

FCC EVALUATION REPORT FOR CERTIFICATION

Applicant : LG Electronics Inc.

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

Pyeongteak-si, Gyeonggi-do, Korea.

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

Date of Issue : December 8, 2009

Order Number: GETEC-C1-09-253

Test Report Number: GETEC-E3-09-148

Test Site: Gumi College EMC Center

FCC Registration Number: (100749, 443957)

FCC ID.: BEJ47LD450UA

Applicant: LG Electronics Inc.

Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: LCD TV/Monitor
Type of Authority	: Certification
Model Name	: 47LD450-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



Jae-Hoon Jeong, Senior Engineer
GUMI College EMC center



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

1. General Information

Applicant: LG Electronics Inc.

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

Manufacturer: LG Electronics Inc.

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

Contact Person: Mr. Sang-Wook Lee, Chief research engineer

Tel Number: +82-31-610-9623

- **FCC ID.** BEJ47LD450UA
- **EUT Type** LCD TV/Monitor
- **Model Name** 47LD450-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 4 ~ 5, 2009
- **Place of Test** **Gumi College EMC Center** (FCC Registration Number: 100749, 443957)
407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.
- **Test Report Number** GETEC-E3-09-148
- **Dates of Issue** December 8, 2009



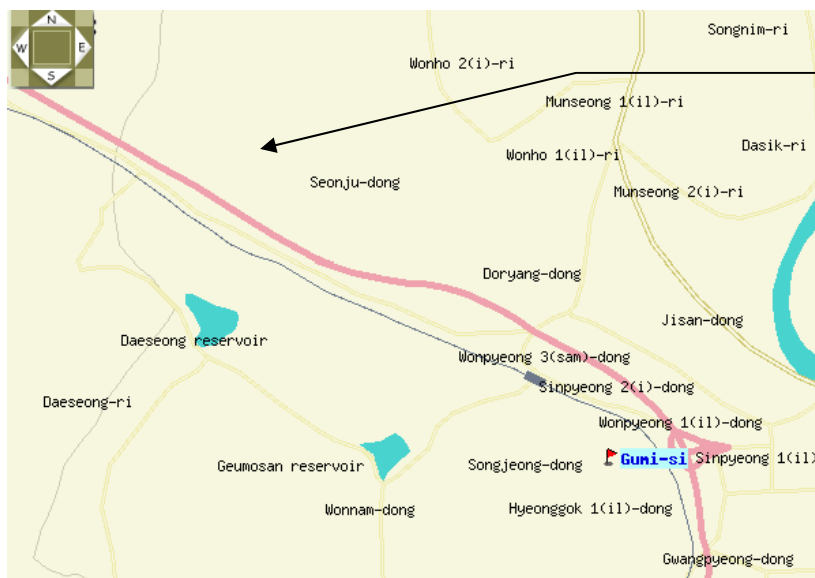
2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ASNI C63.4-2003) was used in determining radiated and conducted emissions emanating from **LG Electronics Inc. LCD TV/Monitor (Model Name: 47LD450-UA)**

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

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

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



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



3. Product Information

3.1 Description of EUT

The Equipment under Test (EUT) is the **LG Electronics Inc. LCD TV/Monitor (Model Name: 47LD450-UA) FCC ID.: BEJ47LD450UA**

MODELS		42LD450 (42LD450-UA)	47LD450 (47LD450-UA)
Dimensions (Width x Height x Depth)	With stand	40.3 x 27.0 x 10.3 inches 1023.0 x 685.0 x 261.0 mm	44.7 x 29.8 x 10.6 inches 1136.0 x 757.0 x 270.0 mm
	Without stand	40.3 x 25.0 x 3.0 inches 1023.0 x 635.0 x 76.6 mm	44.7 x 27.5 x 3.0 inches 1136.0 x 698.0 x 76.5 mm
Weight	With stand	33.1 lbs / 15.0 kg	43.0 lbs / 19.5 kg
	Without stand	29.8 lbs / 13.5 kg	38.6 lbs / 17.5 kg
Power requirement		AC100-240V ~ 50/60Hz	
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	32 ~ 104°F (0 ~ 40°C)	
	Operating Humidity	Less than 80%	
	Storage Temperature	-4 ~ 140°F (-20 ~ 60°C)	
	Storage Humidity	Less than 85%	
Maximum Frequency range:		648 MHz	



3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID
PC	Hewlett Packard	D530	S/N: CNG34800PY FCC ID: DoC
Video card	ATI	ARI RV360(9600)	S/N: SN0402017176 FCC ID: DoC
Keyboard	COMPAQ	166516-AD6	S/N: B13BBOR391006D FCC ID: AQ6-23K15
PS2 mouse	LOGITECH	M-S69	S/N: 334684-108 FCC ID: JNZ211443
Joystick	Microsoft	X05-92626	S/N: 9262600296169 FCC ID: DoC
DVD player	LG Electronics Inc	LC-954	S/N: 3850R-Z674K FCC ID: DoC
Headset	GOWOONSORI	GW-500M	S/N: N/A FCC ID: DoC
Printer	Hewlett Packard	970CXI	S/N: MY9B01F1FG FCC ID: DoC
TV signal generator	FLUKE	54200	S/N: 831011 FCC ID: DoC
USB memory stick	SM Electronics	UDD-32M	S/N: N/A FCC ID: DoC

See “Appendix D – Test Setup Photographs” for actual system test set-up



3.2.2 Used Cable(s)

Cable Name	Condition	Description
Power cable	Connected to the EUT	1.8 m unshielded
Video(RGB) input cable	Connected to the EUT and PC	1.8 m shielded with two ferrite cores
Video(HDMI/DVI) input cable	Connected to the EUT and PC	1.95 m shielded
RS-232C(Service & control) input cable	Connected to the EUT and PC	1.2 m shielded with two ferrite cores
Audio input cable	Connected to the EUT and PC	1.8 m shielded
Component input cable	Connected to the EUT and DVD Player	2.0 m shielded
Component sound input cable	Connected to the EUT and DVD Player	1.5 m shielded
AV input cable	Connected to the EUT and DVD Player	3.0 m shielded
Headset cable	Connected to the EUT	2.75 m shielded
Antenna cable	Connected to the EUT and TV signal generator	10.0 m shielded

3.3 Modification Item(s)

- None



4. Description of tests

4.1 Test Condition

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

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

- Test Voltage / Frequency : AC 120 V / 60 Hz
- Test Mode(s)
 - . Monitor mode
 - . Radiated emission: 1 920 * 1 080 / 60 Hz (RGB: Analog), 1 920 * 1 080 / 60 Hz (HDMI/DVI: Digital)
 - . Conducted emission: 1 920 * 1 080 / 60 Hz (RGB: Analog), 1 920 * 1 080 / 60 Hz (HDMI/DVI: Digital),
1 024 * 768 / 60 Hz (RGB: Analog), 640 * 480 / 60 Hz (RGB: Analog),
 - . USB memory stick play mode: Continuous play mode of Picture file and 1 kHz audio file.
- Operating test pattern
 - . "H" character scrolling mode (Font size: 10)
 - . Black background white character
 - . Brightness and contrast was adjusted as maximum level
 - . 1 kHz sound tone with winamp player

"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

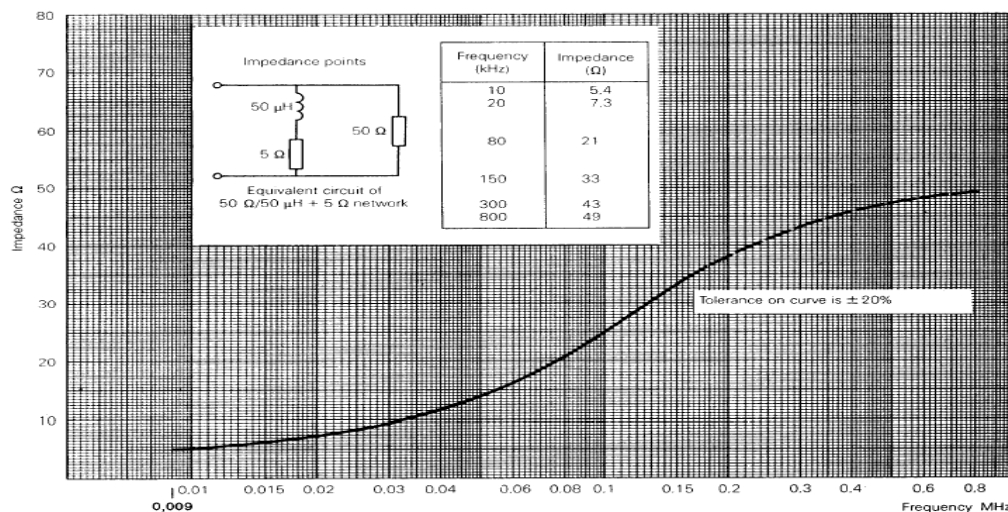


Fig 2. Impedance of LISN



4.3 Radiated Emission

The measurements were conducted 3 m anechoic chamber (FCC Registration No.: 443957) 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.

The spectrum was scanned from 30 to 1000 MHz, using bicornical log antenna (Schwarzbeck, VULB9160).

Above 1 GHz, horn antenna (Schwarzbeck, BBHA9120D / EMCO 3160) was used.

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 1MHz 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 m to 4 m and stopped at the azimuth or height producing the maximum emission.

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

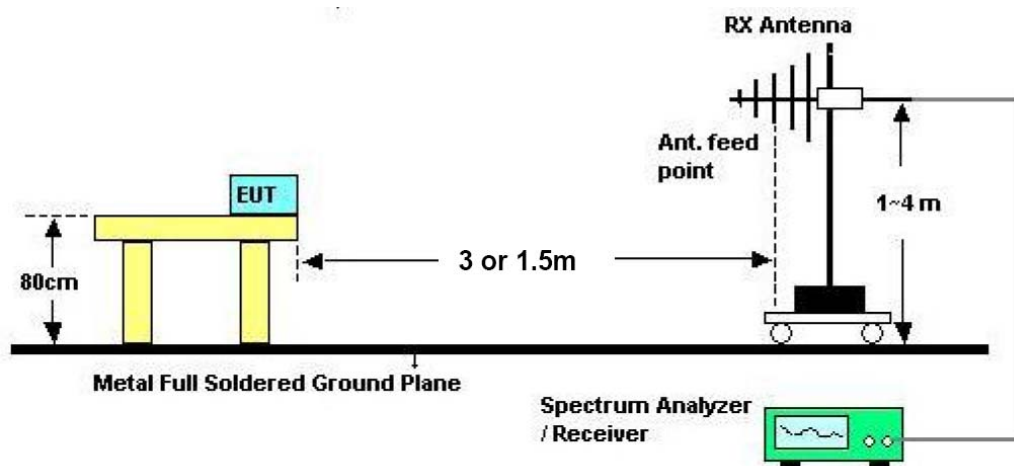


Fig 3. Dimensions of test site.



