



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-C1-10-268

Test Report Number: GETEC-E3-10-155

Test Site: Gumi College EMC Center

FCC Registration Number: (100749, 443957)

FCC ID. : BEJ47LW9500UA

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	: 47LW9500-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 Engineer
GUMI College EMC center



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Scope: Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and / or unintentional radiators for compliance with technical rules and regulations of the Federal Communications Commission.

1. General Information

Applicant: LG Electronics Inc.

Applicant Address: 19-1, Cheongho-ri, Jinwi-myeon, Pyeongteak-si, Gyeonggi-do, Korea.

Manufacturer: LG Electronics Inc.

Manufacturer Address: 19-1, Cheongho-ri, Jinwi-myeon, Pyeongteak-si, Gyeonggi-do, Korea.

Contact Person: Mr. Do-Hyung Kim, Chief research engineer

Tel Number: +82-31-610-9623

- **FCC ID.** BEJ47LW9500UA
- **EUT Type** LED LCD TV/Monitor
- **Model Name** 47LW9500-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 24 ~ 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-E3-10-155
- **Dates of Issue** January 5, 2011



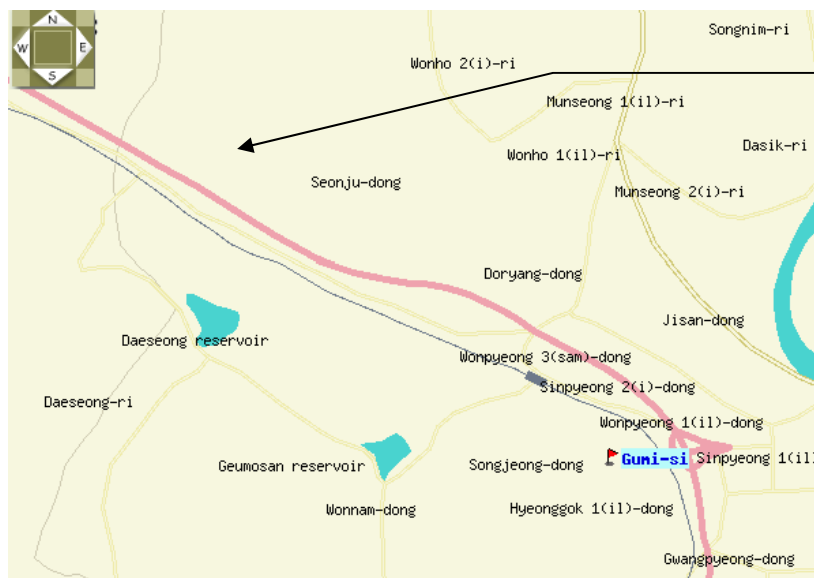
2. Introduction

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: 47LW9500-UA)**

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

The site address is 407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.

This test site is one of the highest point of Gumi 1 college at about 200 km away from Seoul city and 40 km away from Daegu city. It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures. The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.4 (2003)



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



3. Product Information

3.1 Description of EUT

The Equipment under Test (EUT) is the **LG Electronics Inc. LED LCD TV/Monitor (Model Name: 47LW9500-UA) FCC ID.: BEJ47LW9500UA**

