

FCC EVALUATION REPORT FOR CERTIFICATION

Applicant : LG Electronics Inc.**19-1, Cheongho-ri, Jinwi-myeon,****Pyeongteak-si, Gyeonggi-do, Korea.****Attn: Mr. Do-Hyung Kim, Chief research engineer****Date of Issue : January 5, 2011****Order Number: GETEC-C1-10-269****Test Report Number: GETEC-E3-10-156****Test Site: Gumi College EMC Center****FCC Registration Number: (100749, 443957)****FCC ID. : BEJ55LW9500UA****Applicant : LG Electronics Inc.**

Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: LED LCD TV/Monitor
Type of Authority	: Certification
Model Name	: 55LW9500-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 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**Tae-Sig Park, General Manager**
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.....	22
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. Do-Hyung Kim, Chief research engineer

Tel Number: +82-31-610-9623

- **FCC ID.** BEJ55LW9500UA
- **EUT Type** LED LCD TV/Monitor
- **Model Name** 55LW9500-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** December 23 ~ 28, 2010
- **Place of Test** **Gumi College EMC Center** (FCC Registration Number: 100749, 443957)
407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.
- **Test Report Number** GETEC-E3-10-156
- **Dates of Issue** January 5, 2011



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 TV/Monitor (Model Name: 55LW9500-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)



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 TV/Monitor (Model Name: 55LW9500-UA) FCC ID.: BEJ55LW9500UA**

MODELS		47LW9500 (47LW9500-UA)	55LW9500 (55LW9500-UA)	60LW9500 (60LW9500-UA)
Dimensions (W x H x D)	With stand	1095.2 mm x 734.9 mm x 235.0 mm	1265.0 mm x 831.0 mm x 289.5 mm	1422.8 mm x 943.7 mm x 289.5 mm
	Without stand	1095.2 mm x 664.7 mm x 30.7 mm	1265.0 mm x 760.3 mm x 30.7 mm	1422.8 mm x 880.5 mm x 41.5 mm
Weight	With stand	21.3 kg	24.5 kg	29.6 kg
	Without stand	17.1 kg	19.5 kg	29.6 kg
Power requirement		AC 100 - 240V ~ 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 ohm		
Environment condition	Operating Temperature	0 - 40°C		
	Operating Humidity	Less than 80%		
	Storage Temperature	-20 - 60°C		
	Storage Humidity	Less than 85%		

-. Maximum Frequency Range : 667 MHz



3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID.
PC	Hewlett Packard	D530	S/N: CNG34800PY FCC ID.: DoC
Video card	ATI	ATI RV360(9600)	S/N: SN0402017176 FCC ID.: DoC
PS2 keyboard	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
USB memory stick	LG Electronics Inc.	UM5 2GB	S/N: 003RLRZN37758 FCC ID.: N/A
TV signal generator	FLUKE	54200	S/N: 831011 FCC ID.: DoC
Headset	PHILIPS	SBC HL 140	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.
None	-	-	S/N: - FCC ID.: -



3.2.3 Used Cable(s)

Cable Name	Condition	Description
Power cable	Connected to the EUT	1.80 m unshielded
RGB(Analog) cable	Connected to the EUT and PC	1.80 m shielded with two ferrite cores
HDMI/DVI(Digital) cable	Connected to the EUT and PC	2.00 m shielded
RS-232C(Control & service) cable	Connected to the EUT and PC	1.80 m shielded
Audio(RGB/DVI) cable	Connected to the EUT and PC	1.80 m shielded
Component cable	Connected to the EUT and DVD player	3.00 m shielded
AV cable	Connected to the EUT and DVD player	3.00 m shielded
Headset cable	Connected to the EUT and headset	1.20 m shielded
Antenna cable	Connected to the EUT and TV signal generator	10.00 m shielded
LAN cable	Connected to the EUT and Network	10.00 m unshielded

3.3 Modification Item(s)

- None



4. Description of tests

4.1 Test Condition

The EUT was installed, arranged and operated in a manner that is most representative of equipment as typically used. The measurements were carried out while varying operating modes and cable positions within typically arrangement to determine maximum emission level.

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

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

-. 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
- . Continuous playback of 1 kHz audio file with winamp player
- . Settings and control the display via the network from a PC
- . USB memory stick was connected to the USB port

“The verification report for TV/AV mode would be issued by LG Electronics Inc.”



4.2 Conducted Emission

The Line conducted emission test facility is inside a 4 m × 8 m × 2.5 m shielded enclosure. (FCC Registration No.: 100749)

The EUT was placed on a non-conducting 1.0 m by 1.5 m table, which is 0.8 m in height and 0.4 m away from the vertical wall of the shielded enclosure.

The EUT is powered from the Rohde & Schwarz LISN (ESH2-Z5) and the support equipment is powered from the Rohde & Schwarz LISN (ESH3-Z5). Powers to the LISN are filtered by high-current high insertion loss power line filter.

Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

The RF output of the LISN was connected to the EMI test receiver (Rohde & Schwarz, ESCS30).

The EMI test receiver was scanned from 150 kHz to 30 MHz with 20 ms sweep time to determine the frequency producing the maximum EME from the EUT. The frequency producing the maximum level was re-examined using Quasi-Peak mode of the EMI test receiver.

The bandwidth of Quasi-peak mode was set to 9 kHz. Each emission was maximized consistent with typical applications by varying the configuration of the test sample. Interface cables were connected to the available interface ports of the test unit. The effect of varying the position of cables was investigated to find the configuration that produces maximum diagram emission. Excess cable lengths were bundled at center with 30 cm ~ 40 cm.

Each EME reported was calibrated using the R/S signal generator

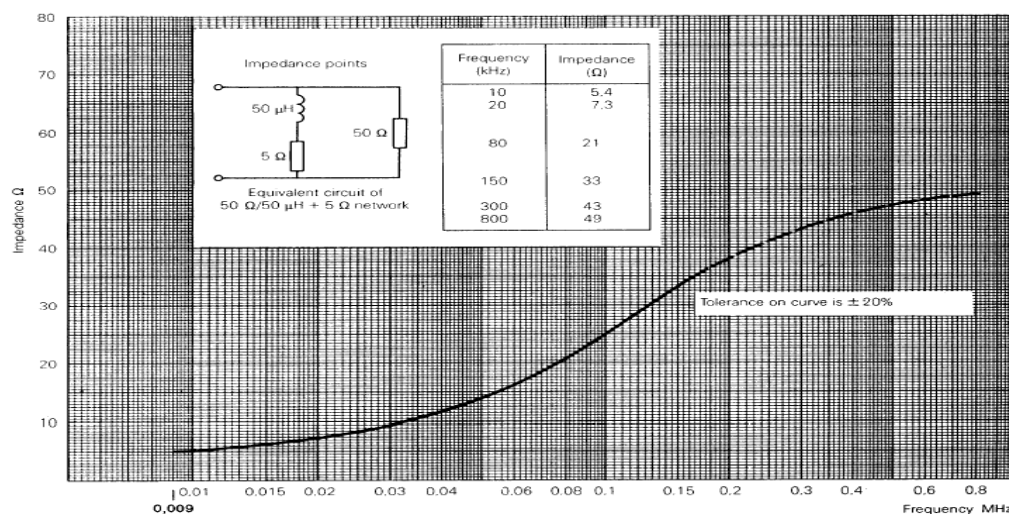


Fig 2. Impedance of LISN



4.3 Radiated Emission

Preliminary measurements were conducted 3 m semi anechoic chamber using broadband antennas to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The technology configuration, mode of operation and turntable azimuth with respect to antenna was note for each frequency found.

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

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during pre-scan measurements was re-examined and investigated using EMI test receiver. The detector function was set to CISPR quasi-peak mode average mode and the bandwidth of the receiver was set to 120 kHz or 1 MHz depending on the frequency or type of signal.

The EUT, support equipment and interconnecting cables were reconfigured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8 m high non-metallic 1.0 m × 1.5 m table.

The turntable containing the test sample was rotated; the antenna height was varied 1 to 4 meter and stopped at the azimuth or height producing the maximum emission.