5. Conducted Emission

5.1 Operating Environment

Temperature : 22 °C
Relative Humidity : 46 % 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) 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. 13. 2009
■ - ESH3-Z5	Rohde & Schwarz	LISN	838979/020	12. 12. 2009
■ - ESH2-Z5	Rohde & Schwarz	LISN	829991/009	12. 12. 2009
□ - ISN T8	TESEQ. GmbH	ISN	24568	10. 16. 2010

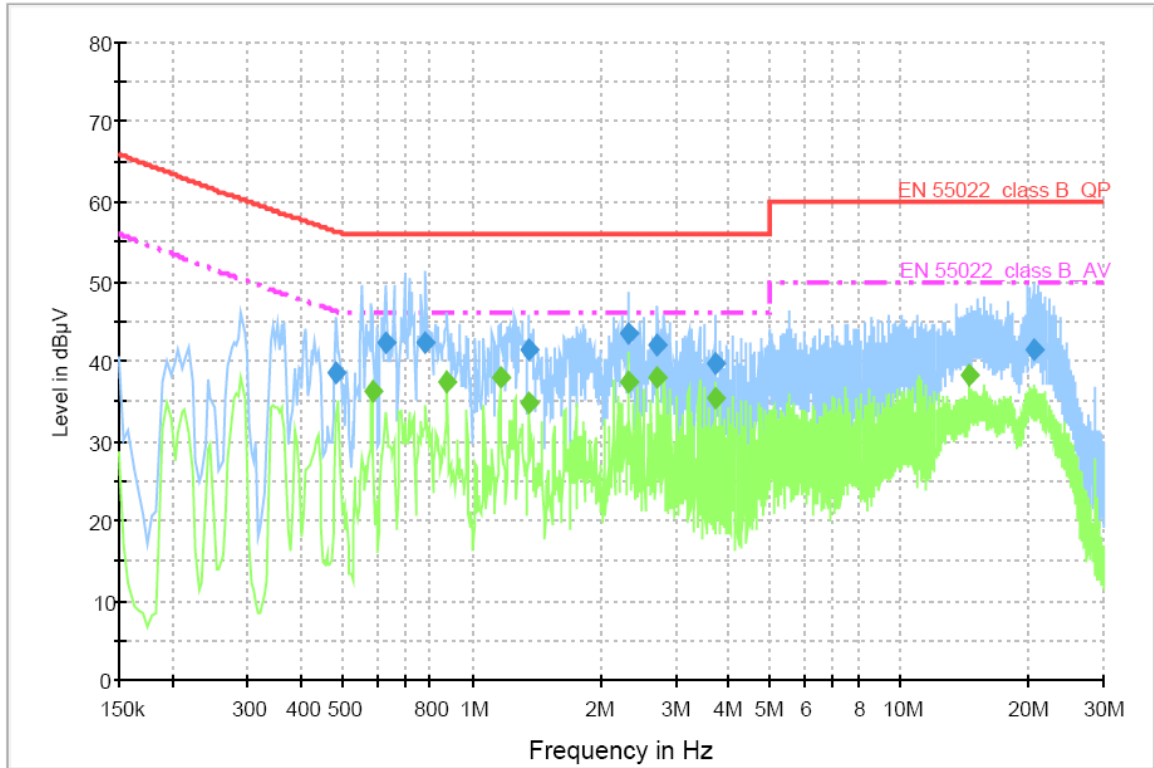
5.6 Test data for Conducted Emission

-. Test Date : December 5, 2009
-. Resolution Bandwidth : 9 kHz
-. Frequency Range : 0.15 MHz ~ 30 MHz



◆ Test resolution: 1 920 * 1 080 / 60 Hz (RGB: Analog mode)

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.482000	38.5	1000.000	9.000	GND	L1	10.0	17.9	56.3	
0.630000	42.4	1000.000	9.000	GND	L1	10.0	13.6	56.0	
0.782000	42.5	1000.000	9.000	GND	L1	10.0	13.5	56.0	
1.362000	41.4	1000.000	9.000	GND	L1	10.1	14.6	56.0	
2.334000	43.6	1000.000	9.000	GND	L1	10.1	12.4	56.0	
2.726000	42.0	1000.000	9.000	GND	L1	10.1	14.0	56.0	
3.698000	39.8	1000.000	9.000	GND	L1	10.2	16.2	56.0	
20.714000	41.4	1000.000	9.000	GND	L1	10.9	18.6	60.0	

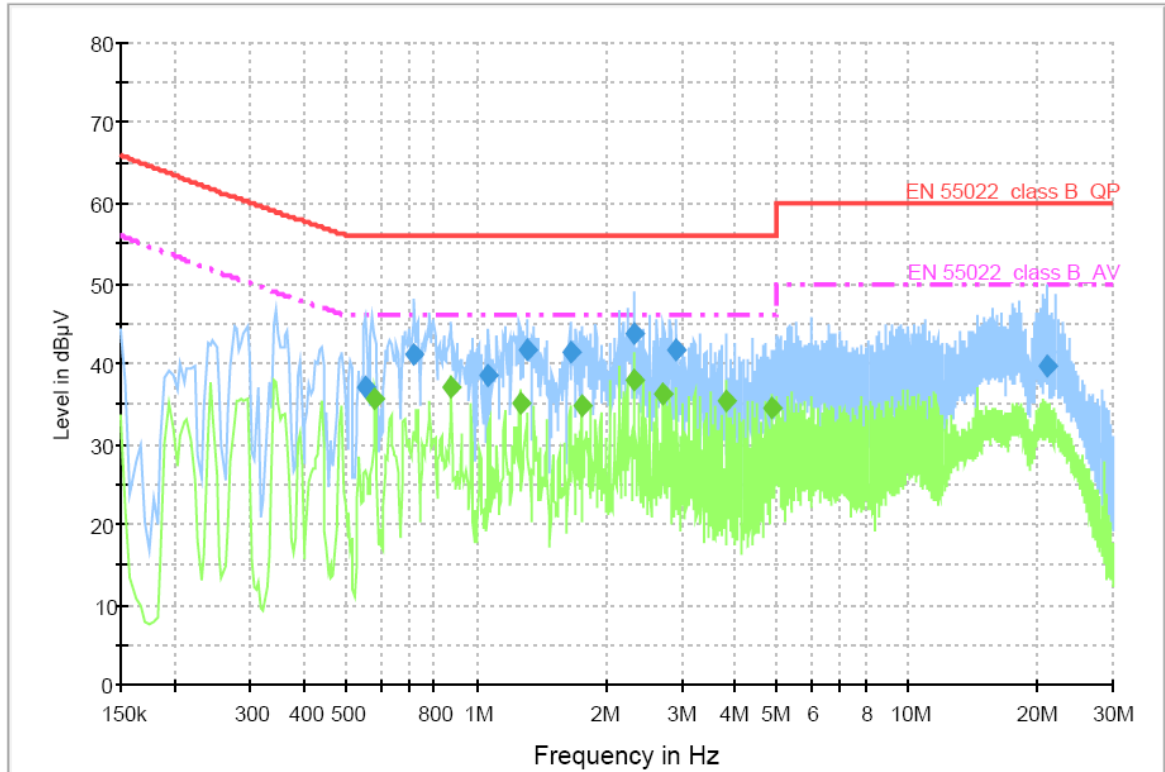
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.586000	36.2	1000.000	9.000	GND	L1	10.0	9.8	46.0	
0.874000	37.5	1000.000	9.000	GND	L1	10.0	8.5	46.0	
1.166000	38.0	1000.000	9.000	GND	L1	10.0	8.0	46.0	
1.362000	34.7	1000.000	9.000	GND	L1	10.1	11.3	46.0	
2.338000	37.3	1000.000	9.000	GND	L1	10.1	8.7	46.0	
2.726000	37.9	1000.000	9.000	GND	L1	10.1	8.1	46.0	
3.698000	35.4	1000.000	9.000	GND	L1	10.2	10.6	46.0	
14.478000	38.4	1000.000	9.000	GND	L1	10.6	11.6	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
0.554000	37.2	1000.000	9.000	GND	N	10.0	18.8	56.0	
0.718000	41.2	1000.000	9.000	GND	N	10.0	14.8	56.0	
1.070000	38.5	1000.000	9.000	GND	N	10.1	17.5	56.0	
1.314000	41.7	1000.000	9.000	GND	N	10.1	14.3	56.0	
1.654000	41.5	1000.000	9.000	GND	N	10.1	14.5	56.0	
2.334000	43.8	1000.000	9.000	GND	N	10.1	12.2	56.0	
2.918000	41.8	1000.000	9.000	GND	N	10.1	14.2	56.0	
21.254000	39.8	1000.000	9.000	GND	N	10.8	20.2	60.0	