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

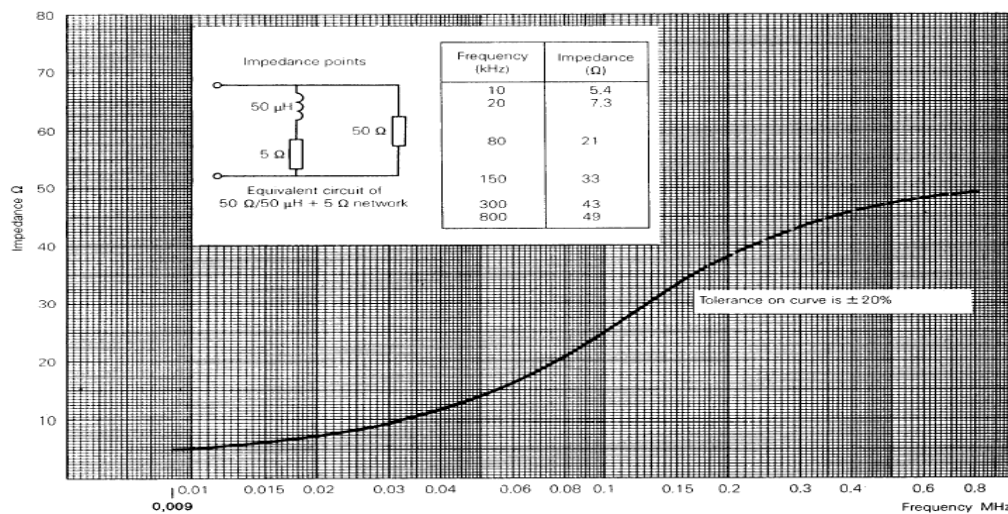


Fig 2. Impedance of LISN



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

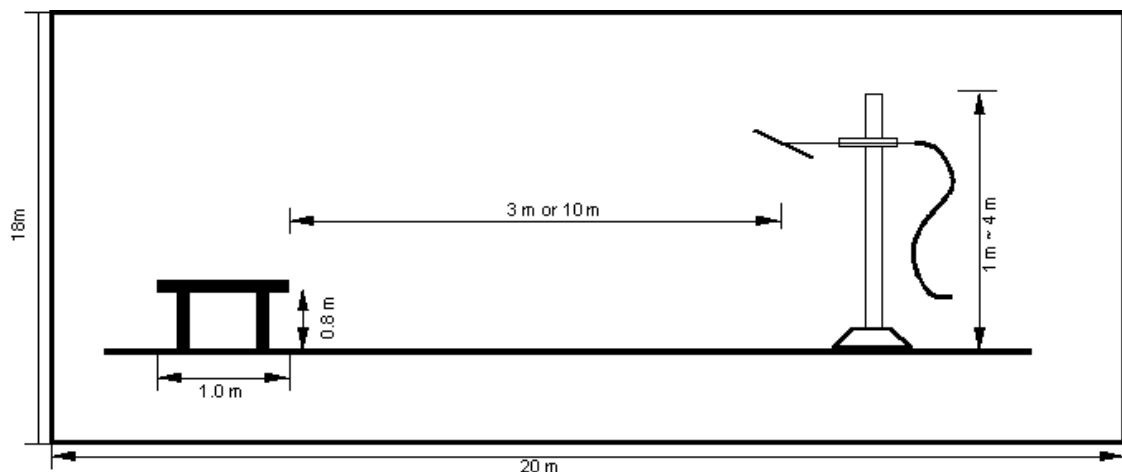


Fig 3. Dimensions of test site



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

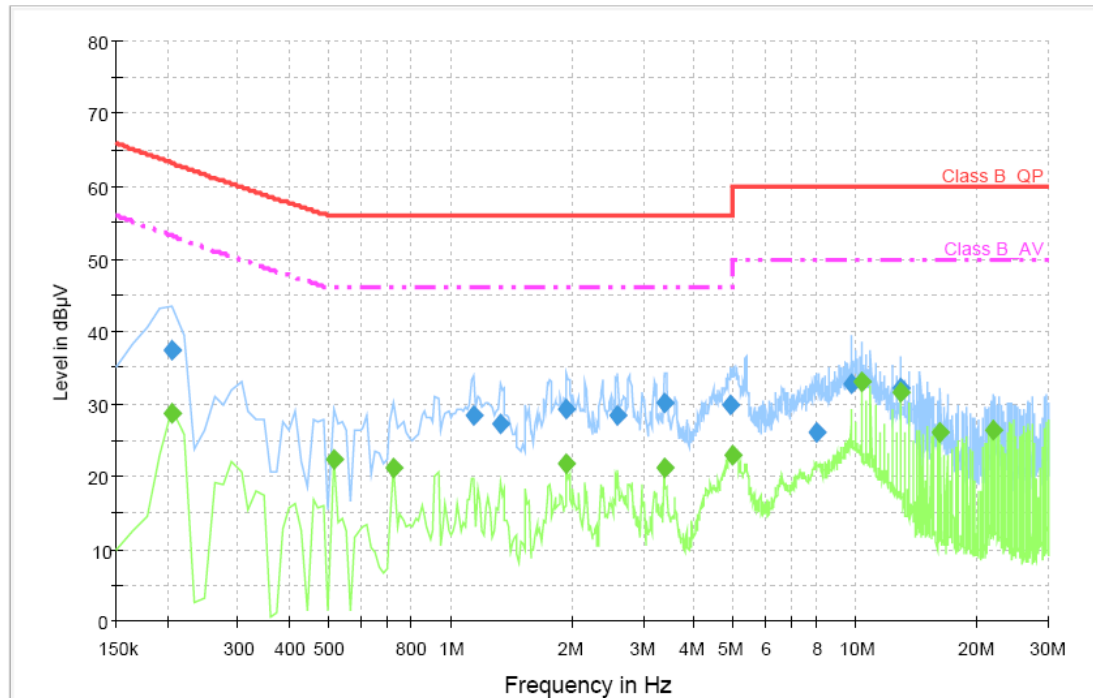
5.6 Test data for Conducted Emission

-. 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
0.206000	37.4	1000.000	9.000	GND	L1	10.1	25.8	63.2	
1.144000	28.3	1000.000	9.000	GND	L1	10.1	27.7	56.0	
1.326000	27.2	1000.000	9.000	GND	L1	10.1	28.8	56.0	
1.942000	29.3	1000.000	9.000	GND	L1	10.2	26.7	56.0	
2.600000	28.3	1000.000	9.000	GND	L1	10.2	27.7	56.0	
3.370000	30.0	1000.000	9.000	GND	L1	10.3	26.0	56.0	
4.924000	29.8	1000.000	9.000	GND	L1	10.3	26.2	56.0	
8.018000	25.9	1000.000	9.000	GND	L1	10.5	34.1	60.0	
9.754000	32.8	1000.000	9.000	GND	L1	10.6	27.2	60.0	
13.002000	32.2	1000.000	9.000	GND	L1	10.8	27.8	60.0	

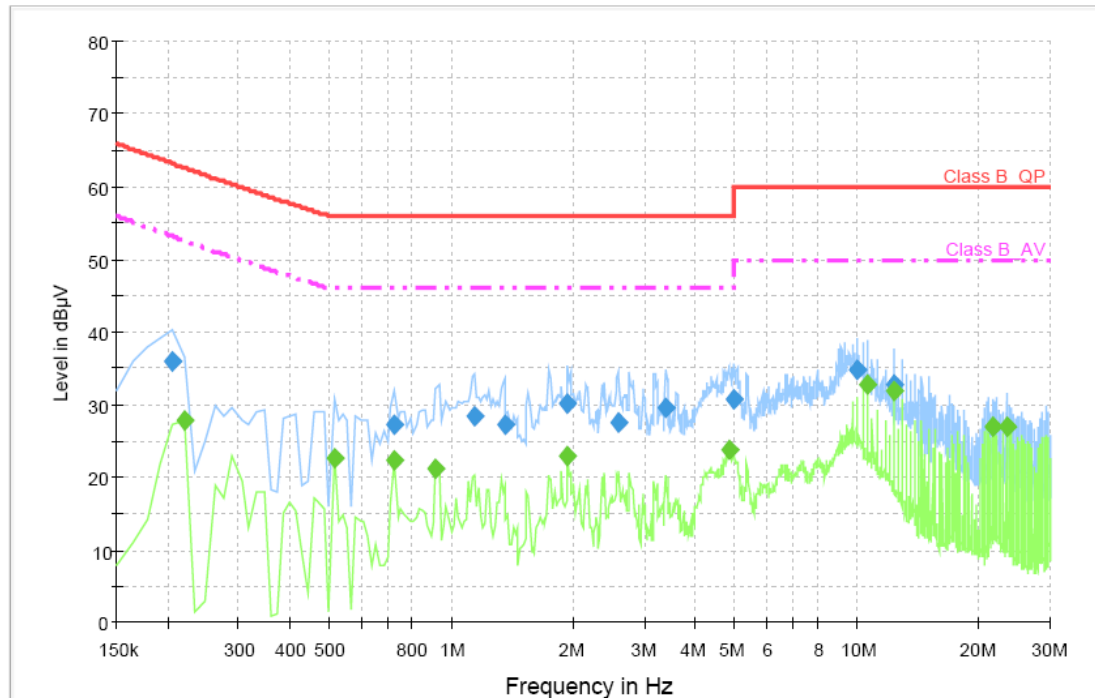
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.206000	28.6	1000.000	9.000	GND	L1	10.1	24.6	53.2	
0.514000	22.3	1000.000	9.000	GND	L1	10.1	23.7	46.0	
0.724000	21.1	1000.000	9.000	GND	L1	10.1	24.9	46.0	
1.942000	21.9	1000.000	9.000	GND	L1	10.2	24.1	46.0	
3.370000	21.2	1000.000	9.000	GND	L1	10.3	24.8	46.0	
4.994000	22.9	1000.000	9.000	GND	L1	10.3	23.1	46.0	
10.342000	32.9	1000.000	9.000	GND	L1	10.6	17.1	50.0	
13.002000	31.7	1000.000	9.000	GND	L1	10.8	18.3	50.0	
16.250000	26.0	1000.000	9.000	GND	L1	11.0	24.0	50.0	
21.864000	26.3	1000.000	9.000	GND	L1	11.2	23.7	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
0.206000	35.9	1000.000	9.000	GND	N	10.1	27.3	63.2	
0.724000	27.2	1000.000	9.000	GND	N	10.1	28.8	56.0	
1.144000	28.4	1000.000	9.000	GND	N	10.1	27.6	56.0	
1.354000	27.1	1000.000	9.000	GND	N	10.1	28.9	56.0	
1.942000	30.0	1000.000	9.000	GND	N	10.2	26.0	56.0	
2.572000	27.4	1000.000	9.000	GND	N	10.2	28.6	56.0	
3.398000	29.5	1000.000	9.000	GND	N	10.3	26.5	56.0	
4.994000	30.8	1000.000	9.000	GND	N	10.4	25.2	56.0	
10.048000	34.8	1000.000	9.000	GND	N	10.5	25.2	60.0	
12.414000	32.7	1000.000	9.000	GND	N	10.7	27.3	60.0	