Each EME reported was calibrated using the R/S signal generator

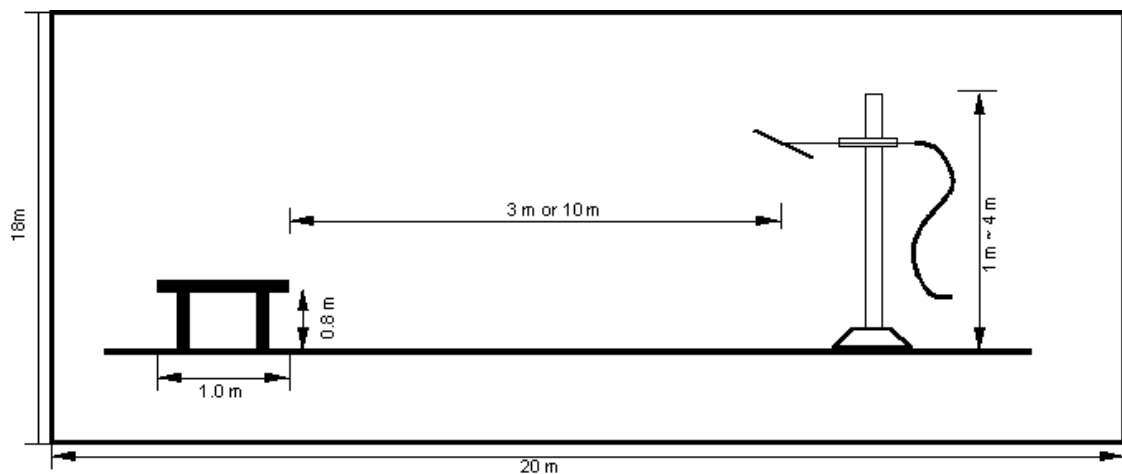


Fig 3. Dimensions of test site



5. Conducted Emission

5.1 Operating Environment

Temperature : 26
Relative Humidity : 38 % R.H.

5.2 Test Set-up

The conducted emission measurements were performed in the shielded room.

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

AMN is bonded on horizontal reference ground plane.

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

5.3 Measurement Uncertainty

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

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

Test Items	Uncertainty	Remark
Conducted emission (9 kHz ~ 150 kHz)	± 2.71 dB	Confidence levels of 95 % ($k = 2$)
Conducted emission (150 kHz ~ 30 MHz)	± 3.34 dB	Confidence levels of 95 % ($k = 2$)



5.4 Limit

RFI Conducted	FCC Limit(dB μ V/m) Class B	
Freq. Range	Quasi-Peak	Average
150 kHz ~ 0.5 MHz	66 ~ 56*	56 ~ 46*
0.5 MHz ~ 5 MHz	56	46
5 MHz ~ 30 MHz	60	50
*Limits decreases linearly with the logarithm of frequency.		

5.5 Test Equipment used

Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESCS30	Rohde & Schwarz	EMI Test Receiver	839809/003	12. 10. 2011
■ - ESH3-Z5	Rohde & Schwarz	LISN	838979/020	12. 10. 2011
■ - ESH2-Z5	Rohde & Schwarz	LISN	829991/009	12. 10. 2011
■ - ISN T8	TESEQ. GmbH	ISN	24568	11. 09. 2011

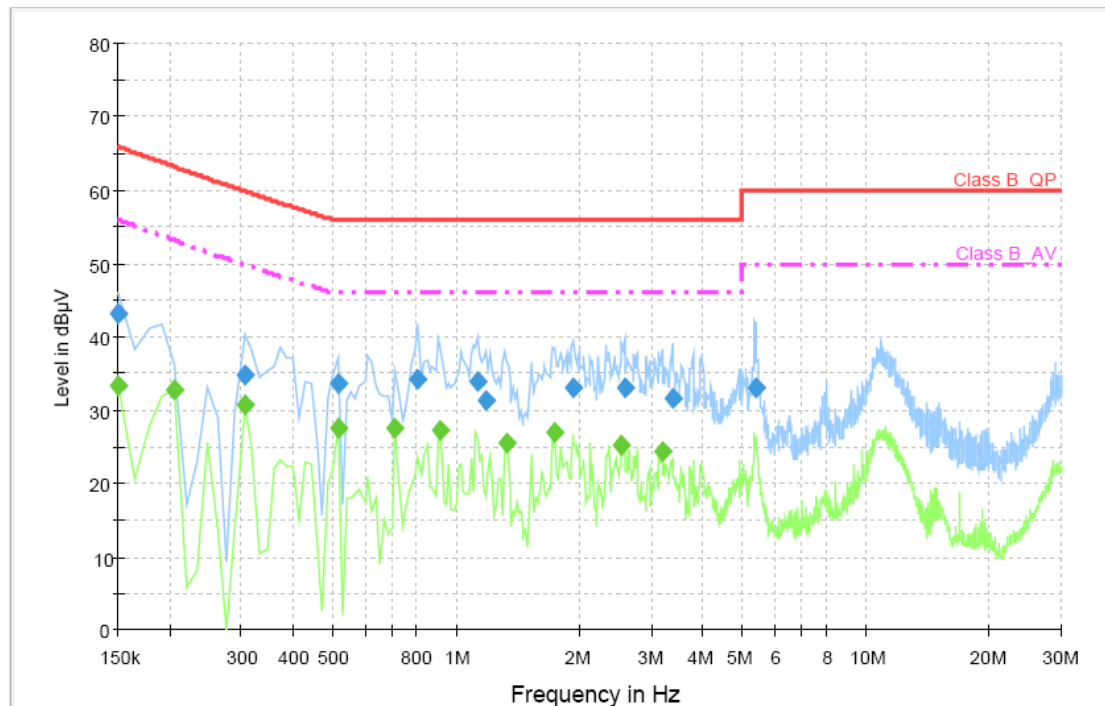
5.6 Test data for Conducted Emission

-. Test Date : December 23, 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	43.3	1000.000	9.000	GND	L1	10.1	22.7	66.0	
0.304000	34.7	1000.000	9.000	GND	L1	10.1	25.2	59.9	
0.514000	33.5	1000.000	9.000	GND	L1	10.1	22.5	56.0	
0.808000	34.3	1000.000	9.000	GND	L1	10.1	21.7	56.0	
1.130000	33.9	1000.000	9.000	GND	L1	10.1	22.1	56.0	
1.186000	31.4	1000.000	9.000	GND	L1	10.1	24.6	56.0	
1.942000	33.0	1000.000	9.000	GND	L1	10.2	23.0	56.0	
2.572000	33.0	1000.000	9.000	GND	L1	10.2	23.0	56.0	
3.370000	31.7	1000.000	9.000	GND	L1	10.3	24.3	56.0	
5.386000	32.9	1000.000	9.000	GND	L1	10.4	27.1	60.0	