Final Measurement Detector 2

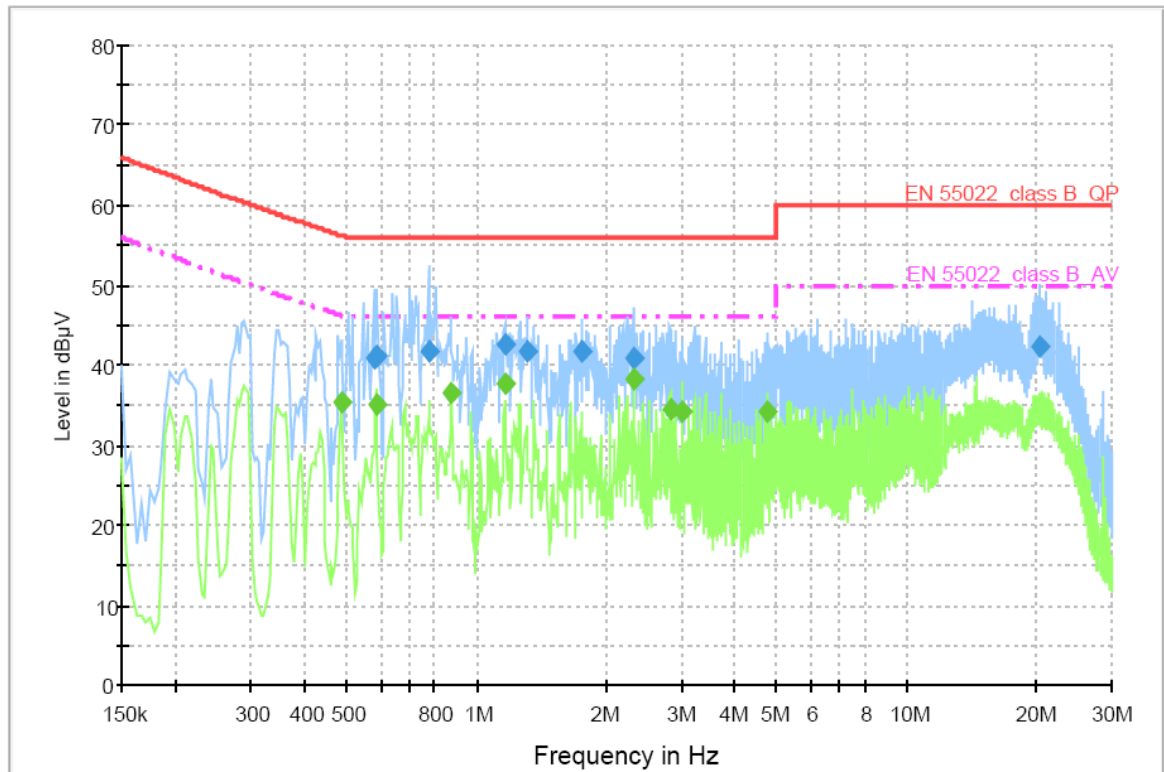
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.582000	35.8	1000.000	9.000	GND	N	10.0	10.2	46.0	
0.874000	37.1	1000.000	9.000	GND	N	10.0	8.9	46.0	
1.266000	35.2	1000.000	9.000	GND	N	10.1	10.8	46.0	
1.754000	34.8	1000.000	9.000	GND	N	10.1	11.2	46.0	
2.334000	38.1	1000.000	9.000	GND	N	10.1	8.0	46.0	
2.726000	36.2	1000.000	9.000	GND	N	10.1	9.8	46.0	
3.794000	35.3	1000.000	9.000	GND	N	10.2	10.7	46.0	
4.866000	34.5	1000.000	9.000	GND	N	10.2	11.5	46.0	

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



◆ Test resolution: 1 920 * 1 080 / 60 Hz (HDMI/DVI: Digital mode)

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.578000	40.7	1000.000	9.000	GND	L1	10.0	15.3	56.0	
0.586000	41.2	1000.000	9.000	GND	L1	10.0	14.8	56.0	
0.774000	41.6	1000.000	9.000	GND	L1	10.0	14.4	56.0	
1.166000	42.5	1000.000	9.000	GND	L1	10.0	13.5	56.0	
1.314000	41.7	1000.000	9.000	GND	L1	10.1	14.3	56.0	
1.754000	41.8	1000.000	9.000	GND	L1	10.1	14.2	56.0	
2.318000	40.9	1000.000	9.000	GND	L1	10.1	15.1	56.0	
20.410000	42.4	1000.000	9.000	GND	L1	10.8	17.6	60.0	

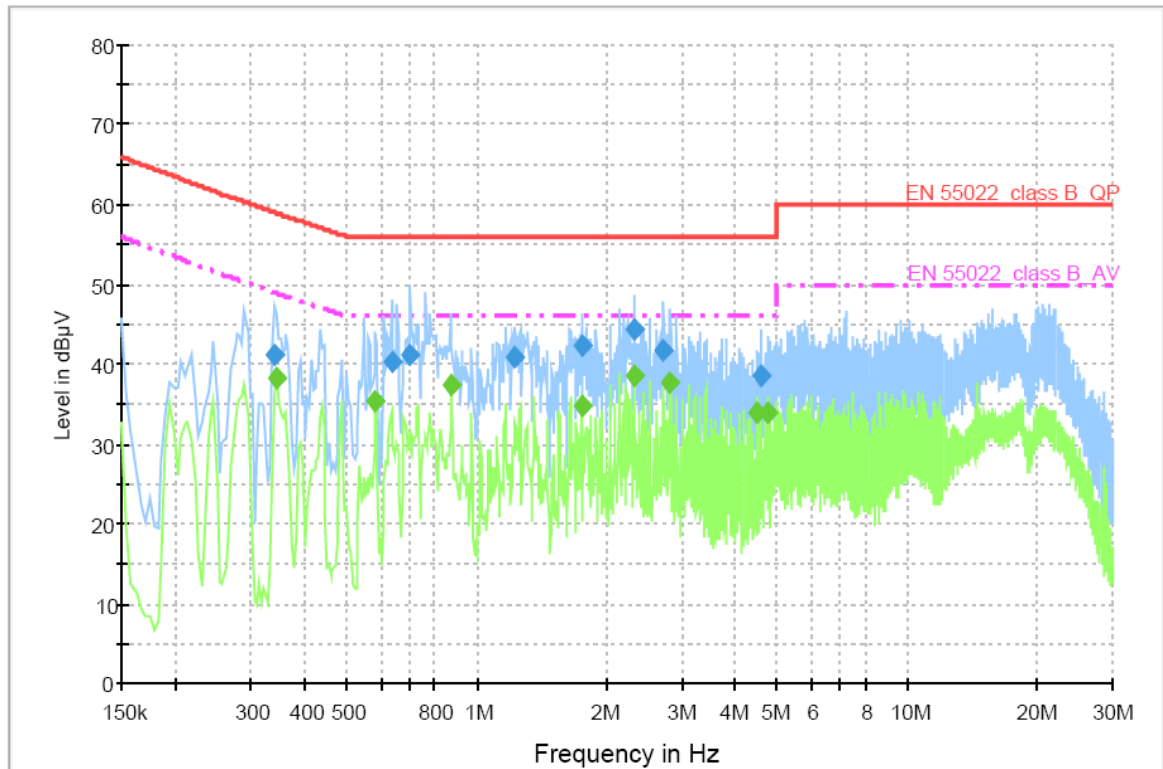
Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.486000	35.4	1000.000	9.000	GND	L1	10.0	10.8	46.2	
0.586000	35.1	1000.000	9.000	GND	L1	10.0	10.9	46.0	
0.878000	36.6	1000.000	9.000	GND	L1	10.0	9.4	46.0	
1.166000	37.8	1000.000	9.000	GND	L1	10.0	8.2	46.0	
2.338000	38.2	1000.000	9.000	GND	L1	10.1	7.8	46.0	
2.826000	34.5	1000.000	9.000	GND	L1	10.1	11.5	46.0	
3.018000	34.1	1000.000	9.000	GND	L1	10.1	11.9	46.0	
4.766000	34.2	1000.000	9.000	GND	L1	10.2	11.8	46.0	

< 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
0.338000	41.1	1000.000	9.000	GND	N	10.0	18.0	59.1	
0.634000	40.3	1000.000	9.000	GND	N	10.0	15.7	56.0	
0.702000	41.3	1000.000	9.000	GND	N	10.0	14.7	56.0	
1.230000	40.9	1000.000	9.000	GND	N	10.1	15.1	56.0	
1.754000	42.3	1000.000	9.000	GND	N	10.1	13.7	56.0	
2.338000	44.2	1000.000	9.000	GND	N	10.1	11.8	56.0	
2.726000	41.8	1000.000	9.000	GND	N	10.1	14.2	56.0	
4.574000	38.6	1000.000	9.000	GND	N	10.2	17.4	56.0	

Final Measurement Detector 2

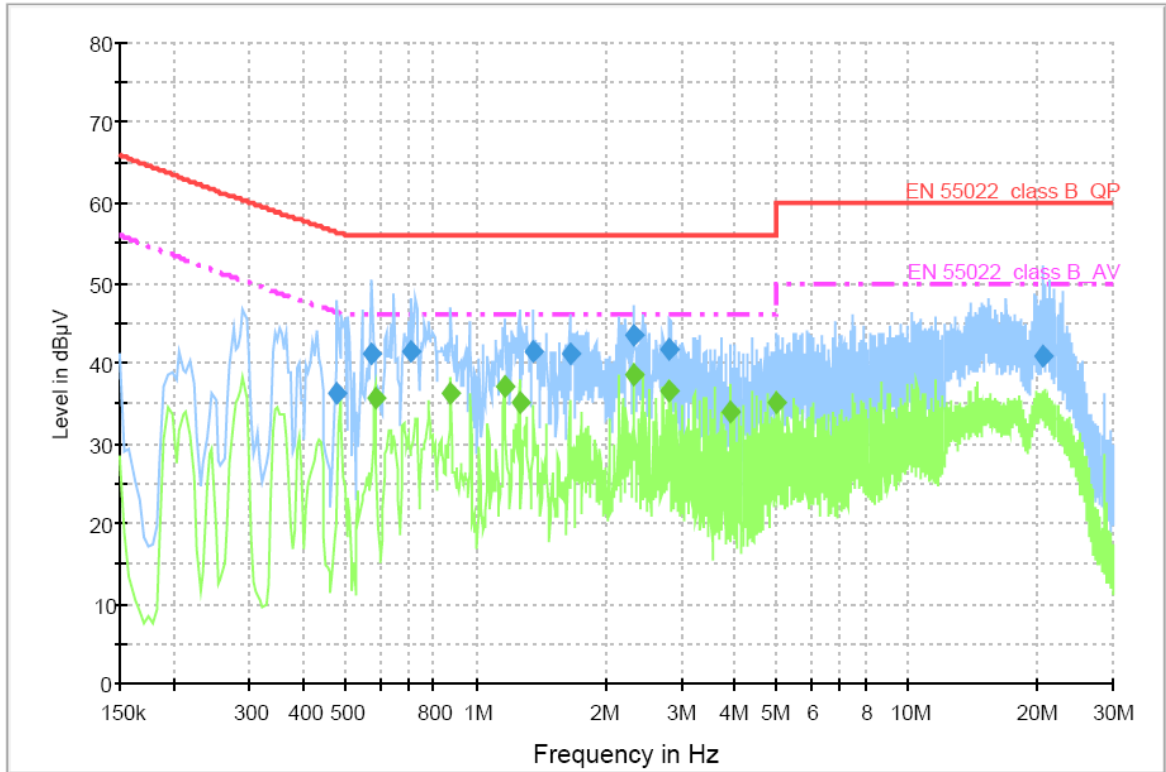
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.342000	38.3	1000.000	9.000	GND	N	10.0	10.6	48.9	
0.582000	35.4	1000.000	9.000	GND	N	10.0	10.6	46.0	
0.874000	37.3	1000.000	9.000	GND	N	10.0	8.7	46.0	
1.750000	34.8	1000.000	9.000	GND	N	10.1	11.2	46.0	
2.338000	38.4	1000.000	9.000	GND	N	10.1	7.6	46.0	
2.822000	37.6	1000.000	9.000	GND	N	10.1	8.4	46.0	
4.478000	33.9	1000.000	9.000	GND	N	10.2	12.1	46.0	
4.766000	34.0	1000.000	9.000	GND	N	10.2	12.0	46.0	