Final Measurement Detector 2

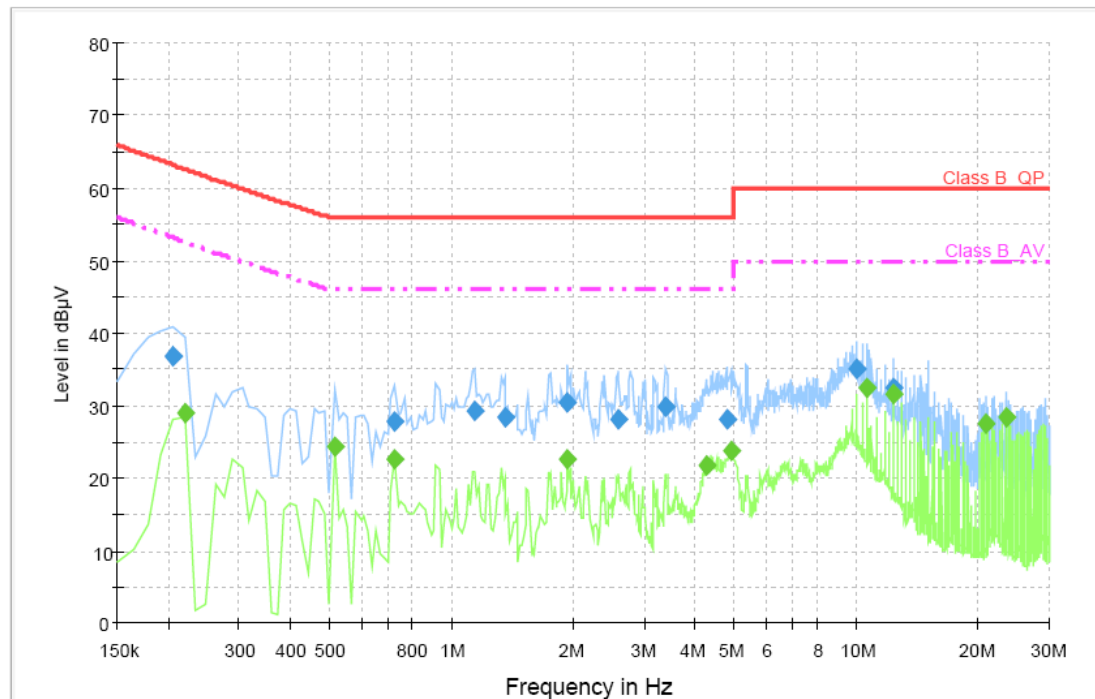
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	27.8	1000.000	9.000	GND	N	10.1	24.8	52.6	
0.514000	22.7	1000.000	9.000	GND	N	10.1	23.3	46.0	
0.724000	22.2	1000.000	9.000	GND	N	10.1	23.8	46.0	
0.920000	21.2	1000.000	9.000	GND	N	10.1	24.8	46.0	
1.942000	22.8	1000.000	9.000	GND	N	10.2	23.2	46.0	
4.840000	23.9	1000.000	9.000	GND	N	10.3	22.1	46.0	
10.636000	32.8	1000.000	9.000	GND	N	10.6	17.2	50.0	
12.414000	31.8	1000.000	9.000	GND	N	10.7	18.2	50.0	
21.542000	27.0	1000.000	9.000	GND	N	10.9	23.0	50.0	
23.348000	26.8	1000.000	9.000	GND	N	10.8	23.2	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
0.206000	36.8	1000.000	9.000	GND	L1	10.1	26.4	63.2	
0.724000	27.9	1000.000	9.000	GND	L1	10.1	28.1	56.0	
1.144000	29.2	1000.000	9.000	GND	L1	10.1	26.8	56.0	
1.354000	28.4	1000.000	9.000	GND	L1	10.1	27.6	56.0	
1.942000	30.4	1000.000	9.000	GND	L1	10.2	25.6	56.0	
2.586000	28.0	1000.000	9.000	GND	L1	10.2	28.0	56.0	
3.398000	29.9	1000.000	9.000	GND	L1	10.3	26.1	56.0	
4.784000	28.0	1000.000	9.000	GND	L1	10.3	28.0	56.0	
10.048000	35.0	1000.000	9.000	GND	L1	10.6	25.0	60.0	
12.414000	32.4	1000.000	9.000	GND	L1	10.7	27.6	60.0	

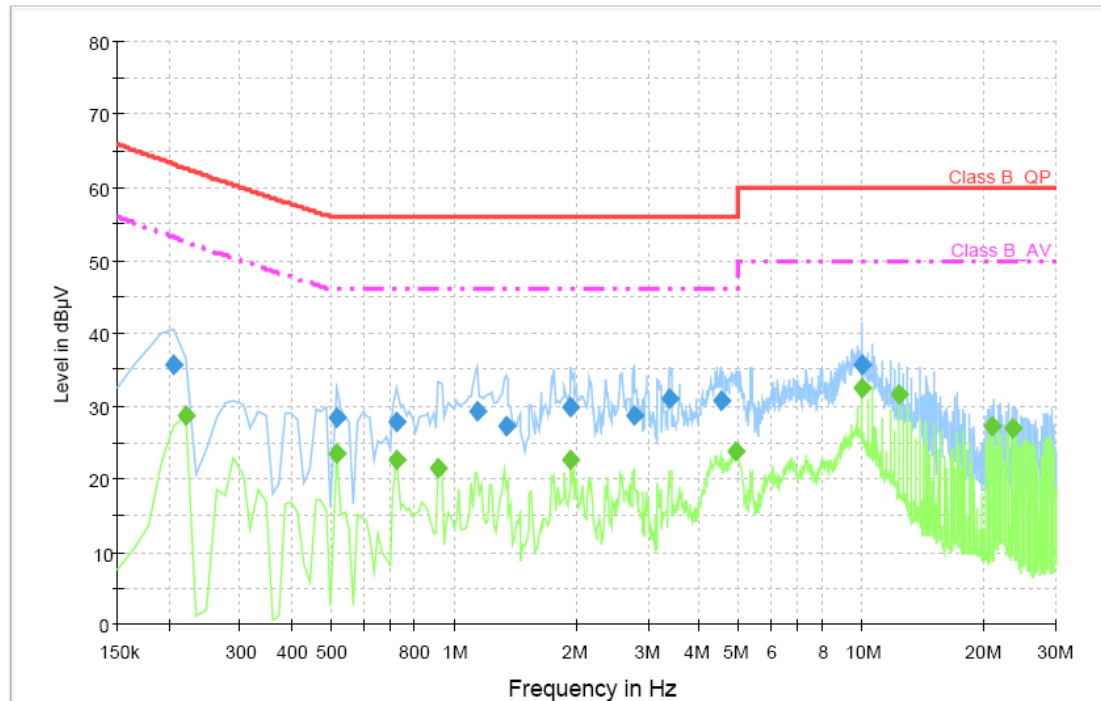
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	29.0	1000.000	9.000	GND	L1	10.1	23.6	52.6	
0.514000	24.2	1000.000	9.000	GND	L1	10.1	21.8	46.0	
0.724000	22.7	1000.000	9.000	GND	L1	10.1	23.3	46.0	
1.942000	22.6	1000.000	9.000	GND	L1	10.2	23.4	46.0	
4.252000	21.7	1000.000	9.000	GND	L1	10.3	24.3	46.0	
4.896000	23.7	1000.000	9.000	GND	L1	10.3	22.3	46.0	
10.636000	32.4	1000.000	9.000	GND	L1	10.6	17.6	50.0	
12.414000	31.7	1000.000	9.000	GND	L1	10.7	18.3	50.0	
20.954000	27.6	1000.000	9.000	GND	L1	11.3	22.4	50.0	
23.348000	28.3	1000.000	9.000	GND	L1	11.2	21.7	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
0.206000	35.6	1000.000	9.000	GND	N	10.1	27.6	63.2	
0.514000	28.3	1000.000	9.000	GND	N	10.1	27.7	56.0	
0.724000	27.8	1000.000	9.000	GND	N	10.1	28.2	56.0	
1.144000	29.2	1000.000	9.000	GND	N	10.1	26.8	56.0	
1.340000	27.2	1000.000	9.000	GND	N	10.1	28.8	56.0	
1.942000	29.7	1000.000	9.000	GND	N	10.2	26.3	56.0	
2.768000	28.7	1000.000	9.000	GND	N	10.2	27.3	56.0	
3.370000	30.9	1000.000	9.000	GND	N	10.3	25.1	56.0	
4.504000	30.8	1000.000	9.000	GND	N	10.3	25.2	56.0	
10.048000	35.7	1000.000	9.000	GND	N	10.5	24.3	60.0	