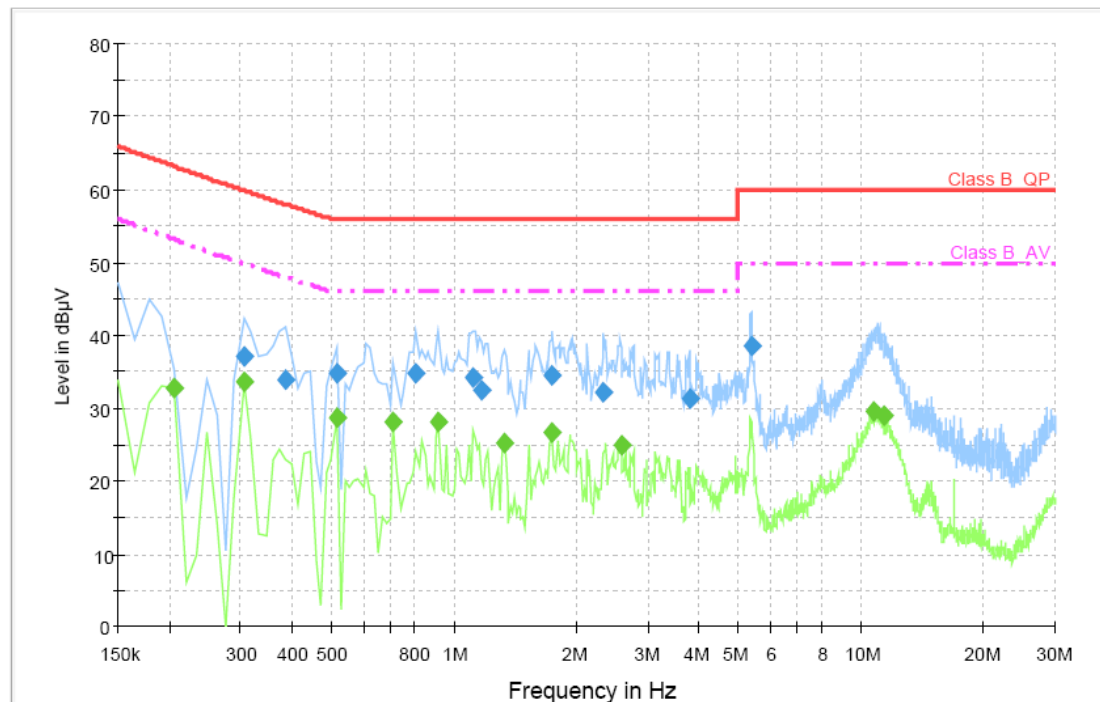
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	33.5	1000.000	9.000	GND	L1	10.1	22.6	56.0	
0.206000	32.7	1000.000	9.000	GND	L1	10.1	20.5	53.2	
0.304000	30.9	1000.000	9.000	GND	L1	10.1	19.0	49.9	
0.514000	27.5	1000.000	9.000	GND	L1	10.1	18.5	46.0	
0.710000	27.5	1000.000	9.000	GND	L1	10.1	18.5	46.0	
0.920000	27.4	1000.000	9.000	GND	L1	10.1	18.6	46.0	
1.326000	25.5	1000.000	9.000	GND	L1	10.1	20.5	46.0	
1.746000	27.1	1000.000	9.000	GND	L1	10.2	18.9	46.0	
2.530000	25.2	1000.000	9.000	GND	L1	10.2	20.8	46.0	
3.188000	24.3	1000.000	9.000	GND	L1	10.2	21.7	46.0	

< 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
0.304000	37.2	1000.000	9.000	GND	N	10.1	22.7	59.9	
0.388000	33.8	1000.000	9.000	GND	N	10.1	24.2	58.0	
0.514000	34.8	1000.000	9.000	GND	N	10.1	21.2	56.0	
0.808000	34.7	1000.000	9.000	GND	N	10.1	21.3	56.0	
1.116000	34.1	1000.000	9.000	GND	N	10.1	21.9	56.0	
1.172000	32.5	1000.000	9.000	GND	N	10.1	23.5	56.0	
1.746000	34.4	1000.000	9.000	GND	N	10.2	21.6	56.0	
2.334000	32.3	1000.000	9.000	GND	N	10.2	23.7	56.0	
3.790000	31.4	1000.000	9.000	GND	N	10.3	24.6	56.0	
5.372000	38.5	1000.000	9.000	GND	N	10.4	21.5	60.0	

Final Measurement Detector 2

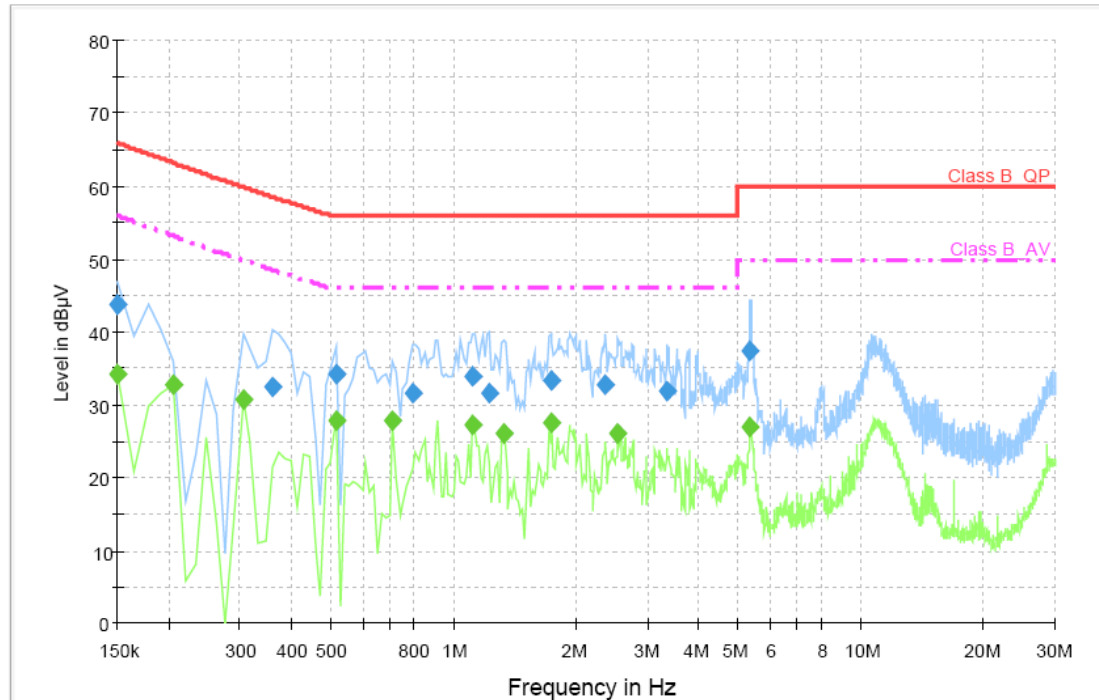
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.206000	32.7	1000.000	9.000	GND	N	10.1	20.5	53.2	
0.304000	33.5	1000.000	9.000	GND	N	10.1	16.4	49.9	
0.514000	28.6	1000.000	9.000	GND	N	10.1	17.4	46.0	
0.710000	28.0	1000.000	9.000	GND	N	10.1	18.0	46.0	
0.920000	28.3	1000.000	9.000	GND	N	10.1	17.7	46.0	
1.326000	25.3	1000.000	9.000	GND	N	10.1	20.7	46.0	
1.746000	26.8	1000.000	9.000	GND	N	10.2	19.2	46.0	
2.572000	24.8	1000.000	9.000	GND	N	10.2	21.2	46.0	
10.734000	29.7	1000.000	9.000	GND	N	10.6	20.3	50.0	
11.448000	29.1	1000.000	9.000	GND	N	10.6	20.9	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	43.7	1000.000	9.000	GND	L1	10.1	22.3	66.0	
0.360000	32.3	1000.000	9.000	GND	L1	10.1	26.3	58.6	
0.514000	34.1	1000.000	9.000	GND	L1	10.1	21.9	56.0	
0.794000	31.5	1000.000	9.000	GND	L1	10.1	24.5	56.0	
1.116000	33.9	1000.000	9.000	GND	L1	10.1	22.1	56.0	
1.228000	31.6	1000.000	9.000	GND	L1	10.1	24.4	56.0	
1.732000	33.2	1000.000	9.000	GND	L1	10.2	22.8	56.0	
2.362000	32.7	1000.000	9.000	GND	L1	10.2	23.3	56.0	
3.342000	31.8	1000.000	9.000	GND	L1	10.3	24.2	56.0	
5.358000	37.3	1000.000	9.000	GND	L1	10.4	22.7	60.0	