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



◆ Test resolution: 1 024 * 768 / 60 Hz (RGB: Analog mode)

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.478000	36.3	1000.000	9.000	GND	L1	10.0	20.0	56.3	
0.574000	41.3	1000.000	9.000	GND	L1	10.0	14.7	56.0	
0.710000	41.4	1000.000	9.000	GND	L1	10.0	14.6	56.0	
1.362000	41.3	1000.000	9.000	GND	L1	10.1	14.7	56.0	
1.654000	41.1	1000.000	9.000	GND	L1	10.1	14.9	56.0	
2.338000	43.6	1000.000	9.000	GND	L1	10.1	12.4	56.0	
2.822000	41.8	1000.000	9.000	GND	L1	10.1	14.2	56.0	
20.722000	40.9	1000.000	9.000	GND	L1	10.9	19.1	60.0	

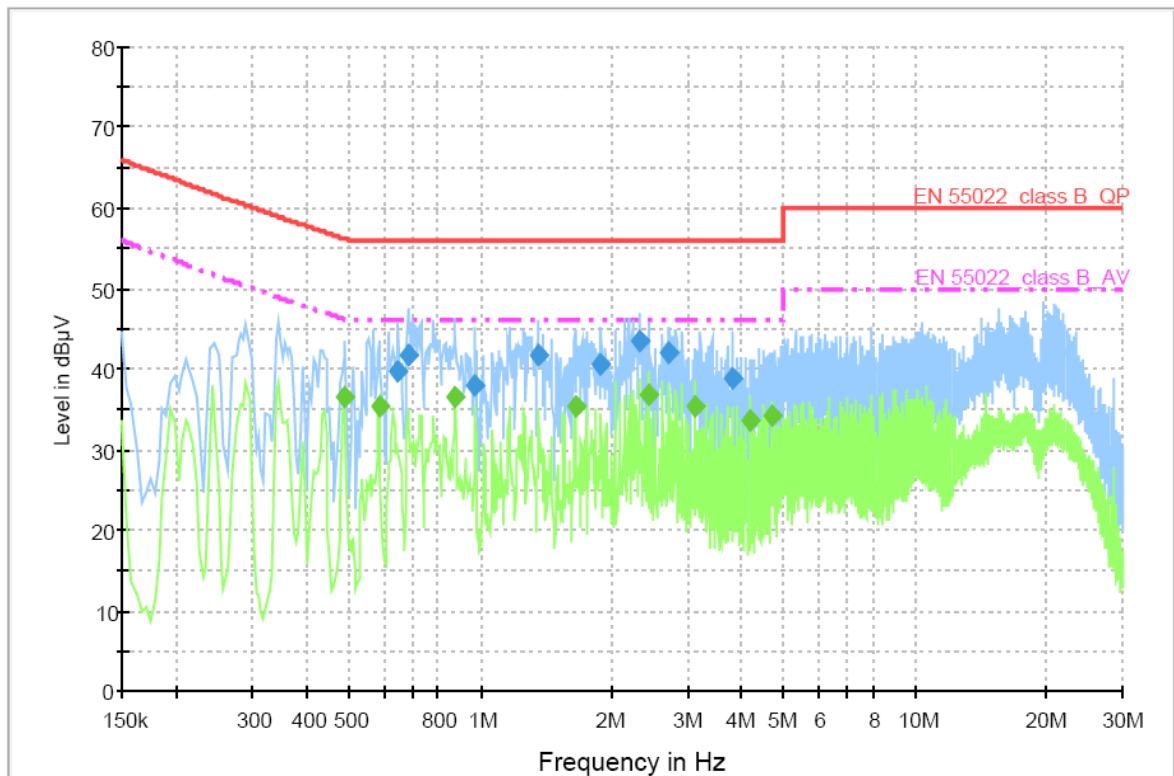
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.586000	35.8	1000.000	9.000	GND	L1	10.0	10.2	46.0	
0.878000	36.4	1000.000	9.000	GND	L1	10.0	9.6	46.0	
1.166000	37.0	1000.000	9.000	GND	L1	10.0	9.0	46.0	
1.266000	35.2	1000.000	9.000	GND	L1	10.1	10.8	46.0	
2.338000	38.6	1000.000	9.000	GND	L1	10.1	7.4	46.0	
2.822000	36.5	1000.000	9.000	GND	L1	10.1	9.5	46.0	
3.890000	34.0	1000.000	9.000	GND	L1	10.2	12.0	46.0	
4.962000	34.9	1000.000	9.000	GND	L1	10.2	11.1	46.0	

< 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
0.646000	39.6	1000.000	9.000	GND	N	10.0	16.4	56.0	
0.682000	41.8	1000.000	9.000	GND	N	10.0	14.2	56.0	
0.970000	37.9	1000.000	9.000	GND	N	10.0	18.1	56.0	
1.362000	41.7	1000.000	9.000	GND	N	10.1	14.3	56.0	
1.898000	40.7	1000.000	9.000	GND	N	10.1	15.3	56.0	
2.338000	43.6	1000.000	9.000	GND	N	10.1	12.4	56.0	
2.726000	42.1	1000.000	9.000	GND	N	10.1	13.9	56.0	
3.798000	38.9	1000.000	9.000	GND	N	10.2	17.1	56.0	

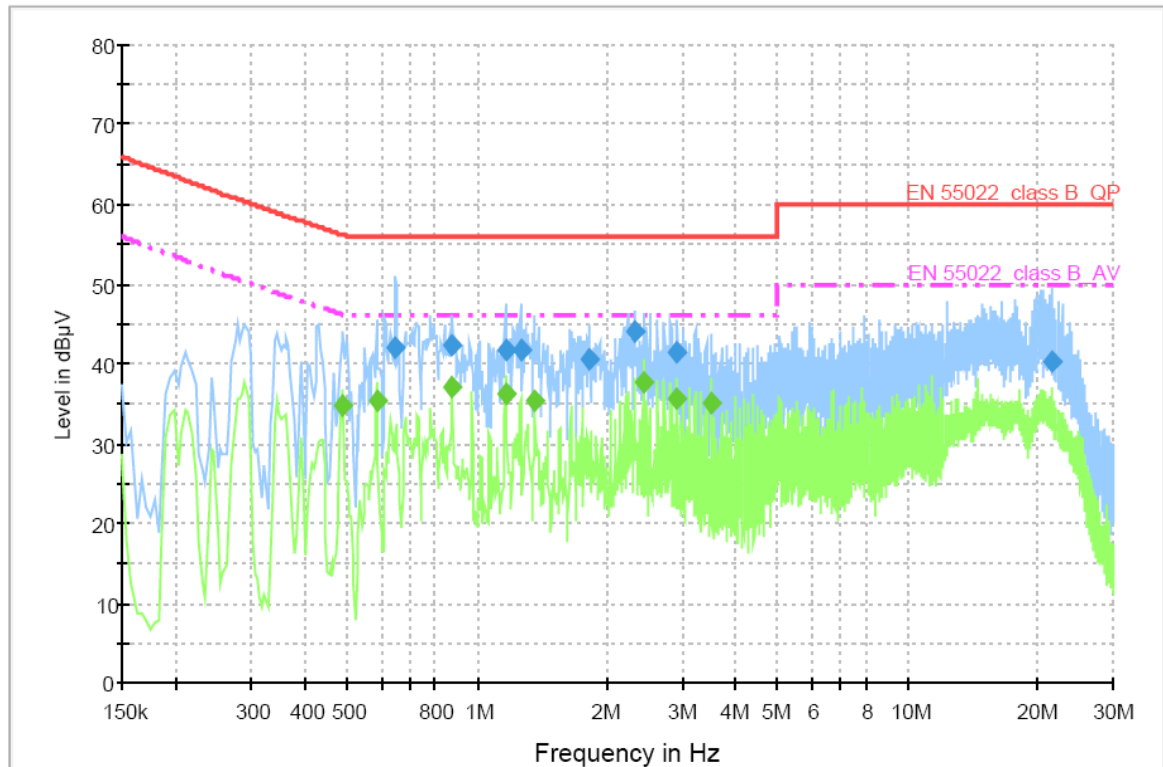
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.486000	36.4	1000.000	9.000	GND	N	10.0	9.8	46.2	
0.586000	35.3	1000.000	9.000	GND	N	10.0	10.7	46.0	
0.878000	36.5	1000.000	9.000	GND	N	10.0	9.5	46.0	
1.654000	35.3	1000.000	9.000	GND	N	10.1	10.7	46.0	
2.430000	36.9	1000.000	9.000	GND	N	10.1	9.1	46.0	
3.114000	35.3	1000.000	9.000	GND	N	10.1	10.7	46.0	
4.182000	33.5	1000.000	9.000	GND	N	10.2	12.5	46.0	
4.670000	34.2	1000.000	9.000	GND	N	10.2	11.8	46.0	

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



◆ Test resolution: 640 * 480 / 60 Hz (RGB: Analog mode)
Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.646000	42.0	1000.000	9.000	GND	L1	10.0	14.0	56.0	
0.878000	42.5	1000.000	9.000	GND	L1	10.0	13.6	56.0	
1.166000	41.8	1000.000	9.000	GND	L1	10.0	14.2	56.0	
1.266000	41.8	1000.000	9.000	GND	L1	10.1	14.2	56.0	
1.826000	40.5	1000.000	9.000	GND	L1	10.1	15.5	56.0	
2.334000	44.0	1000.000	9.000	GND	L1	10.1	12.0	56.0	
2.922000	41.3	1000.000	9.000	GND	L1	10.1	14.7	56.0	
21.718000	40.2	1000.000	9.000	GND	L1	10.9	19.8	60.0	