Final Measurement Detector 2

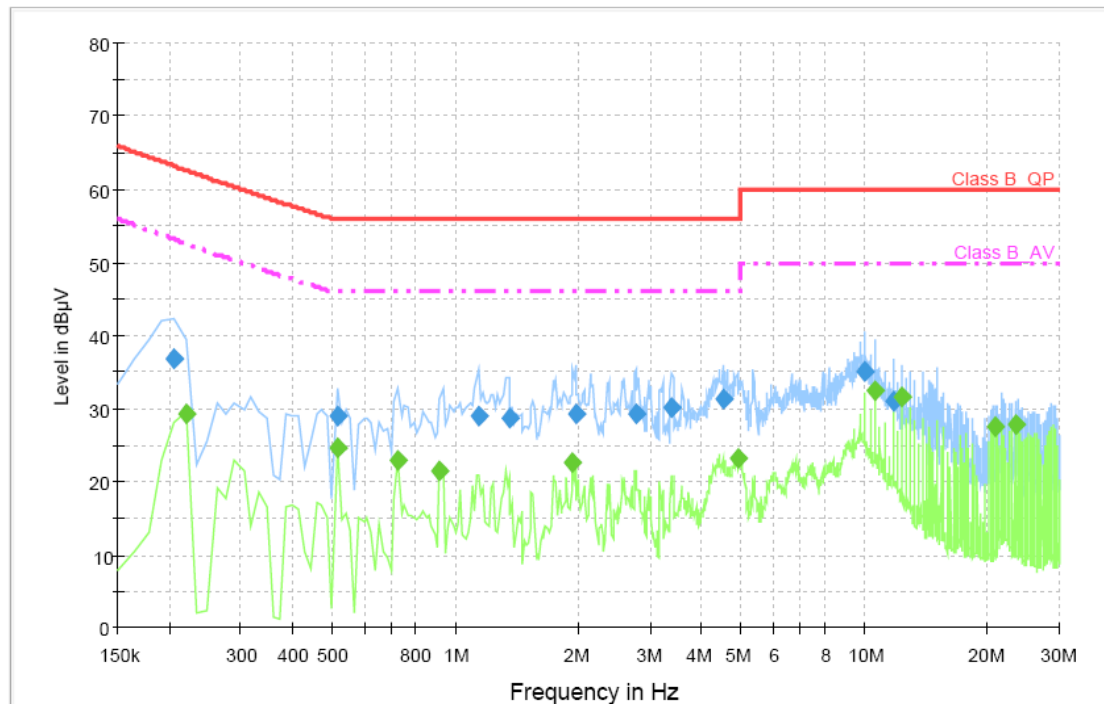
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	28.8	1000.000	9.000	GND	N	10.1	23.8	52.6	
0.514000	23.3	1000.000	9.000	GND	N	10.1	22.7	46.0	
0.724000	22.6	1000.000	9.000	GND	N	10.1	23.4	46.0	
0.920000	21.4	1000.000	9.000	GND	N	10.1	24.6	46.0	
1.942000	22.5	1000.000	9.000	GND	N	10.2	23.5	46.0	
4.896000	23.8	1000.000	9.000	GND	N	10.4	22.2	46.0	
10.048000	32.4	1000.000	9.000	GND	N	10.5	17.6	50.0	
12.414000	31.7	1000.000	9.000	GND	N	10.7	18.3	50.0	
20.954000	27.2	1000.000	9.000	GND	N	11.0	22.8	50.0	
23.348000	27.0	1000.000	9.000	GND	N	10.8	23.0	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
0.206000	36.8	1000.000	9.000	GND	L1	10.1	26.4	63.2	
0.514000	29.0	1000.000	9.000	GND	L1	10.1	27.0	56.0	
1.144000	29.1	1000.000	9.000	GND	L1	10.1	26.9	56.0	
1.354000	28.8	1000.000	9.000	GND	L1	10.1	27.2	56.0	
1.970000	29.2	1000.000	9.000	GND	L1	10.2	26.8	56.0	
2.768000	29.3	1000.000	9.000	GND	L1	10.2	26.7	56.0	
3.398000	30.1	1000.000	9.000	GND	L1	10.3	25.9	56.0	
4.504000	31.4	1000.000	9.000	GND	L1	10.3	24.6	56.0	
10.048000	35.2	1000.000	9.000	GND	L1	10.6	24.8	60.0	
11.826000	31.1	1000.000	9.000	GND	L1	10.7	28.9	60.0	