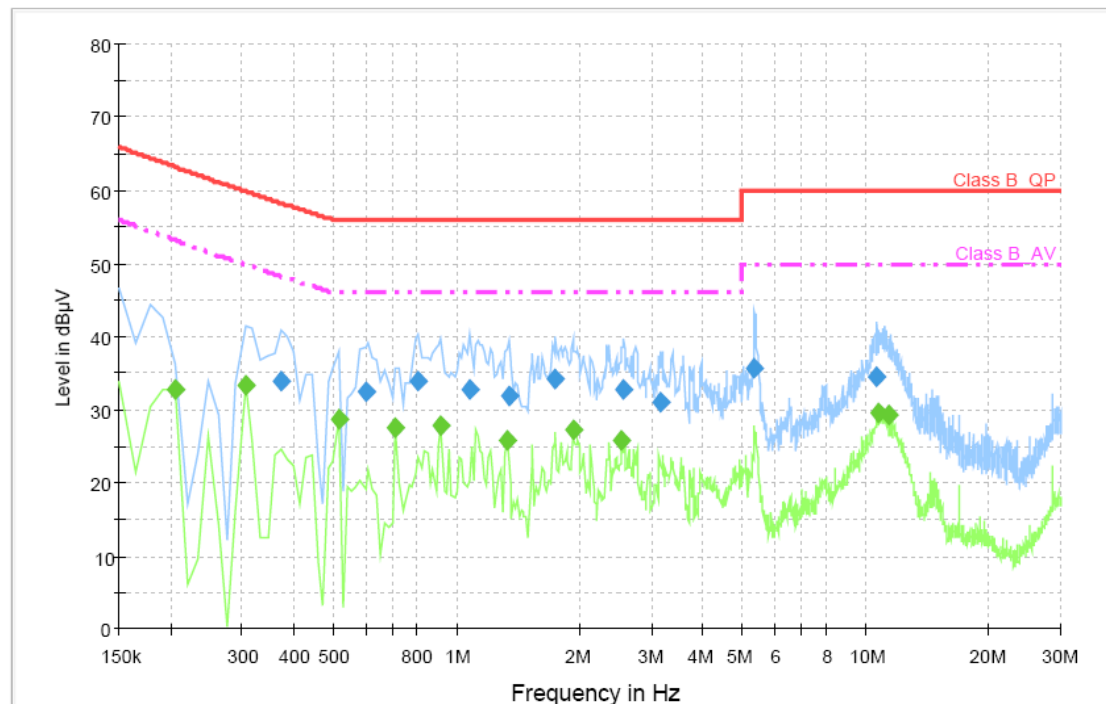
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	34.1	1000.000	9.000	GND	L1	10.1	21.9	56.0	
0.206000	32.8	1000.000	9.000	GND	L1	10.1	20.4	53.2	
0.304000	30.9	1000.000	9.000	GND	L1	10.1	19.0	49.9	
0.514000	28.0	1000.000	9.000	GND	L1	10.1	18.0	46.0	
0.710000	27.8	1000.000	9.000	GND	L1	10.1	18.2	46.0	
1.116000	27.3	1000.000	9.000	GND	L1	10.1	18.7	46.0	
1.326000	26.0	1000.000	9.000	GND	L1	10.1	20.0	46.0	
1.746000	27.5	1000.000	9.000	GND	L1	10.2	18.5	46.0	
2.530000	26.0	1000.000	9.000	GND	L1	10.2	20.0	46.0	
5.358000	27.1	1000.000	9.000	GND	L1	10.4	22.9	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
0.374000	33.9	1000.000	9.000	GND	N	10.1	24.4	58.3	
0.598000	32.5	1000.000	9.000	GND	N	10.1	23.5	56.0	
0.808000	34.0	1000.000	9.000	GND	N	10.1	22.0	56.0	
1.074000	32.7	1000.000	9.000	GND	N	10.1	23.3	56.0	
1.340000	31.9	1000.000	9.000	GND	N	10.1	24.1	56.0	
1.746000	34.2	1000.000	9.000	GND	N	10.2	21.8	56.0	
2.558000	32.9	1000.000	9.000	GND	N	10.2	23.1	56.0	
3.160000	30.9	1000.000	9.000	GND	N	10.2	25.1	56.0	
5.358000	35.6	1000.000	9.000	GND	N	10.4	24.4	60.0	
10.678000	34.5	1000.000	9.000	GND	N	10.6	25.5	60.0	

Final Measurement Detector 2

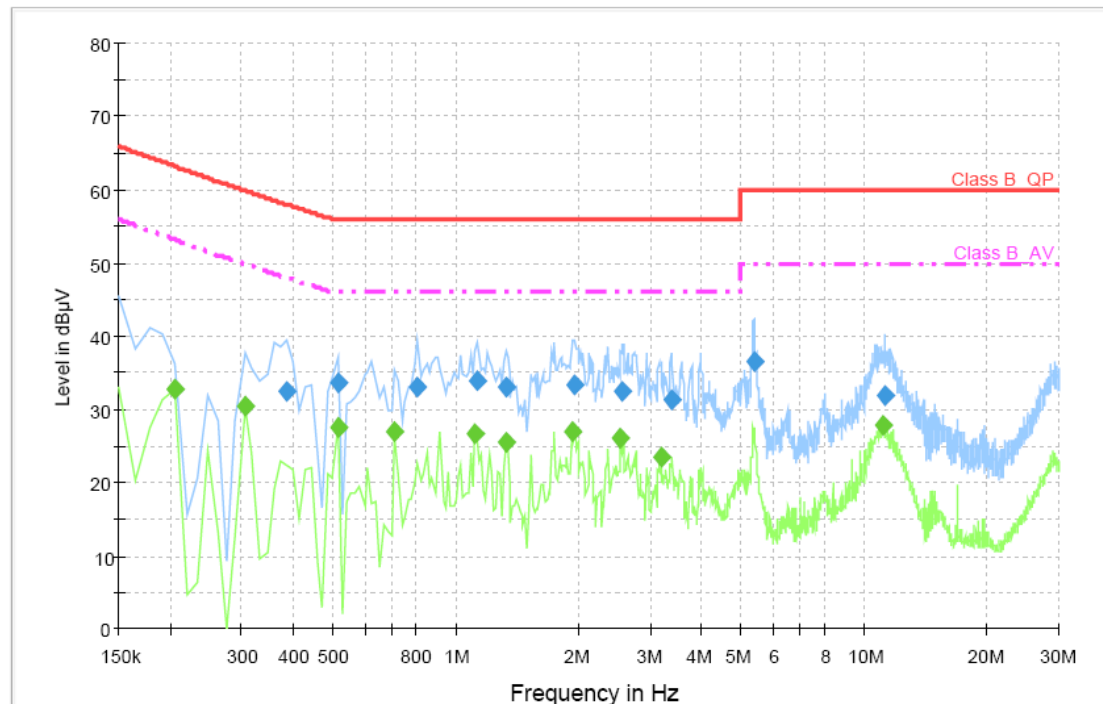
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.206000	32.6	1000.000	9.000	GND	N	10.1	20.6	53.2	
0.304000	33.3	1000.000	9.000	GND	N	10.1	16.6	49.9	
0.514000	28.7	1000.000	9.000	GND	N	10.1	17.3	46.0	
0.710000	27.6	1000.000	9.000	GND	N	10.1	18.4	46.0	
0.920000	27.9	1000.000	9.000	GND	N	10.1	18.1	46.0	
1.326000	25.8	1000.000	9.000	GND	N	10.1	20.2	46.0	
1.928000	27.3	1000.000	9.000	GND	N	10.2	18.7	46.0	
2.530000	25.9	1000.000	9.000	GND	N	10.2	20.1	46.0	
10.804000	29.5	1000.000	9.000	GND	N	10.6	20.6	50.0	
11.336000	29.3	1000.000	9.000	GND	N	10.6	20.7	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
0.388000	32.3	1000.000	9.000	GND	L1	10.1	25.7	58.0	
0.514000	33.6	1000.000	9.000	GND	L1	10.1	22.4	56.0	
0.808000	32.9	1000.000	9.000	GND	L1	10.1	23.1	56.0	
1.130000	33.8	1000.000	9.000	GND	L1	10.1	22.2	56.0	
1.326000	33.2	1000.000	9.000	GND	L1	10.1	22.8	56.0	
1.956000	33.5	1000.000	9.000	GND	L1	10.2	22.5	56.0	
2.558000	32.5	1000.000	9.000	GND	L1	10.2	23.5	56.0	
3.370000	31.3	1000.000	9.000	GND	L1	10.3	24.7	56.0	
5.372000	36.4	1000.000	9.000	GND	L1	10.4	23.6	60.0	
11.224000	32.0	1000.000	9.000	GND	L1	10.7	28.0	60.0	