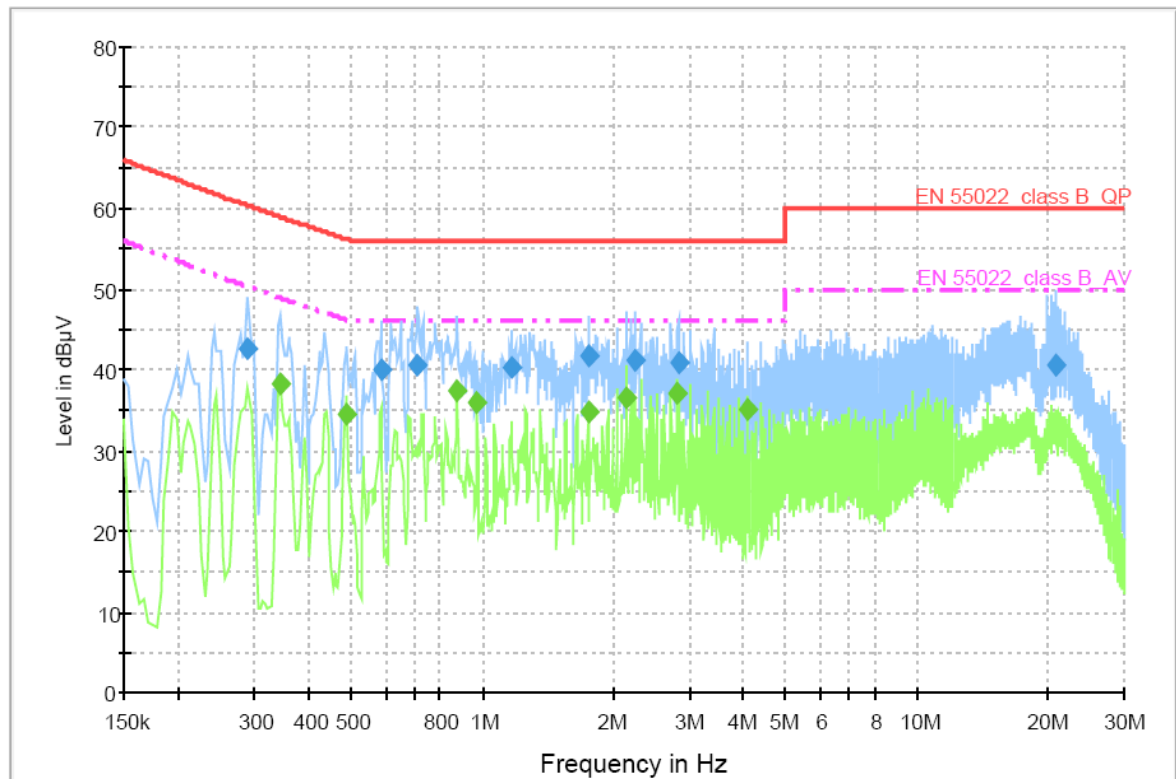
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.490000	34.8	1000.000	9.000	GND	L1	10.0	11.4	46.2	
0.586000	35.4	1000.000	9.000	GND	L1	10.0	10.6	46.0	
0.874000	37.0	1000.000	9.000	GND	L1	10.0	9.0	46.0	
1.166000	36.2	1000.000	9.000	GND	L1	10.0	9.8	46.0	
1.362000	35.3	1000.000	9.000	GND	L1	10.1	10.7	46.0	
2.434000	37.8	1000.000	9.000	GND	L1	10.1	8.2	46.0	
2.918000	35.7	1000.000	9.000	GND	L1	10.1	10.3	46.0	
3.502000	35.1	1000.000	9.000	GND	L1	10.1	10.9	46.0	

< 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
0.290000	42.7	1000.000	9.000	GND	N	10.0	17.7	60.3	
0.586000	40.1	1000.000	9.000	GND	N	10.0	15.9	56.0	
0.710000	40.6	1000.000	9.000	GND	N	10.0	15.4	56.0	
1.170000	40.3	1000.000	9.000	GND	N	10.1	15.7	56.0	
1.754000	41.8	1000.000	9.000	GND	N	10.1	14.2	56.0	
2.242000	41.2	1000.000	9.000	GND	N	10.1	14.8	56.0	
2.826000	40.8	1000.000	9.000	GND	N	10.1	15.2	56.0	
20.914000	40.5	1000.000	9.000	GND	N	10.8	19.5	60.0	

Final Measurement Detector 2

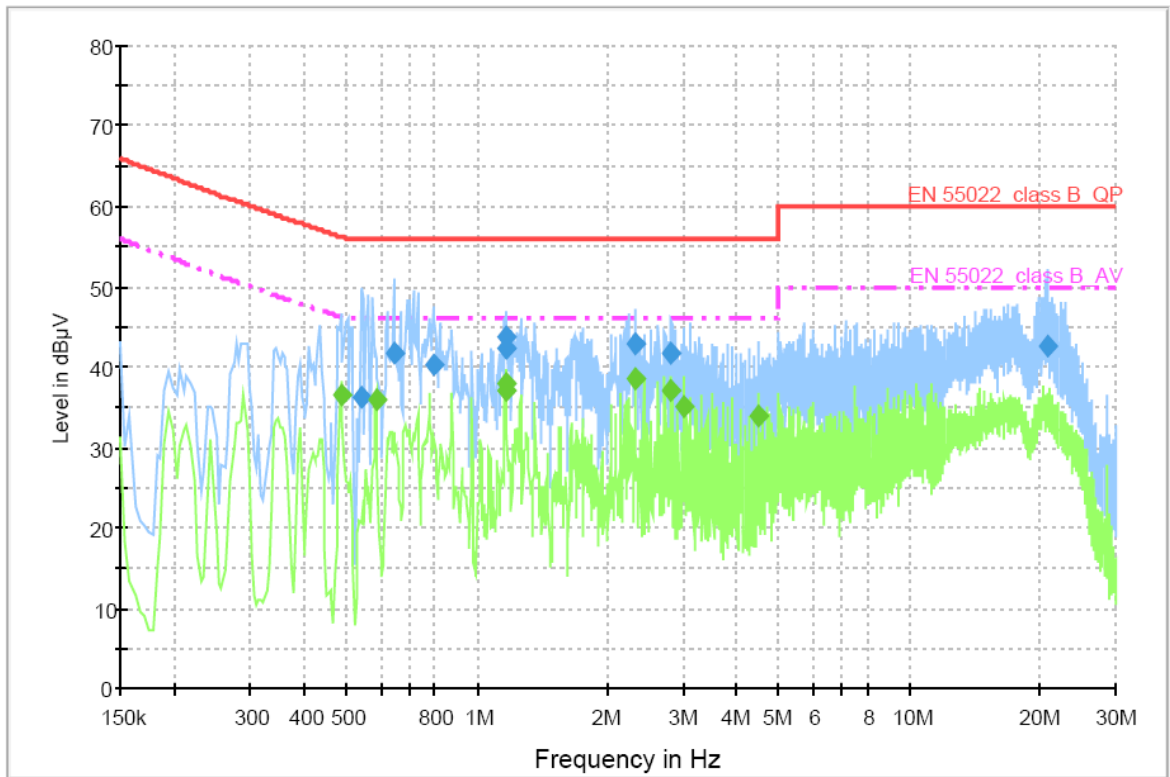
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.342000	38.3	1000.000	9.000	GND	N	10.0	10.6	48.9	
0.490000	34.4	1000.000	9.000	GND	N	10.0	11.8	46.2	
0.874000	37.4	1000.000	9.000	GND	N	10.0	8.6	46.0	
0.974000	35.8	1000.000	9.000	GND	N	10.0	10.2	46.0	
1.754000	34.8	1000.000	9.000	GND	N	10.1	11.2	46.0	
2.142000	36.5	1000.000	9.000	GND	N	10.1	9.5	46.0	
2.822000	37.0	1000.000	9.000	GND	N	10.1	9.0	46.0	
4.086000	35.1	1000.000	9.000	GND	N	10.2	10.9	46.0	

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



◆ Test resolution: USB memory stick play mode

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.542000	36.2	1000.000	9.000	GND	L1	10.0	19.8	56.0	
0.642000	41.8	1000.000	9.000	GND	L1	10.0	14.2	56.0	
0.794000	40.3	1000.000	9.000	GND	L1	10.0	15.7	56.0	
1.166000	42.2	1000.000	9.000	GND	L1	10.0	13.8	56.0	
1.170000	43.9	1000.000	9.000	GND	L1	10.0	12.1	56.0	
2.334000	42.8	1000.000	9.000	GND	L1	10.1	13.2	56.0	
2.822000	41.6	1000.000	9.000	GND	L1	10.1	14.4	56.0	
20.938000	42.7	1000.000	9.000	GND	L1	10.9	17.3	60.0	