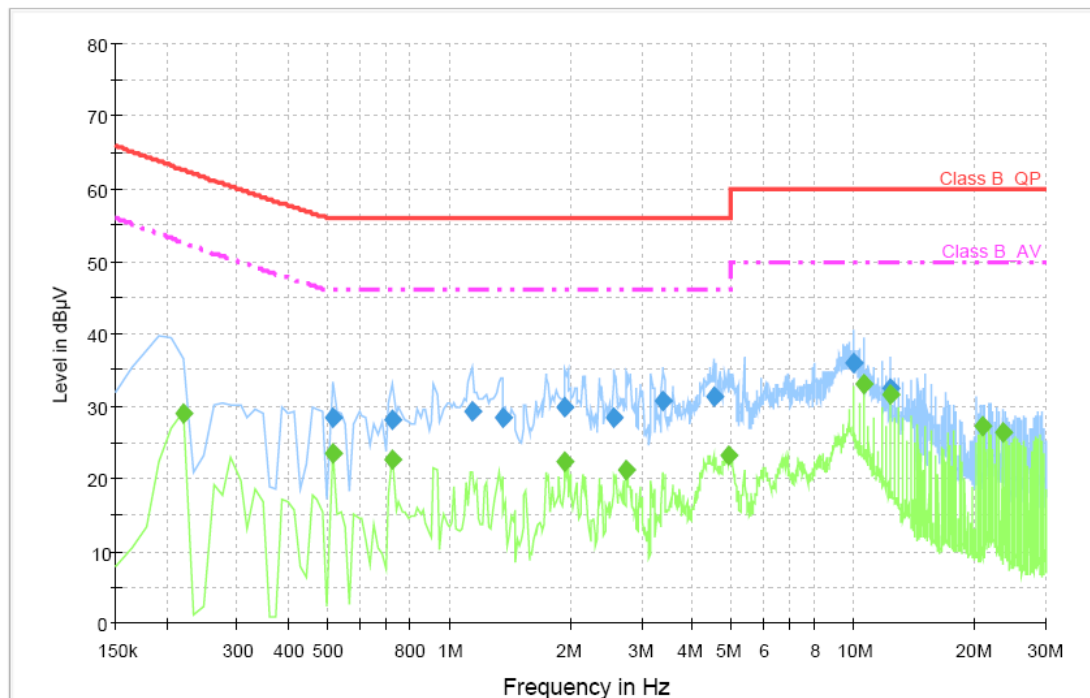
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	29.3	1000.000	9.000	GND	L1	10.1	23.3	52.6	
0.514000	24.6	1000.000	9.000	GND	L1	10.1	21.4	46.0	
0.724000	22.8	1000.000	9.000	GND	L1	10.1	23.2	46.0	
0.920000	21.5	1000.000	9.000	GND	L1	10.1	24.5	46.0	
1.942000	22.5	1000.000	9.000	GND	L1	10.2	23.5	46.0	
4.896000	23.1	1000.000	9.000	GND	L1	10.3	22.9	46.0	
10.636000	32.4	1000.000	9.000	GND	L1	10.6	17.6	50.0	
12.414000	31.6	1000.000	9.000	GND	L1	10.7	18.4	50.0	
20.954000	27.6	1000.000	9.000	GND	L1	11.3	22.4	50.0	
23.348000	27.9	1000.000	9.000	GND	L1	11.2	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
0.514000	28.4	1000.000	9.000	GND	N	10.1	27.6	56.0	
0.724000	28.0	1000.000	9.000	GND	N	10.1	28.0	56.0	
1.144000	29.2	1000.000	9.000	GND	N	10.1	26.8	56.0	
1.354000	28.4	1000.000	9.000	GND	N	10.1	27.6	56.0	
1.942000	29.9	1000.000	9.000	GND	N	10.2	26.1	56.0	
2.558000	28.4	1000.000	9.000	GND	N	10.2	27.6	56.0	
3.384000	30.6	1000.000	9.000	GND	N	10.3	25.4	56.0	
4.504000	31.3	1000.000	9.000	GND	N	10.3	24.7	56.0	
10.048000	35.8	1000.000	9.000	GND	N	10.5	24.2	60.0	
12.414000	32.4	1000.000	9.000	GND	N	10.7	27.6	60.0	

Final Measurement Detector 2

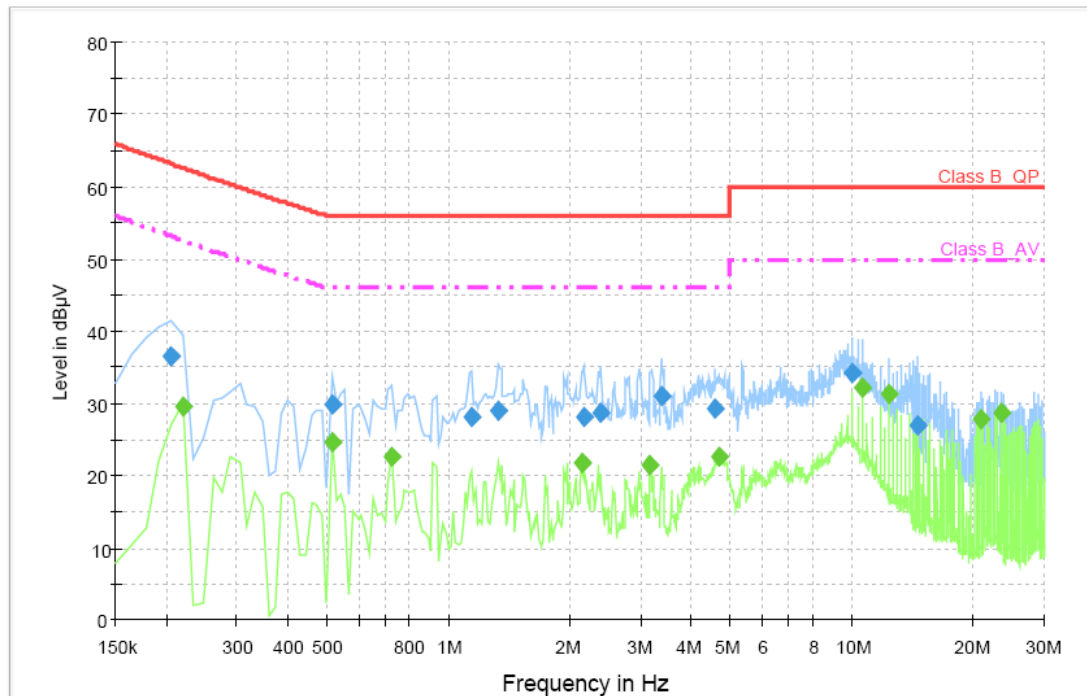
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	29.0	1000.000	9.000	GND	N	10.1	23.6	52.6	
0.514000	23.6	1000.000	9.000	GND	N	10.1	22.4	46.0	
0.724000	22.6	1000.000	9.000	GND	N	10.1	23.4	46.0	
1.942000	22.4	1000.000	9.000	GND	N	10.2	23.6	46.0	
2.754000	21.2	1000.000	9.000	GND	N	10.2	24.8	46.0	
4.896000	23.1	1000.000	9.000	GND	N	10.4	22.9	46.0	
10.636000	33.0	1000.000	9.000	GND	N	10.6	17.0	50.0	
12.414000	31.7	1000.000	9.000	GND	N	10.7	18.3	50.0	
20.954000	27.2	1000.000	9.000	GND	N	11.0	22.8	50.0	
23.348000	26.5	1000.000	9.000	GND	N	10.8	23.5	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
0.206000	36.4	1000.000	9.000	GND	L1	10.1	26.8	63.2	
0.514000	29.7	1000.000	9.000	GND	L1	10.1	26.3	56.0	
1.144000	28.2	1000.000	9.000	GND	L1	10.1	27.8	56.0	
1.326000	29.1	1000.000	9.000	GND	L1	10.1	26.9	56.0	
2.166000	28.2	1000.000	9.000	GND	L1	10.2	27.8	56.0	
2.390000	28.8	1000.000	9.000	GND	L1	10.2	27.2	56.0	
3.370000	31.0	1000.000	9.000	GND	L1	10.3	25.0	56.0	
4.574000	29.2	1000.000	9.000	GND	L1	10.3	26.8	56.0	
10.048000	34.3	1000.000	9.000	GND	L1	10.6	25.7	60.0	
14.486000	26.8	1000.000	9.000	GND	L1	10.9	33.2	60.0	