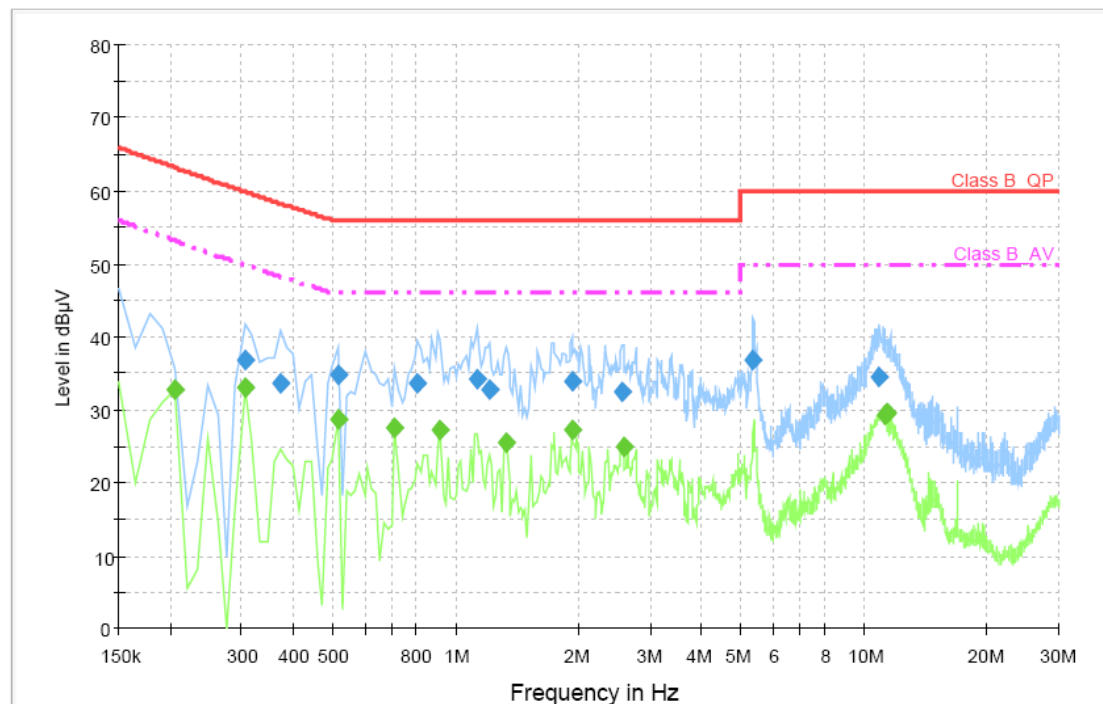
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.206000	32.7	1000.000	9.000	GND	L1	10.1	20.5	53.2	
0.304000	30.4	1000.000	9.000	GND	L1	10.1	19.5	49.9	
0.514000	27.5	1000.000	9.000	GND	L1	10.1	18.5	46.0	
0.710000	26.9	1000.000	9.000	GND	L1	10.1	19.1	46.0	
1.116000	26.8	1000.000	9.000	GND	L1	10.1	19.2	46.0	
1.326000	25.6	1000.000	9.000	GND	L1	10.1	20.4	46.0	
1.928000	27.0	1000.000	9.000	GND	L1	10.2	19.0	46.0	
2.530000	26.0	1000.000	9.000	GND	L1	10.2	20.0	46.0	
3.188000	23.4	1000.000	9.000	GND	L1	10.2	22.6	46.0	
11.070000	27.9	1000.000	9.000	GND	L1	10.6	22.1	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
0.304000	36.8	1000.000	9.000	GND	N	10.1	23.1	59.9	
0.374000	33.5	1000.000	9.000	GND	N	10.1	24.8	58.3	
0.514000	34.7	1000.000	9.000	GND	N	10.1	21.3	56.0	
0.808000	33.6	1000.000	9.000	GND	N	10.1	22.4	56.0	
1.130000	34.3	1000.000	9.000	GND	N	10.1	21.7	56.0	
1.214000	32.7	1000.000	9.000	GND	N	10.1	23.3	56.0	
1.928000	34.0	1000.000	9.000	GND	N	10.2	22.0	56.0	
2.558000	32.5	1000.000	9.000	GND	N	10.2	23.5	56.0	
5.358000	36.8	1000.000	9.000	GND	N	10.4	23.2	60.0	
10.930000	34.6	1000.000	9.000	GND	N	10.6	25.4	60.0	

Final Measurement Detector 2

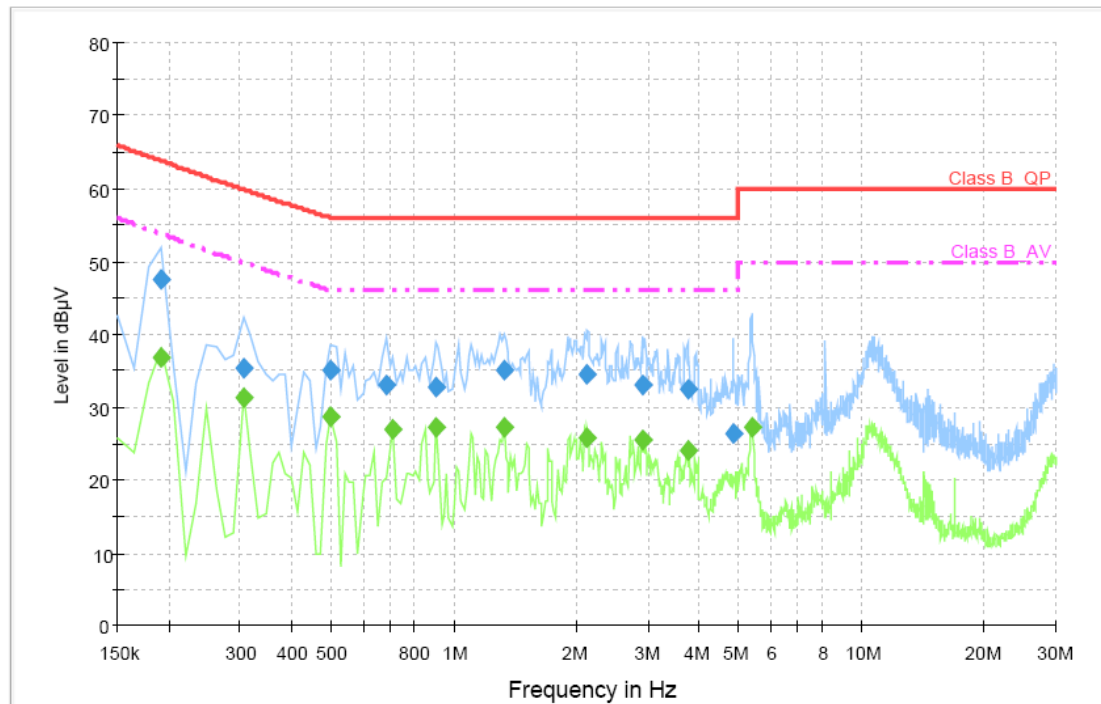
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.206000	32.6	1000.000	9.000	GND	N	10.1	20.6	53.2	
0.304000	33.0	1000.000	9.000	GND	N	10.1	16.9	49.9	
0.514000	28.6	1000.000	9.000	GND	N	10.1	17.4	46.0	
0.710000	27.5	1000.000	9.000	GND	N	10.1	18.5	46.0	
0.920000	27.2	1000.000	9.000	GND	N	10.1	18.8	46.0	
1.326000	25.5	1000.000	9.000	GND	N	10.1	20.5	46.0	
1.928000	27.2	1000.000	9.000	GND	N	10.2	18.8	46.0	
2.572000	24.9	1000.000	9.000	GND	N	10.2	21.1	46.0	
11.280000	29.3	1000.000	9.000	GND	N	10.6	20.7	50.0	
11.406000	29.7	1000.000	9.000	GND	N	10.6	20.3	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
0.192000	47.7	1000.000	9.000	GND	L1	10.1	16.1	63.8	
0.304000	35.5	1000.000	9.000	GND	L1	10.1	24.4	59.9	
0.500000	35.0	1000.000	9.000	GND	L1	10.1	21.0	56.0	
0.682000	32.9	1000.000	9.000	GND	L1	10.1	23.1	56.0	
0.906000	32.9	1000.000	9.000	GND	L1	10.1	23.1	56.0	
1.326000	35.2	1000.000	9.000	GND	L1	10.1	20.8	56.0	
2.124000	34.6	1000.000	9.000	GND	L1	10.2	21.4	56.0	
2.894000	33.2	1000.000	9.000	GND	L1	10.2	22.8	56.0	
3.748000	32.4	1000.000	9.000	GND	L1	10.3	23.6	56.0	
4.868000	26.2	1000.000	9.000	GND	L1	10.3	29.8	56.0	