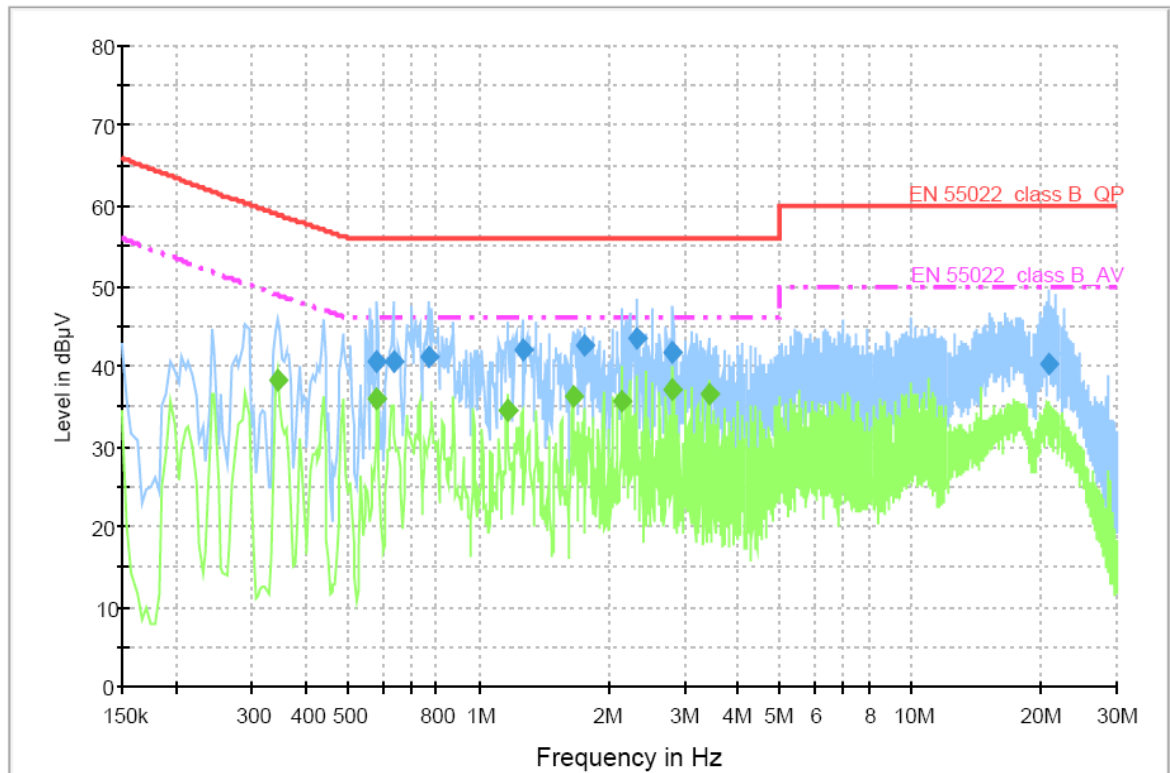
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.486000	36.6	1000.000	9.000	GND	L1	10.0	9.6	46.2	
0.586000	36.0	1000.000	9.000	GND	L1	10.0	10.0	46.0	
1.166000	37.1	1000.000	9.000	GND	L1	10.0	8.9	46.0	
1.170000	38.0	1000.000	9.000	GND	L1	10.0	8.0	46.0	
2.334000	38.5	1000.000	9.000	GND	L1	10.1	7.5	46.0	
2.822000	37.2	1000.000	9.000	GND	L1	10.1	8.8	46.0	
3.018000	35.2	1000.000	9.000	GND	L1	10.1	10.8	46.0	
4.474000	33.9	1000.000	9.000	GND	L1	10.2	12.1	46.0	

< Fig 12. Conducted emission result (Live line)>



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.582000	40.7	1000.000	9.000	GND	N	10.0	15.3	56.0	
0.634000	40.6	1000.000	9.000	GND	N	10.0	15.4	56.0	
0.766000	41.2	1000.000	9.000	GND	N	10.0	14.8	56.0	
1.266000	42.0	1000.000	9.000	GND	N	10.1	14.0	56.0	
1.754000	42.6	1000.000	9.000	GND	N	10.1	13.4	56.0	
2.338000	43.6	1000.000	9.000	GND	N	10.1	12.4	56.0	
2.822000	41.8	1000.000	9.000	GND	N	10.1	14.2	56.0	
20.806000	40.2	1000.000	9.000	GND	N	10.8	19.8	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.342000	38.3	1000.000	9.000	GND	N	10.0	10.6	48.9	
0.582000	36.0	1000.000	9.000	GND	N	10.0	10.0	46.0	
1.166000	34.4	1000.000	9.000	GND	N	10.1	11.6	46.0	
1.170000	34.4	1000.000	9.000	GND	N	10.1	11.6	46.0	
1.654000	36.2	1000.000	9.000	GND	N	10.1	9.8	46.0	
2.142000	35.6	1000.000	9.000	GND	N	10.1	10.4	46.0	
2.822000	37.0	1000.000	9.000	GND	N	10.1	9.0	46.0	
3.406000	36.6	1000.000	9.000	GND	N	10.1	9.4	46.0	

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



6. Radiated Emission

6.1 Operating Environment

Temperature : 21 °C
Relative Humidity : 45 % 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	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 3 m, Vertical)	± 3.54 dB	Confidence levels of 95 % (k=2)
Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)	± 3.49 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)	± 3.85 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal)	± 3.76 dB	Confidence levels of 95 % (k=2)
Radiated emission (30 MHz ~ 300 MHz, 10 m, Vertical)	± 3.21 dB	Confidence levels of 95 % (k=2)
Radiated emission (30 MHz ~ 300 MHz, 10 m, Horizontal)	± 3.32 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Vertical)	± 3.77 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Horizontal)	± 3.84 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
■ - ESI	Rohde & Schwarz	EMI test receiver	830482/010	12. 14. 2009
■ - VULB9160	Schwarzbeck	Broadband Test Antenna	3193	12. 11. 2009
■ - BBHA9120D	Schwarzbeck	Horn ANT	207	12. 26. 2009
■ - MCU066	matur GmbH	MCU066	1390306	N/A
■ - TT2.5SI	matur GmbH	Turntable	1390307	N/A
■ - AM 4.0	matur GmbH	Antenna Mast	1390308	N/A
■ - AFS 44 00101800-25-10P-44	MITEQ	Preamplifier	1258943	11. 12. 2010

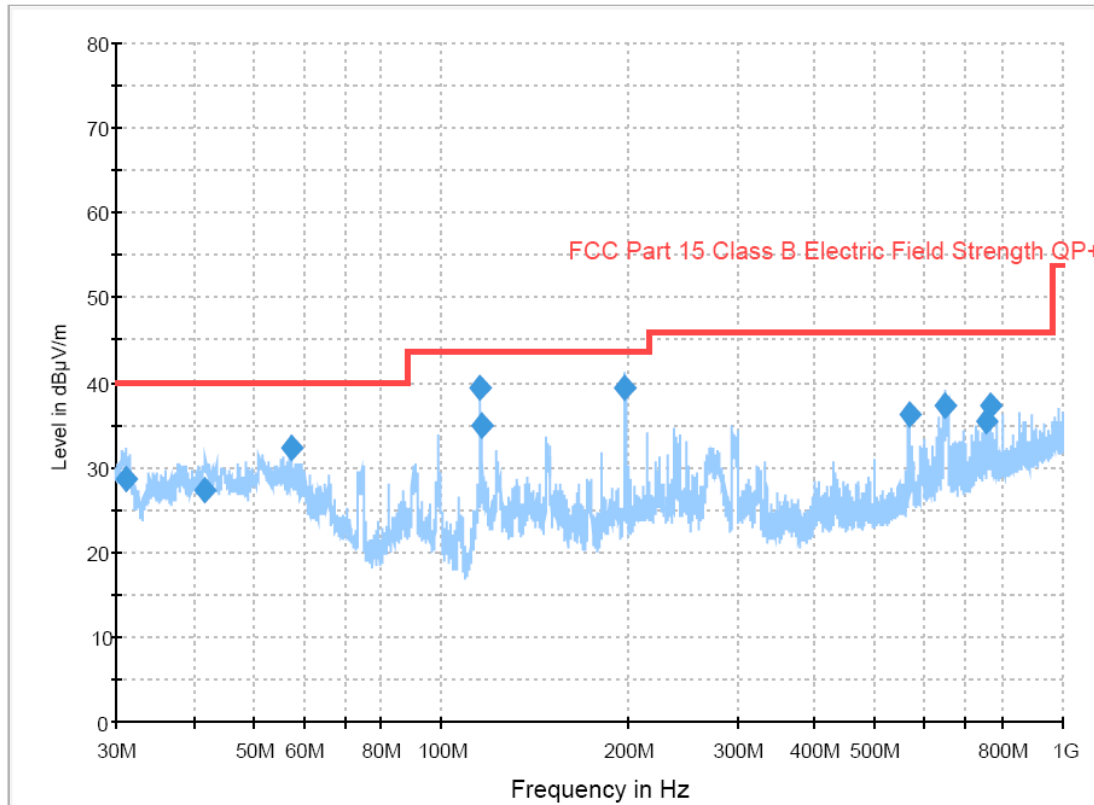
6.6 Test data for Radiated Emission

- Test Date : December 4, 2009
- 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 1000 MHz (648 MHz). The measurement was made up to 5 000 MHz



- ◆ Operating Condition: 1 920 * 1 080 / 60 Hz (RGB: Analog mode)
Detector mode: Quasi- peak detector mode

FCC_ESIB_Direct_RE with Scans



Final Result 1

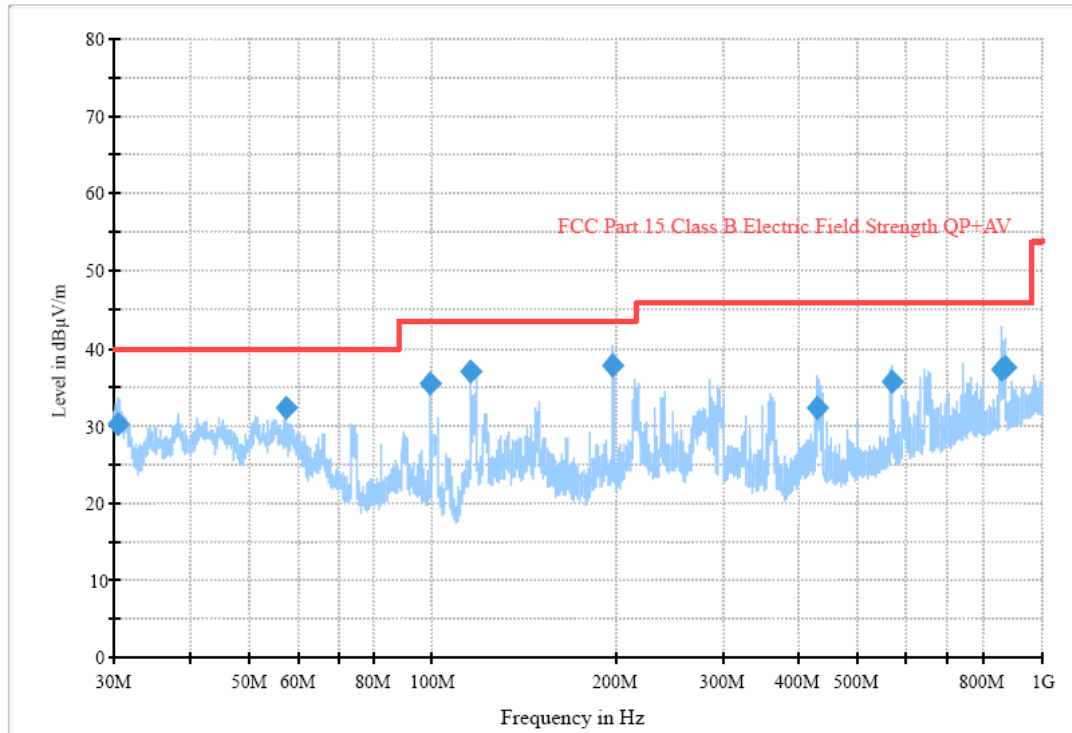
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
31.240000	28.5	1000.0	120.000	100.0	H	225.0	11.9	11.5	40.0
41.840000	27.4	1000.0	120.000	100.0	H	180.0	12.8	12.6	40.0
57.360000	32.4	1000.0	120.000	100.0	H	180.0	12.9	7.6	40.0
115.520000	39.4	1000.0	120.000	100.0	H	72.0	12.5	4.1	43.5
116.640000	34.8	1000.0	120.000	100.0	H	0.0	12.6	8.7	43.5
198.000000	39.2	1000.0	120.000	186.0	V	168.0	11.9	4.3	43.5
566.480000	36.2	1000.0	120.000	100.0	H	187.0	22.5	9.8	46.0
648.080000	37.1	1000.0	120.000	100.0	V	214.0	23.9	8.9	46.0
755.160000	35.5	1000.0	120.000	110.0	V	182.0	26.2	10.5	46.0
766.400000	37.3	1000.0	120.000	100.0	V	144.0	26.3	8.7	46.0