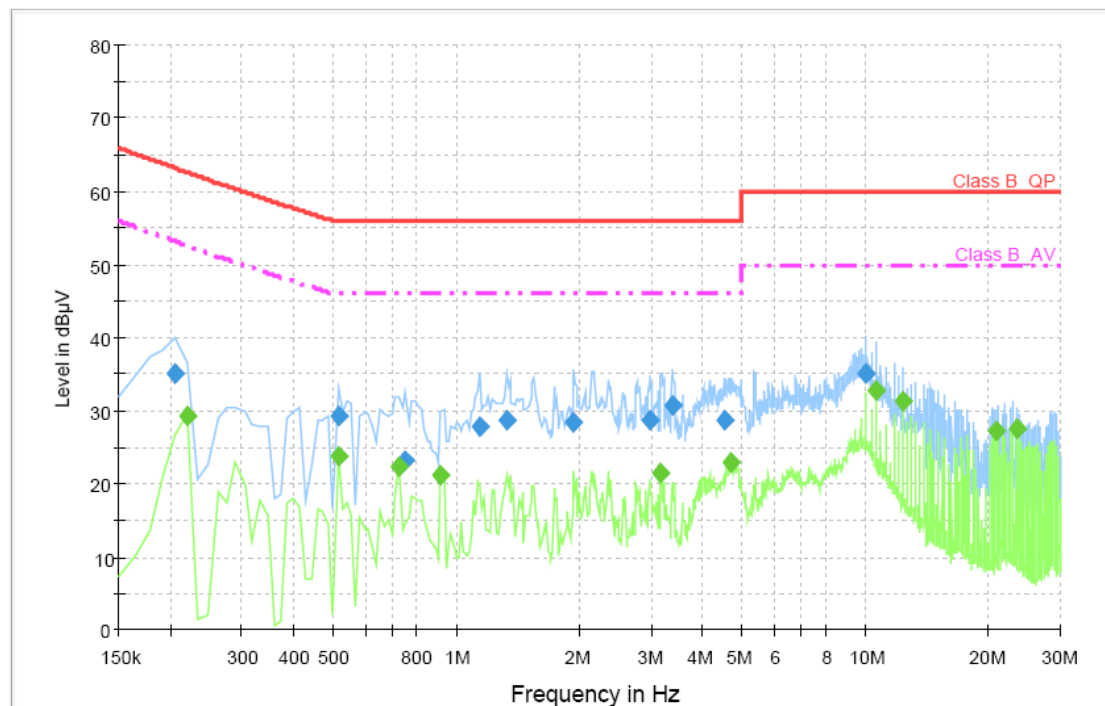
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	29.7	1000.000	9.000	GND	L1	10.1	22.9	52.6	
0.514000	24.7	1000.000	9.000	GND	L1	10.1	21.3	46.0	
0.724000	22.6	1000.000	9.000	GND	L1	10.1	23.4	46.0	
2.138000	21.6	1000.000	9.000	GND	L1	10.2	24.4	46.0	
3.160000	21.5	1000.000	9.000	GND	L1	10.2	24.5	46.0	
4.700000	22.7	1000.000	9.000	GND	L1	10.3	23.3	46.0	
10.636000	32.1	1000.000	9.000	GND	L1	10.6	17.9	50.0	
12.414000	31.2	1000.000	9.000	GND	L1	10.7	18.8	50.0	
20.954000	27.7	1000.000	9.000	GND	L1	11.3	22.3	50.0	
23.348000	28.8	1000.000	9.000	GND	L1	11.2	21.2	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
0.206000	35.2	1000.000	9.000	GND	N	10.1	28.0	63.2	
0.514000	29.3	1000.000	9.000	GND	N	10.1	26.7	56.0	
0.752000	23.2	1000.000	9.000	GND	N	10.1	32.8	56.0	
1.144000	27.8	1000.000	9.000	GND	N	10.1	28.2	56.0	
1.326000	28.8	1000.000	9.000	GND	N	10.1	27.2	56.0	
1.942000	28.4	1000.000	9.000	GND	N	10.2	27.6	56.0	
2.978000	28.6	1000.000	9.000	GND	N	10.2	27.4	56.0	
3.384000	30.6	1000.000	9.000	GND	N	10.3	25.4	56.0	
4.504000	28.7	1000.000	9.000	GND	N	10.3	27.3	56.0	
10.048000	35.1	1000.000	9.000	GND	N	10.5	24.9	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	29.4	1000.000	9.000	GND	N	10.1	23.2	52.6	
0.514000	23.9	1000.000	9.000	GND	N	10.1	22.1	46.0	
0.724000	22.3	1000.000	9.000	GND	N	10.1	23.7	46.0	
0.920000	21.1	1000.000	9.000	GND	N	10.1	24.9	46.0	
3.160000	21.6	1000.000	9.000	GND	N	10.2	24.4	46.0	
4.700000	22.8	1000.000	9.000	GND	N	10.3	23.2	46.0	
10.636000	32.6	1000.000	9.000	GND	N	10.6	17.4	50.0	
12.414000	31.3	1000.000	9.000	GND	N	10.7	18.7	50.0	
20.954000	27.3	1000.000	9.000	GND	N	11.0	22.7	50.0	
23.348000	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 : 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

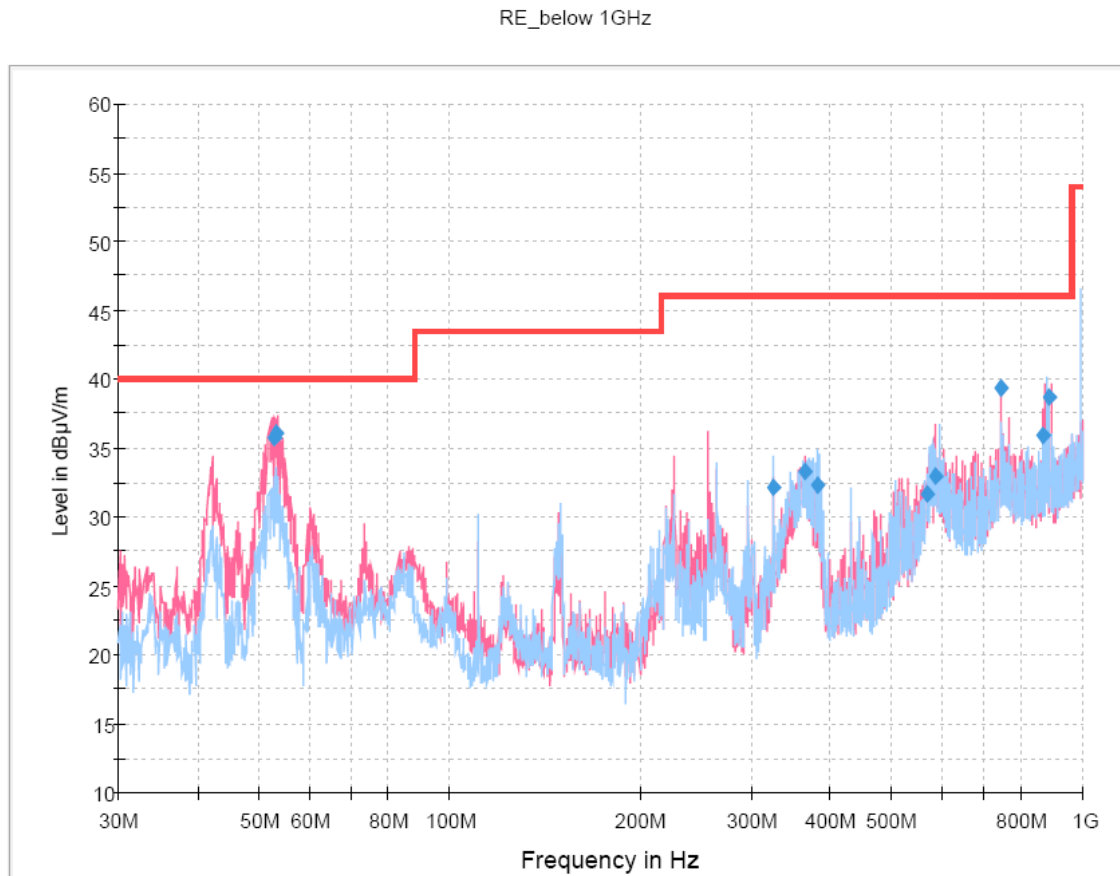
Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESIB26	Rohde & Schwarz	EMI Test Receiver	830482/010	12. 11. 2011
■ - VULB9160	Schwarzbeck	Broadband Test Antenna	3193	03. 15. 2012
■ - BBHA9120D	Schwarzbeck	Horn ANT	207	12. 22. 2011
■ - MCU066	maturo GmbH	Position Controller	1390306	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 ~ 28, 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