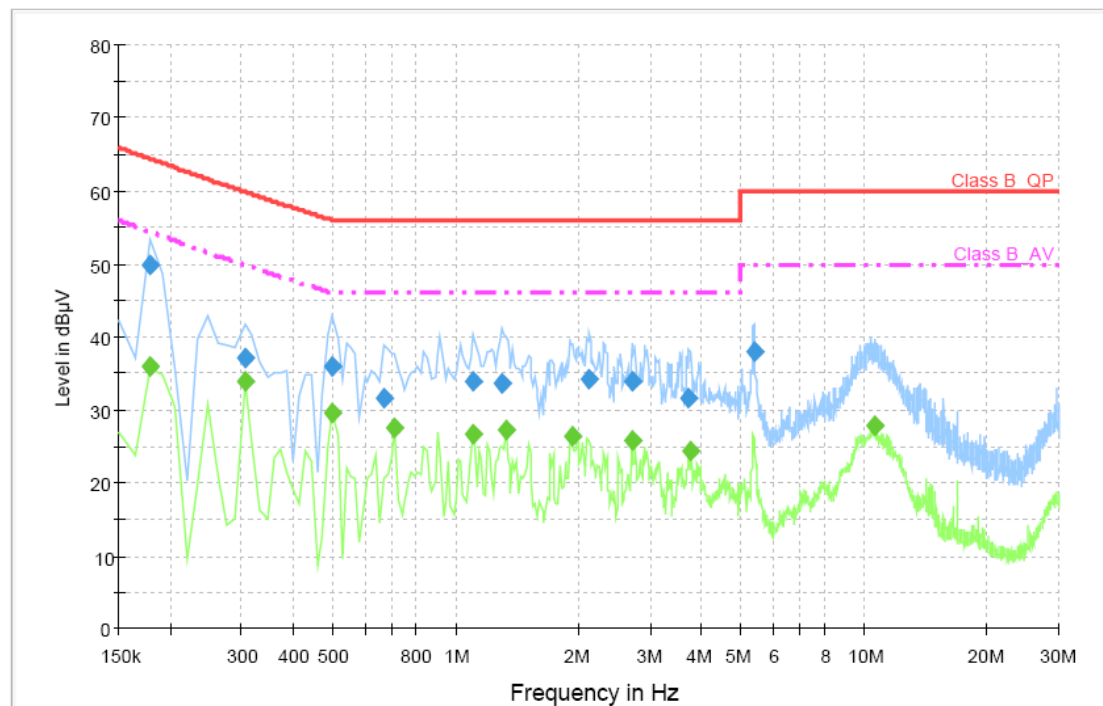
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.192000	36.8	1000.000	9.000	GND	L1	10.1	17.0	53.8	
0.304000	31.4	1000.000	9.000	GND	L1	10.1	18.5	49.9	
0.500000	28.8	1000.000	9.000	GND	L1	10.1	17.2	46.0	
0.710000	27.1	1000.000	9.000	GND	L1	10.1	18.9	46.0	
0.906000	27.3	1000.000	9.000	GND	L1	10.1	18.7	46.0	
1.326000	27.2	1000.000	9.000	GND	L1	10.1	18.8	46.0	
2.124000	25.9	1000.000	9.000	GND	L1	10.2	20.1	46.0	
2.894000	25.6	1000.000	9.000	GND	L1	10.2	20.4	46.0	
3.776000	24.2	1000.000	9.000	GND	L1	10.3	21.8	46.0	
5.372000	27.2	1000.000	9.000	GND	L1	10.4	22.8	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
0.178000	50.0	1000.000	9.000	GND	N	10.1	14.5	64.5	
0.304000	37.1	1000.000	9.000	GND	N	10.1	22.8	59.9	
0.500000	36.0	1000.000	9.000	GND	N	10.1	20.0	56.0	
0.668000	31.7	1000.000	9.000	GND	N	10.1	24.3	56.0	
1.102000	34.0	1000.000	9.000	GND	N	10.1	22.0	56.0	
1.298000	33.7	1000.000	9.000	GND	N	10.1	22.3	56.0	
2.124000	34.1	1000.000	9.000	GND	N	10.2	21.9	56.0	
2.698000	33.9	1000.000	9.000	GND	N	10.2	22.1	56.0	
3.734000	31.5	1000.000	9.000	GND	N	10.3	24.5	56.0	
5.372000	38.1	1000.000	9.000	GND	N	10.4	21.9	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.178000	36.0	1000.000	9.000	GND	N	10.1	18.5	54.5	
0.304000	33.8	1000.000	9.000	GND	N	10.1	16.1	49.9	
0.500000	29.7	1000.000	9.000	GND	N	10.1	16.3	46.0	
0.710000	27.5	1000.000	9.000	GND	N	10.1	18.5	46.0	
1.102000	26.7	1000.000	9.000	GND	N	10.1	19.3	46.0	
1.326000	27.2	1000.000	9.000	GND	N	10.1	18.8	46.0	
1.928000	26.5	1000.000	9.000	GND	N	10.2	19.5	46.0	
2.698000	25.9	1000.000	9.000	GND	N	10.2	20.1	46.0	
3.776000	24.3	1000.000	9.000	GND	N	10.3	21.7	46.0	
10.608000	27.8	1000.000	9.000	GND	N	10.6	22.2	50.0	

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



6. Radiated Emission

6.1 Operating Environment

Temperature : 26
Relative Humidity : 43 % 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