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



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

FCC_ESIB_Direct_RE with Scans



Final Result 1

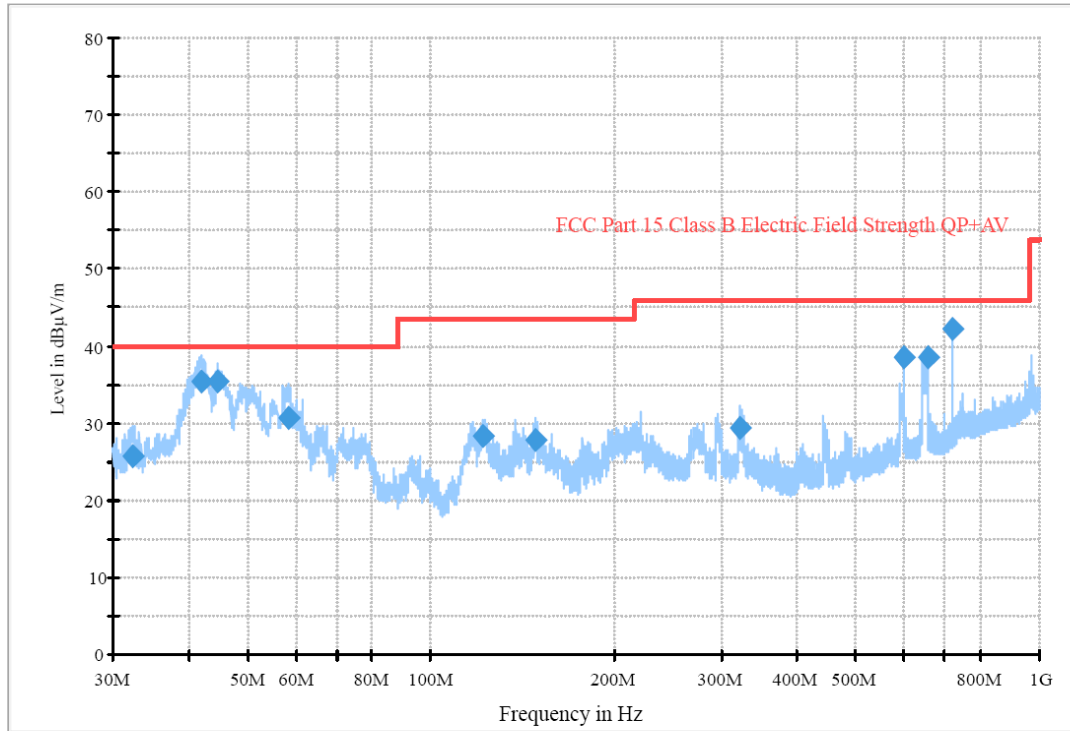
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.520000	30.1	1000.0	120.000	130.0	H	248.0	11.9	9.9	40.0
57.400000	32.4	1000.0	120.000	100.0	H	171.0	12.9	7.6	40.0
99.000000	35.5	1000.0	120.000	111.0	H	280.0	10.6	8.0	43.5
115.520000	37.0	1000.0	120.000	100.0	H	76.0	12.5	6.5	43.5
198.000000	37.7	1000.0	120.000	181.0	V	156.0	11.9	5.8	43.5
427.680000	32.2	1000.0	120.000	167.0	V	186.0	19.2	13.8	46.0
566.360000	35.8	1000.0	120.000	100.0	H	186.0	22.5	10.2	46.0
859.360000	37.2	1000.0	120.000	181.0	V	225.0	27.3	8.8	46.0
871.840000	37.5	1000.0	120.000	212.0	V	180.0	27.4	8.5	46.0

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



- ◆ Operating Condition: USB memory stick play mode
Detector mode: Quasi- peak detector mode

FCC_ESIB_Direct_RE with Scans



Final Result 1

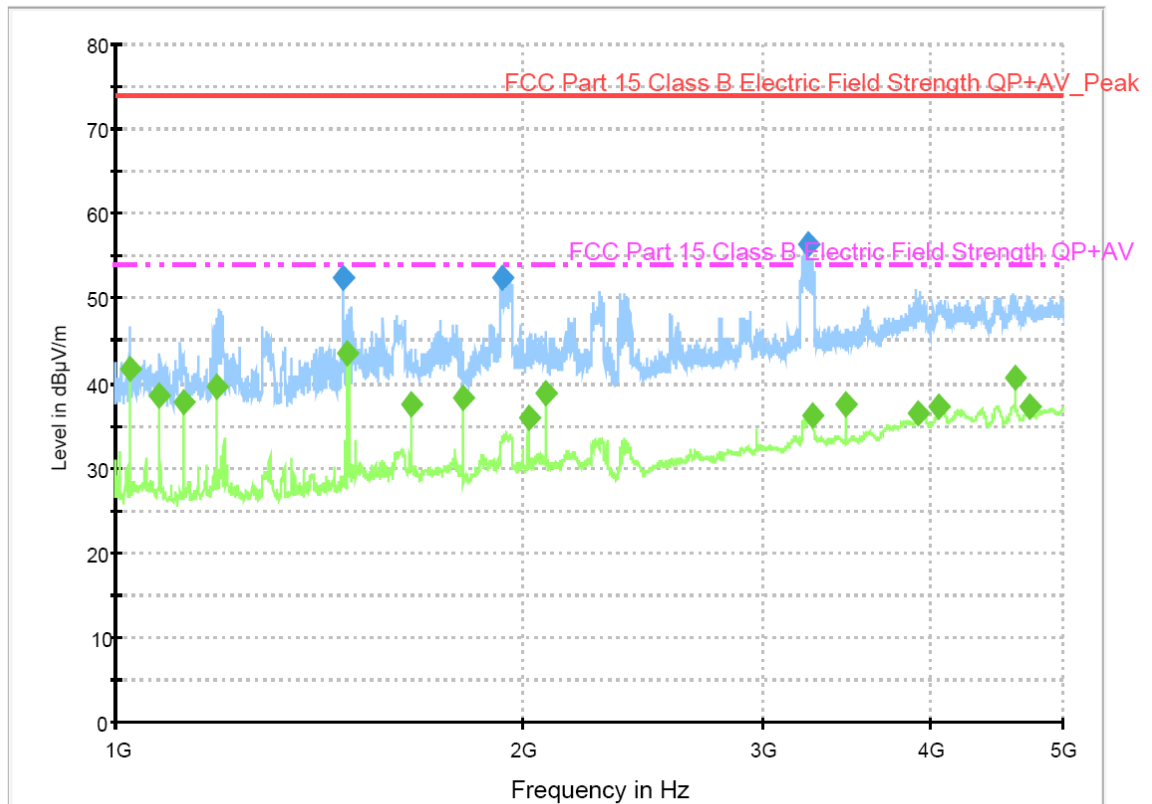
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
32.280000	25.7	1000.0	120.000	100.0	V	0.0	11.9	14.3	40.0
41.960000	35.3	1000.0	120.000	100.0	V	35.0	12.8	4.7	40.0
44.800000	35.4	1000.0	120.000	100.0	V	22.0	13.2	4.6	40.0
58.200000	30.8	1000.0	120.000	100.0	V	148.0	12.8	9.2	40.0
122.200000	28.3	1000.0	120.000	100.0	V	7.0	13.2	15.2	43.5
148.800000	27.8	1000.0	120.000	111.0	V	5.0	14.7	15.7	43.5
321.720000	29.3	1000.0	120.000	100.0	H	205.0	16.3	16.7	46.0
600.000000	38.4	1000.0	120.000	117.0	H	186.0	23.5	7.6	46.0
654.000000	38.5	1000.0	120.000	100.0	H	162.0	24.0	7.5	46.0
720.000000	42.0	1000.0	120.000	100.0	H	181.0	25.2	4.0	46.0

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



- ◆ Operating Condition: 1 920 * 1 080 / 60 Hz (RGB: Analog mode)
Detector mode: Peak detector mode / Average detector mode

FCC_ESIB_Preamplifier_RE with Scans



Final Result 1

Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1474.000000	52.5	100.0	V	0.0	-14.5	21.5	74.0	
1927.600000	52.6	100.0	V	180.0	-13.1	21.4	74.0	
3248.400000	56.5	100.0	H	180.0	-7.5	17.5	74.0	