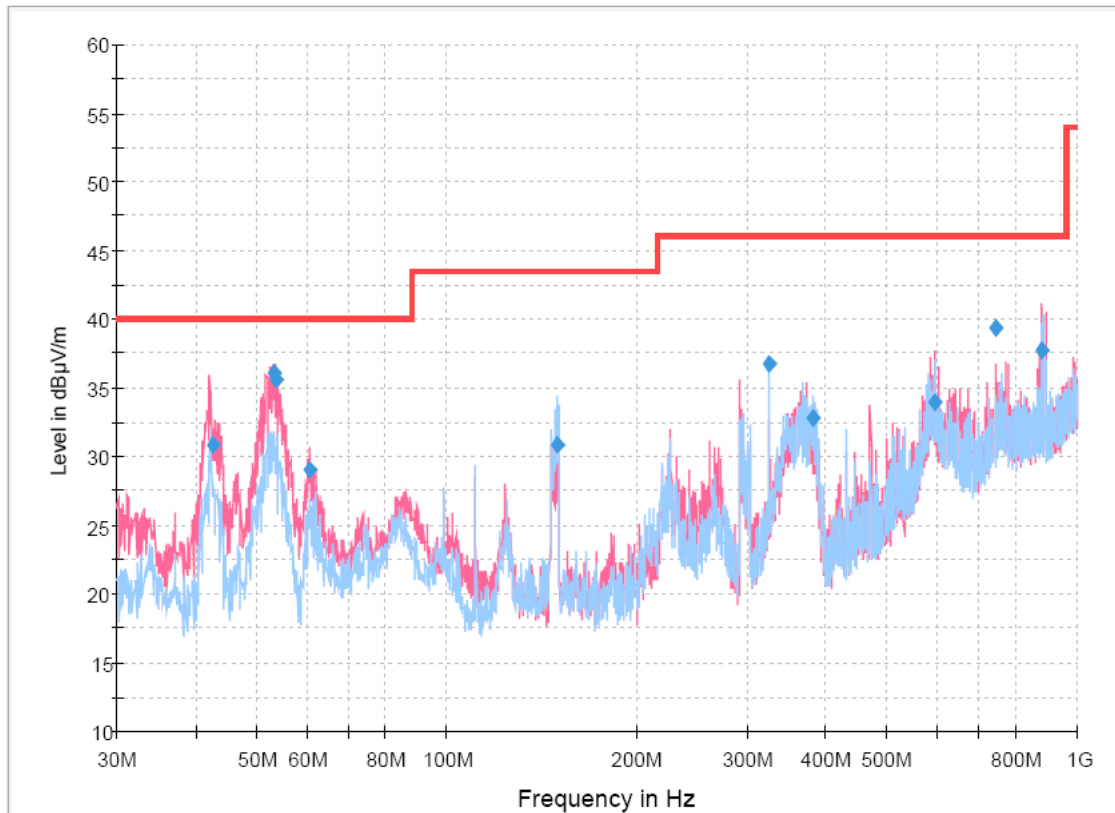
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
52.823750	35.7	1000.0	120.000	100.0	V	68.0	13.2	4.30	40.00
53.132500	36.0	1000.0	120.000	100.0	V	79.0	13.1	4.00	40.00
324.011250	32.1	1000.0	120.000	113.0	H	195.0	17.2	13.90	46.00
364.656250	33.3	1000.0	120.000	181.0	V	32.0	17.6	12.70	46.00
382.002500	32.3	1000.0	120.000	100.0	H	52.0	17.7	13.70	46.00
569.152500	31.7	1000.0	120.000	113.0	V	0.0	24.1	14.30	46.00
584.173750	33.0	1000.0	120.000	110.0	V	19.0	24.6	13.00	46.00
742.485000	39.3	1000.0	120.000	100.0	V	19.0	27.6	6.70	46.00
864.018750	35.8	1000.0	120.000	100.0	V	205.0	29.5	10.20	46.00
881.390000	38.6	1000.0	120.000	100.0	H	218.0	29.6	7.40	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

