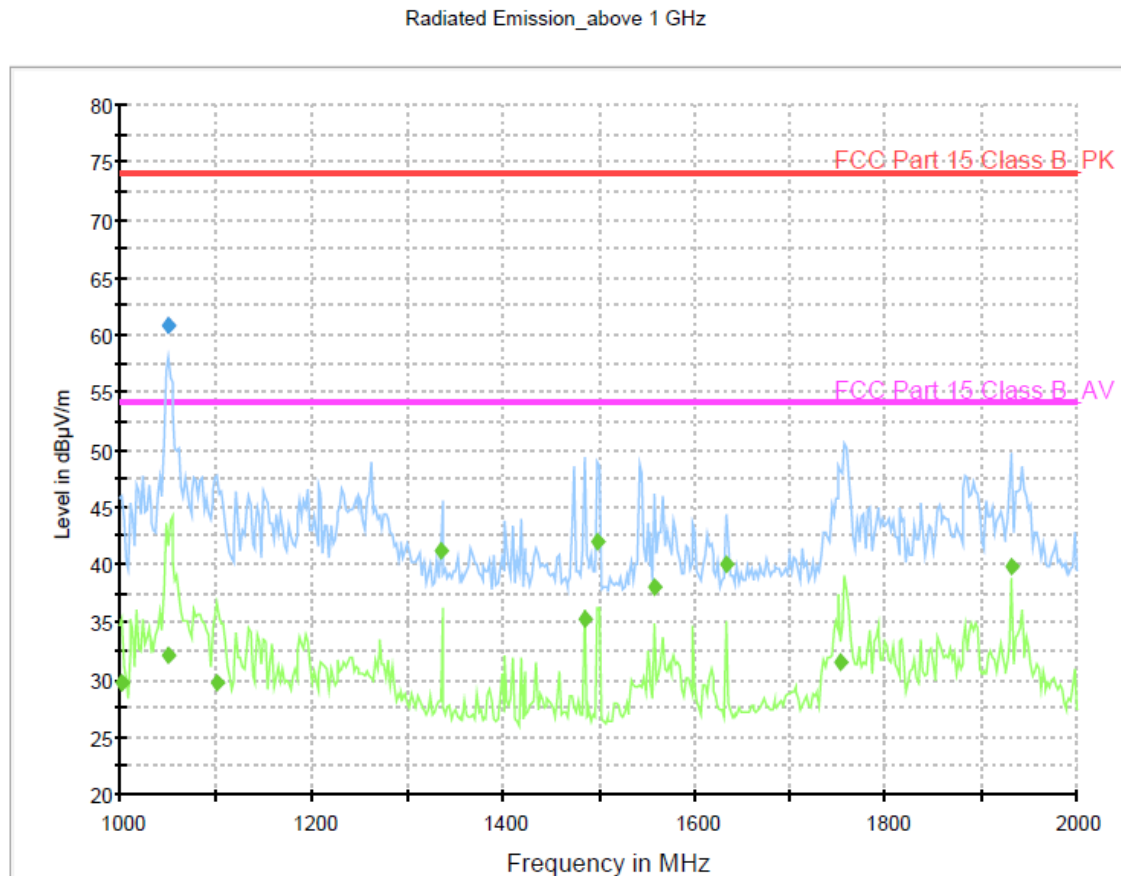
Final Result 2

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1018.236072	27.1	100.0	1000.000	100.0	V	0.0	-15.8	26.9	54.0
1049.900200	33.2	100.0	1000.000	100.0	V	167.0	-15.6	20.8	54.0
1102.396393	29.8	100.0	1000.000	100.0	V	16.0	-15.4	24.2	54.0
1190.176754	27.1	100.0	1000.000	186.0	V	9.0	-15.1	26.9	54.0
1500.002004	46.0	100.0	1000.000	146.0	H	134.0	-14.3	8.0	54.0
1752.107014	28.3	100.0	1000.000	100.0	V	0.0	-13.3	25.7	54.0
1886.779559	28.8	100.0	1000.000	100.0	H	194.0	-13.1	25.2	54.0

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



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (DVI-D: 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)
1050.300200	60.9	100.0	1000.000	100.0	V	180.0	-15.6	13.1	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)
1002.400000	29.7	100.0	1000.000	147.0	V	358.0	-15.9	24.3	54.0
1049.908217	32.1	100.0	1000.000	100.0	V	180.0	-15.6	21.9	54.0
1102.404409	29.6	100.0	1000.000	122.0	V	200.0	-15.4	24.4	54.0
1336.473347	41.1	100.0	1000.000	100.0	H	157.0	-14.4	12.9	54.0
1485.169940	35.2	100.0	1000.000	136.0	H	137.0	-14.3	18.8	54.0
1499.997996	42.0	100.0	1000.000	155.0	H	130.0	-14.3	8.0	54.0
1559.318237	38.1	100.0	1000.000	100.0	V	146.0	-13.9	15.9	54.0
1633.466533	39.9	100.0	1000.000	100.0	V	153.0	-13.6	14.1	54.0
1752.915030	31.5	100.0	1000.000	122.0	H	150.0	-13.3	22.5	54.0
1930.463727	39.9	100.0	1000.000	100.0	H	157.0	-13.0	14.1	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: E2280VV, E2280VXV)** was complies with §15.107 and 15.109 of the FCC Rules.