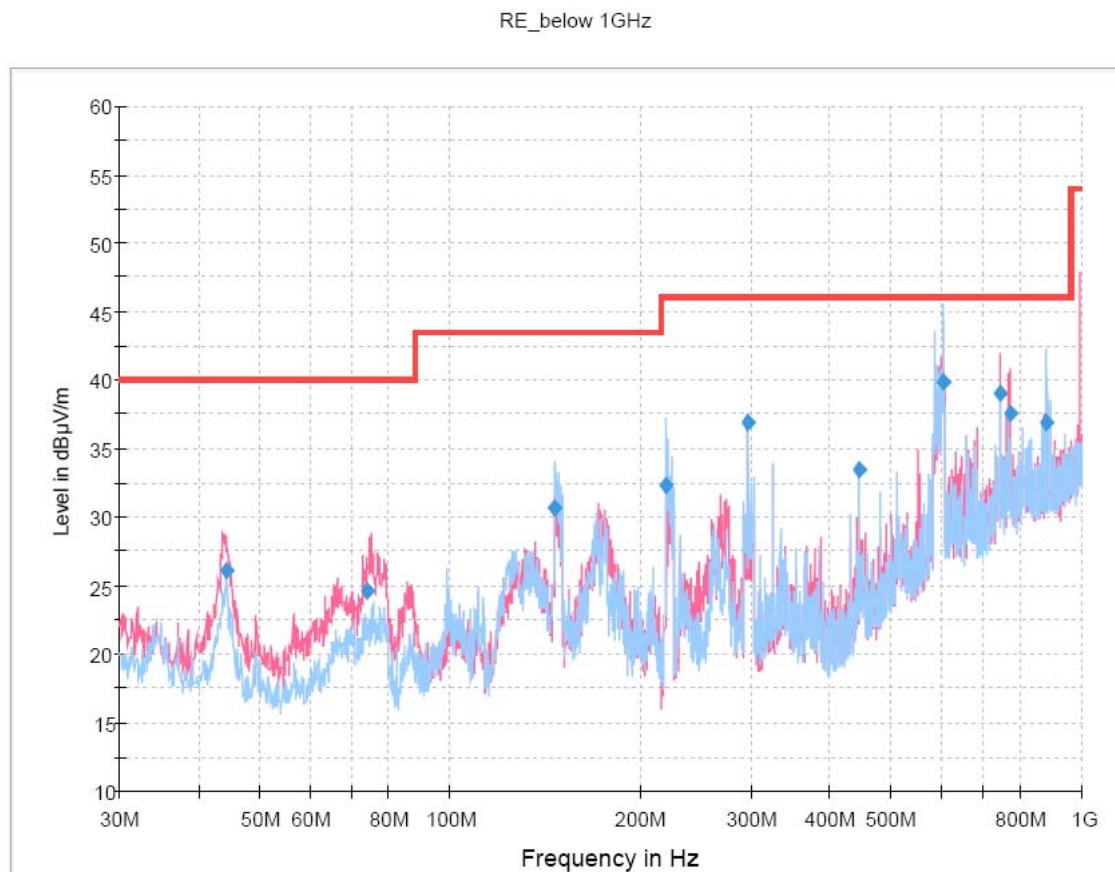
Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESIB26	Rohde & Schwarz	EMI Test Receiver	830482/010	12. 11. 2011
■ - VULB9160	Schwarzbeck	Broadband Test Antenna	3193	03. 15. 2012
■ - BBHA9120D	Schwarzbeck	Horn ANT	207	12. 22. 2011
■ - MCU066	maturo GmbH	Position Controller	1390306	N/A
■ - TT2.5SI	maturo GmbH	Turntable	1390307	N/A
■ - AM 4.0	maturo GmbH	Antenna Mast	1390308	N/A
■ - AFS 44 00101800-25-10P-44	MITEQ	Preamplifier	1258943	11. 12. 2011

6.6 Test data for Radiated Emission

- Test Date : December 24, 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 (667 MHz). The measurement was made up to 5 000 MHz



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



Final Result 1

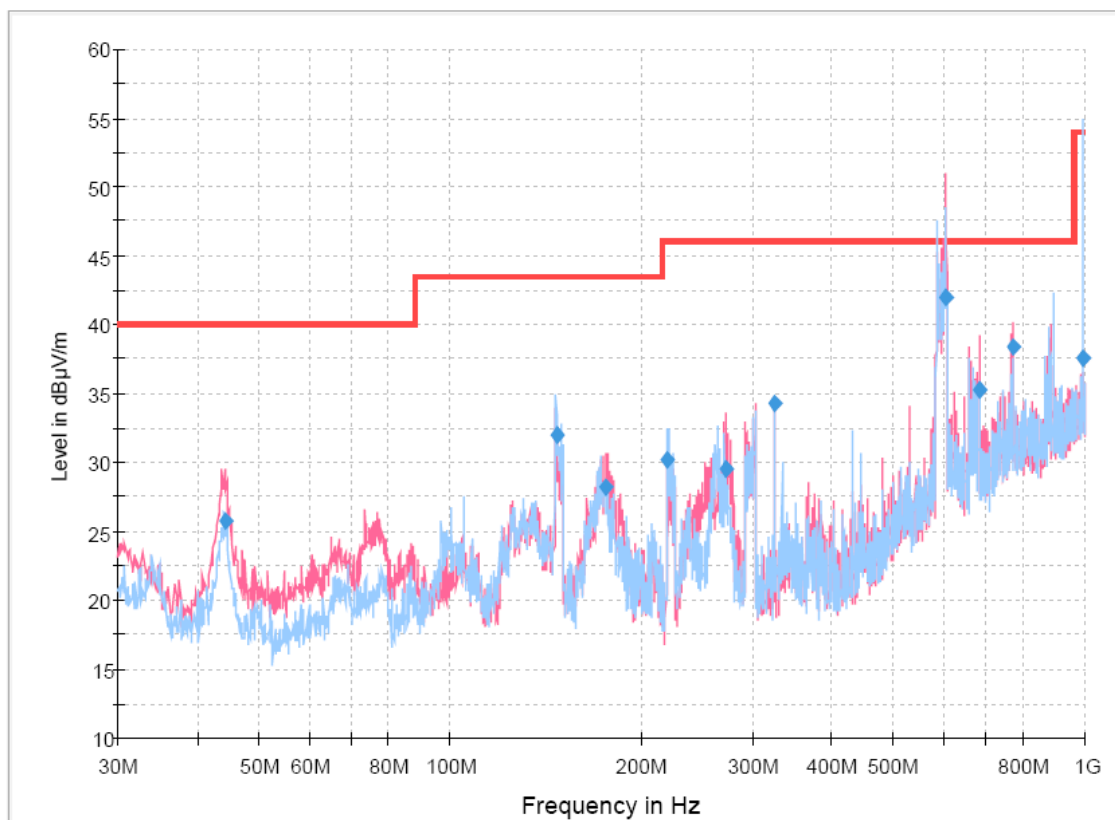
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
44.245000	26.0	1000.0	120.000	113.0	V	32.0	12.5	14.00	40.00
73.925000	24.5	1000.0	120.000	100.0	V	181.0	10.6	15.50	40.00
146.465000	30.7	1000.0	120.000	181.0	H	277.0	14.8	12.80	43.50
220.180000	32.2	1000.0	120.000	181.0	H	132.0	12.8	13.80	46.00
296.972500	36.9	1000.0	120.000	100.0	V	220.0	16.7	9.10	46.00
445.463750	33.5	1000.0	120.000	181.0	H	211.0	19.7	12.50	46.00
603.426250	39.9	1000.0	120.000	100.0	H	0.0	25.1	6.10	46.00
742.485000	39.0	1000.0	120.000	100.0	V	339.0	27.6	7.00	46.00
770.697500	37.6	1000.0	120.000	100.0	V	32.0	28.2	8.40	46.00
880.475000	36.8	1000.0	120.000	200.0	H	68.0	29.6	9.20	46.00