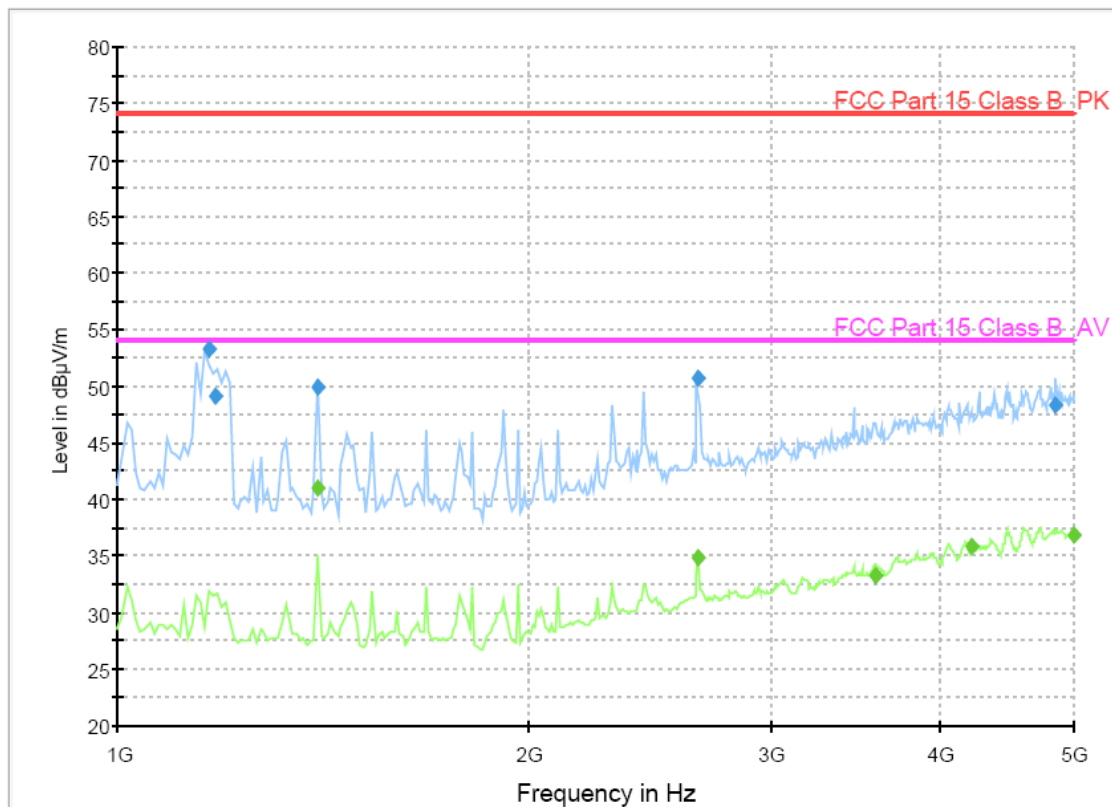
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
42.505000	30.7	1000.0	120.000	100.0	V	0.0	12.5	9.30	40.00
53.105000	36.0	1000.0	120.000	100.0	V	90.0	13.1	4.00	40.00
53.732500	35.6	1000.0	120.000	100.0	V	90.0	13.1	4.40	40.00
60.777500	29.1	1000.0	120.000	100.0	V	101.0	12.6	10.90	40.00
150.017500	30.9	1000.0	120.000	200.0	H	273.0	15.0	12.60	43.50
324.011250	36.7	1000.0	120.000	100.0	H	196.0	17.2	9.30	46.00
381.970000	32.8	1000.0	120.000	100.0	H	65.0	17.7	13.20	46.00
593.993750	33.9	1000.0	120.000	100.0	V	79.0	24.9	12.10	46.00
742.485000	39.4	1000.0	120.000	100.0	V	33.0	27.6	6.60	46.00
880.396250	37.7	1000.0	120.000	100.0	V	354.0	29.6	8.30	46.00

< 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)
1165.320641	53.2	100.0	1000.000	100.0	V	0.0	-13.8	20.8	74.0
1179.368738	49.1	100.0	1000.000	100.0	V	337.0	-13.8	24.9	74.0
1401.401603	49.8	100.0	1000.000	151.0	V	160.0	-13.2	24.2	74.0
2656.302605	50.8	100.0	1000.000	100.0	V	160.0	-8.7	23.2	74.0
4849.495391	48.3	100.0	1000.000	254.0	H	234.0	-1.5	25.7	74.0

Final Result 2

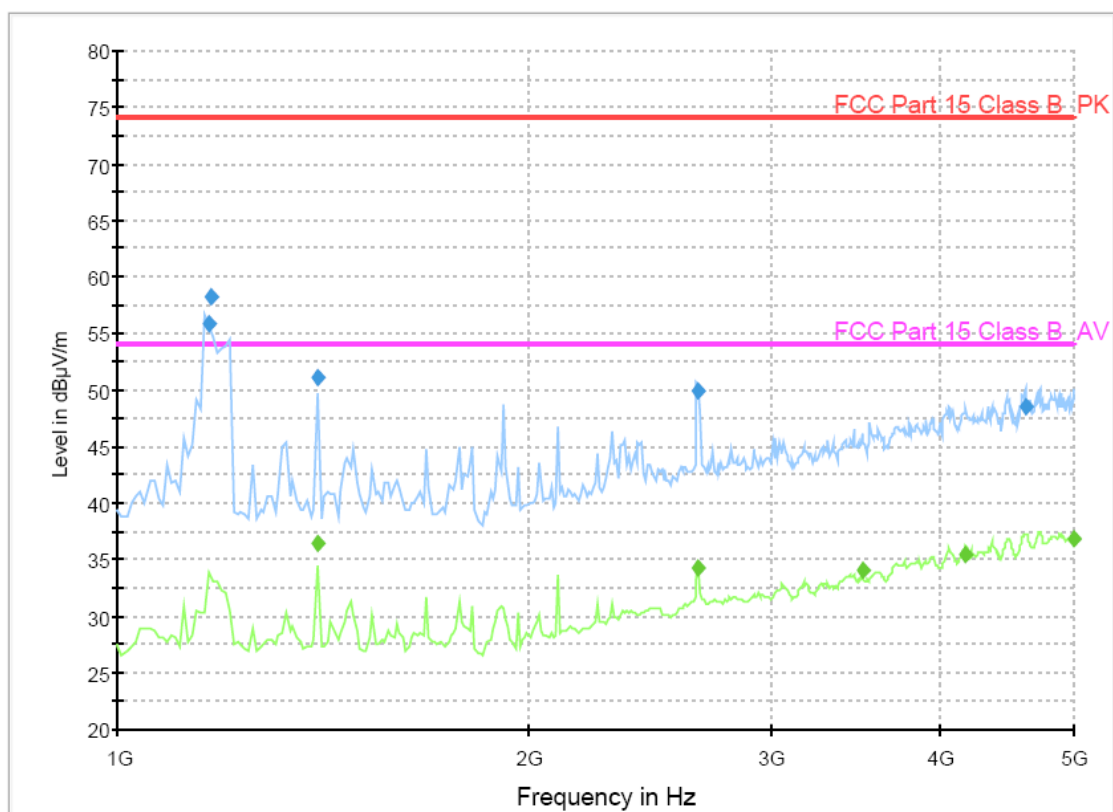
Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1401.401603	41.1	100.0	1000.000	141.0	V	160.0	-13.2	12.9	54.0
2655.118637	34.8	100.0	1000.000	100.0	V	160.0	-8.7	19.2	54.0
3580.562325	33.3	100.0	1000.000	171.0	H	29.0	-5.1	20.7	54.0
4204.212826	35.9	100.0	1000.000	170.0	H	214.0	-2.9	18.1	54.0
5000.000000	36.7	100.0	1000.000	162.0	V	233.0	-1.1	17.3	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)
1165.320641	55.9	100.0	1000.000	100.0	V	0.0	-13.8	18.1	74.0
1171.352706	58.3	100.0	1000.000	163.0	V	0.0	-13.8	15.7	74.0
1401.401603	51.0	100.0	1000.000	100.0	V	140.0	-13.2	23.0	74.0
2653.502605	50.0	100.0	1000.000	100.0	V	167.0	-8.7	24.0	74.0
4609.014429	48.6	100.0	1000.000	257.0	H	276.0	-2.1	25.4	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)
1401.401603	36.4	100.0	1000.000	100.0	H	219.0	-13.2	17.6	54.0
2654.718637	34.2	100.0	1000.000	100.0	V	167.0	-8.7	19.8	54.0
3503.602004	34.0	100.0	1000.000	113.0	H	240.0	-5.5	20.0	54.0
4168.532665	35.5	100.0	1000.000	400.0	V	103.0	-3.0	18.5	54.0
4999.800000	36.9	100.0	1000.000	130.0	H	282.0	-1.1	17.1	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: 47LW9500-UA)** was complies with §15.107 and 15.109 of the FCC Rules.