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



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

RE_below 1GHz



Final Result 1

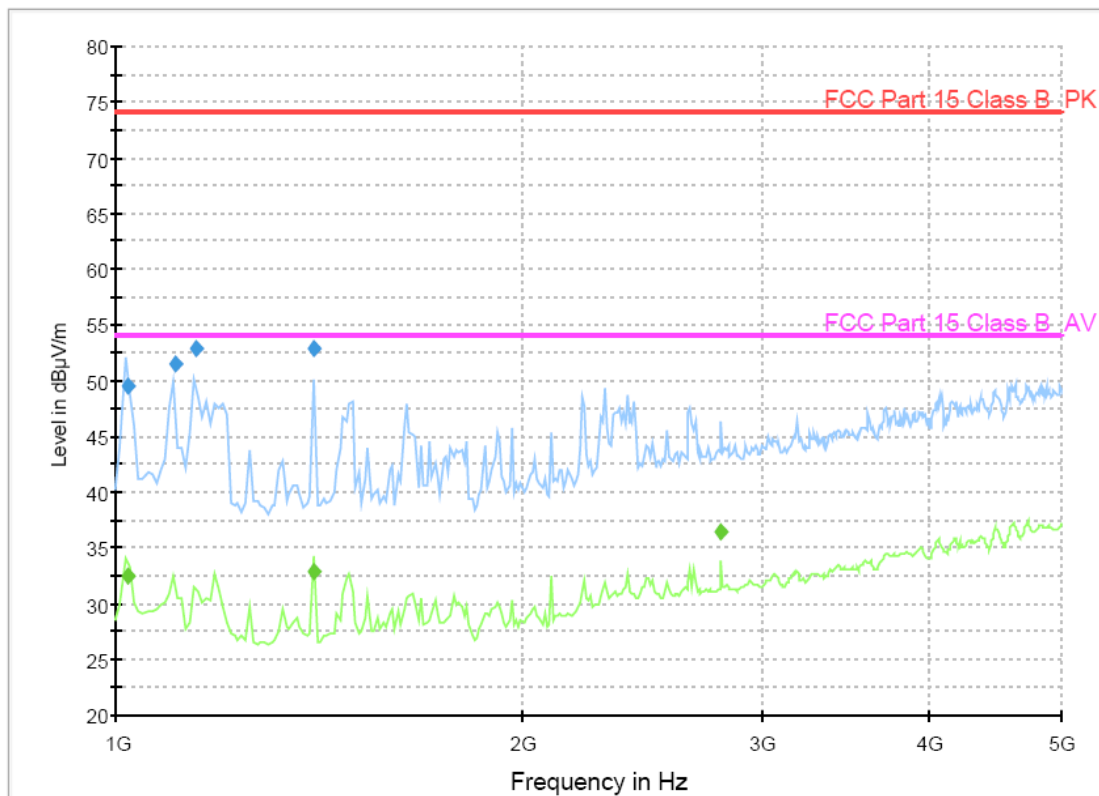
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
44.282500	25.8	1000.0	120.000	113.0	V	68.0	12.5	14.20	40.00
146.981250	32.0	1000.0	120.000	181.0	H	277.0	14.8	11.50	43.50
175.608750	28.1	1000.0	120.000	100.0	V	80.0	13.7	15.40	43.50
220.223750	30.2	1000.0	120.000	180.0	H	137.0	12.8	15.80	46.00
272.797500	29.4	1000.0	120.000	200.0	V	30.0	15.5	16.60	46.00
324.011250	34.2	1000.0	120.000	100.0	V	169.0	17.2	11.80	46.00
603.587500	42.0	1000.0	120.000	103.0	V	0.0	25.1	4.00	46.00
680.048750	35.2	1000.0	120.000	200.0	V	353.0	26.3	10.80	46.00
770.860000	38.4	1000.0	120.000	103.0	V	30.0	28.2	7.60	46.00
990.563750	37.6	1000.0	120.000	200.0	H	33.0	31.5	16.40	54.00

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



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

Radiated Emission_above 1 GHz



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)
1020.632064	49.5	100.0	1000.000	100.0	V	215.0	-14.3	24.5	74.0
1108.008417	51.6	100.0	1000.000	100.0	V	132.0	-14.0	22.4	74.0
1147.688577	52.9	100.0	1000.000	113.0	V	162.0	-13.9	21.1	74.0
1401.401603	52.8	100.0	1000.000	249.0	H	219.0	-13.2	21.2	74.0

Final Result 2

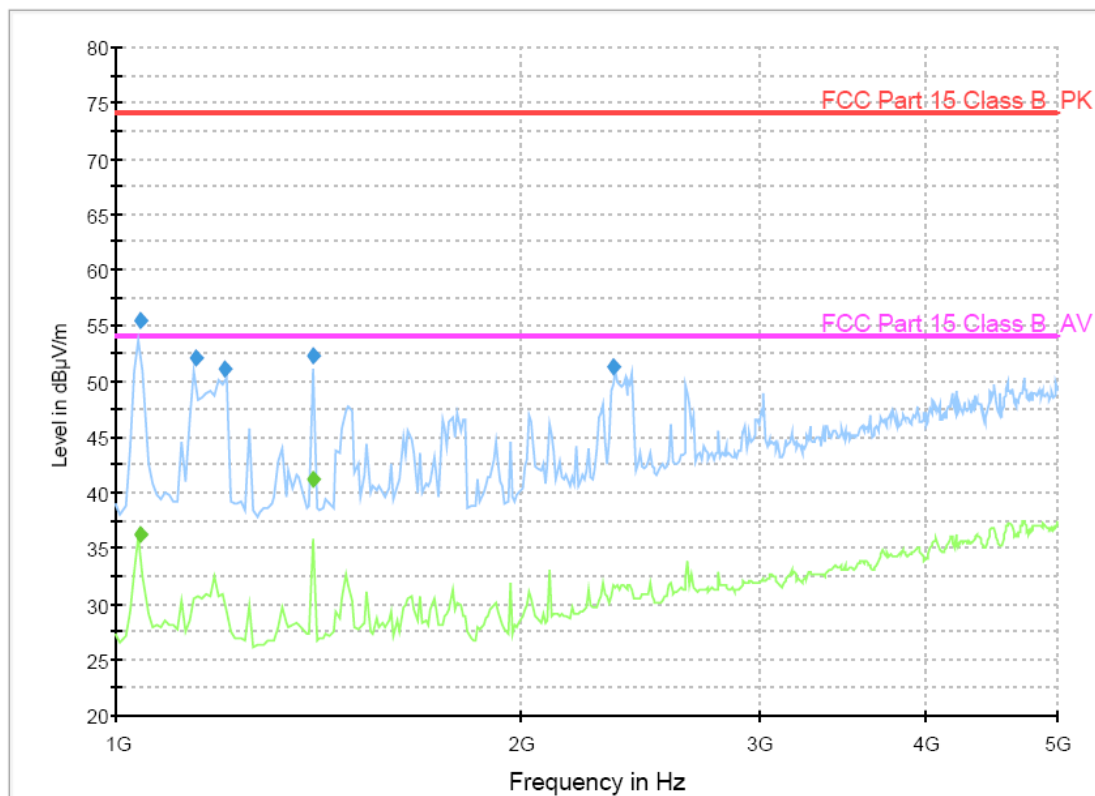
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1021.032064	32.4	100.0	1000.000	100.0	V	215.0	-14.3	21.6	54.0
1401.401603	32.9	100.0	1000.000	147.0	V	198.0	-13.2	21.1	54.0
2803.007214	36.5	100.0	1000.000	141.0	H	225.0	-8.1	17.5	54.0

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



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (HDMI/DVI: Digital)
Green trace: Average detector, Blue trace: Peak detector

Radiated Emission_above 1 GHz



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)
1043.080160	55.5	100.0	1000.000	100.0	V	226.0	-14.3	18.5	74.0
1148.888577	52.0	100.0	1000.000	113.0	V	165.0	-13.9	22.0	74.0
1204.216834	51.1	100.0	1000.000	100.0	V	359.0	-13.7	22.9	74.0
1401.401603	52.4	100.0	1000.000	181.0	H	226.0	-13.2	21.6	74.0
2342.893387	51.3	100.0	1000.000	100.0	V	152.0	-10.1	22.7	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)
1043.480160	36.3	100.0	1000.000	100.0	V	226.0	-14.3	17.7	54.0
1401.401603	41.3	100.0	1000.000	188.0	H	226.0	-13.2	12.8	54.0

< Fig 15. Radiated emission result (1 000 MHz ~ 5 000 MHz) >



7. Sample Calculations

$$\begin{aligned} \text{dB}\mu\text{V} &= 20 \text{ Log}_{10}(\mu\text{V}/\text{m}) \\ \text{dB}\mu\text{V} &= \text{dBm} + 107 \\ \mu\text{V} &= 10^{(\text{dB}\mu\text{V}/20)} \end{aligned}$$

7.1 Example 1 :

■ 20.3 MHz

Class B Limit	= 250 μV = 48 dB μV
Reading	= 39.2 dB μV
$10^{(39.2\text{dB}\mu\text{V}/20)}$	= 91.2 μV
Margin	= 48 dB μV - 39.2 dB μV = 8.8 dB

7.2 Example 2 :

■ 66.7 MHz

Class B Limit	= 100 $\mu\text{V}/\text{m}$ = 40.0 dB $\mu\text{V}/\text{m}$
Reading	= 31.0 dB μV
Antenna Factor + Cable Loss = 5.8 dB	
Total	= 36.8 dB $\mu\text{V}/\text{m}$
Margin	= 40.0 dB $\mu\text{V}/\text{m}$ – 36.8 dB $\mu\text{V}/\text{m}$ = 3.2 dB



8. Recommendation & Conclusion

The data collected shows that the **LG Electronics Inc. LED LCD TV/Monitor (Model Name: 55LW9500-UA)** was complies with §15.107 and 15.109 of the FCC Rules.