Final Result 2

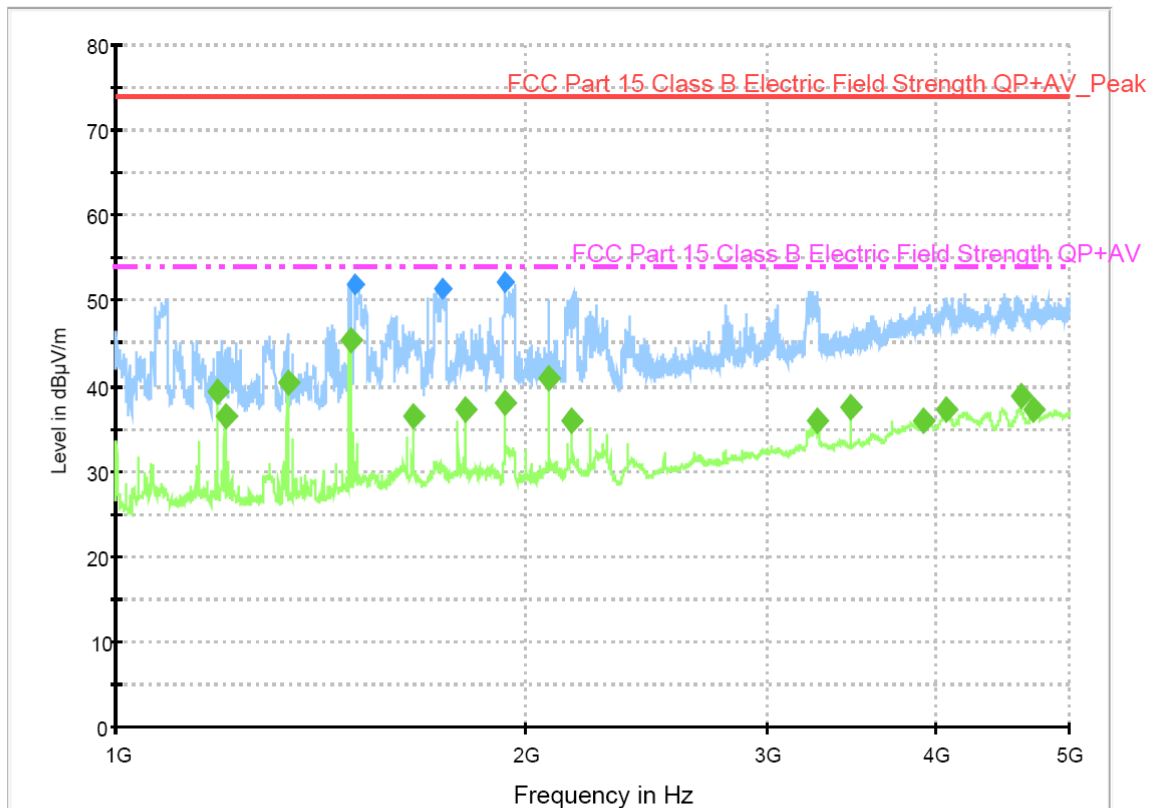
Frequency (MHz)	Average-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1024.000000	41.8	200.0	H	270.0	-16.0	12.2	54.0	
1078.000000	38.5	200.0	V	90.0	-15.7	15.5	54.0	
1122.400000	37.7	100.0	V	90.0	-15.5	16.3	54.0	
1188.000000	39.7	100.0	V	90.0	-15.3	14.3	54.0	
1484.800000	43.6	100.0	V	0.0	-14.5	10.4	54.0	
1653.600000	37.5	100.0	V	0.0	-13.7	16.5	54.0	
1804.000000	38.2	200.0	V	0.0	-13.1	15.8	54.0	
2016.000000	36.0	100.0	V	180.0	-12.5	18.0	54.0	
2078.800000	38.8	100.0	V	180.0	-12.2	15.2	54.0	
3266.800000	36.3	100.0	H	180.0	-7.4	17.7	54.0	
3456.000000	37.6	100.0	H	180.0	-6.7	16.4	54.0	
3914.800000	36.3	200.0	H	180.0	-3.8	17.7	54.0	
4052.400000	37.2	100.0	H	180.0	-3.2	16.8	54.0	
4608.000000	40.6	100.0	H	180.0	-3.2	13.4	54.0	
4718.400000	37.3	200.0	H	180.0	-3.0	16.7	54.0	

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



- ◆ Operating Condition: 1 920 * 1 080 / 60 Hz (HDMI/DVI: Digital mode)
Detector mode: Peak detector mode / Average detector mode

FCC_ESIB_Preamplifier_RE with Scans



Final Result 1

Frequency (MHz)	Maxpeak-MaxHold (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
1496.800000	52.0	100.0	V	0.0	-14.5	22.0	74.0	
1734.800000	51.5	100.0	V	0.0	-13.2	22.5	74.0	
1930.400000	52.3	100.0	H	180.0	-12.9	21.7	74.0	

Final Result 2

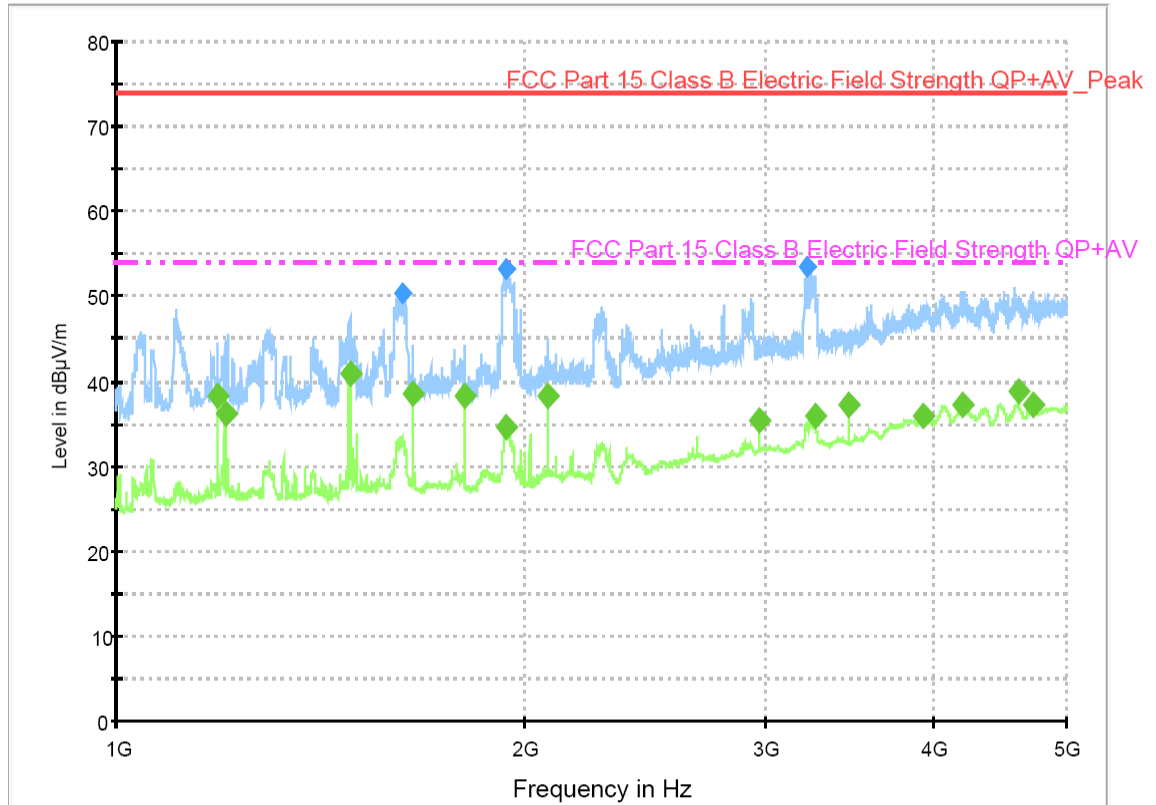
Frequency (MHz)	Average-MaxHold (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
1188.000000	39.4	100.0	V	90.0	-15.3	14.6	54.0	
1202.800000	36.4	200.0	H	270.0	-15.2	17.6	54.0	
1336.400000	40.5	100.0	V	180.0	-14.5	13.5	54.0	
1485.200000	45.5	100.0	V	0.0	-14.5	8.5	54.0	
1653.600000	36.6	100.0	V	0.0	-13.7	17.4	54.0	
1804.000000	37.1	200.0	V	0.0	-13.1	16.9	54.0	
1930.400000	38.1	100.0	H	180.0	-12.9	15.9	54.0	
2078.800000	41.0	100.0	V	180.0	-12.2	13.0	54.0	
2161.600000	35.9	100.0	H	180.0	-11.8	18.1	54.0	
3266.800000	35.9	100.0	H	180.0	-7.4	18.1	54.0	
3456.000000	37.4	100.0	H	180.0	-6.7	16.6	54.0	
3916.400000	36.0	200.0	H	180.0	-3.8	18.0	54.0	
4059.200000	37.1	200.0	V	90.0	-3.2	16.9	54.0	
4608.000000	38.8	100.0	H	180.0	-3.2	15.2	54.0	
4717.600000	37.3	100.0	H	180.0	-3.0	16.7	54.0	

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



- ◆ Operating Condition: USB memory stick play mode
Detector mode: Peak detector mode / Average detector mode

FCC_ESIB_Preamplifier with Scans



Final Result 1

Frequency (MHz)	Maxpeak-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1624.000000	50.5	100.0	V	0.0	-13.7	23.5	74.0	
1938.000000	53.4	100.0	H	180.0	-12.9	20.6	74.0	
3218.000000	53.6	100.0	H	180.0	-7.4	20.4	74.0	

Final Result 2

Frequency (MHz)	Average-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1188.000000	38.4	100.0	V	90.0	-15.3	15.6	54.0	
1202.800000	36.1	200.0	H	270.0	-15.2	17.9	54.0	
1485.200000	40.9	100.0	V	0.0	-14.5	13.1	54.0	
1654.000000	38.5	100.0	V	0.0	-13.7	15.5	54.0	
1804.000000	38.3	200.0	V	0.0	-13.1	15.7	54.0	
1939.200000	34.5	100.0	H	180.0	-12.9	19.5	54.0	
2079.200000	38.3	100.0	V	180.0	-12.2	15.7	54.0	
2970.000000	35.3	100.0	H	180.0	-8.5	18.7	54.0	
3267.200000	36.0	100.0	H	180.0	-7.4	18.0	54.0	
3456.000000	37.3	100.0	H	180.0	-6.7	16.7	54.0	
3919.600000	36.0	200.0	H	180.0	-3.8	18.0	54.0	
4199.600000	37.3	100.0	H	180.0	-3.3	16.7	54.0	
4608.000000	38.8	100.0	H	180.0	-3.2	15.2	54.0	
4720.000000	37.3	100.0	H	180.0	-3.0	16.7	54.0	

< Fig 19. Radiated emission result (1 000 MHz ~ 5 000 MHz)>



7. Sample Calculations

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

7.1 Example 1 :

■ 20.3 MHz

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

7.2 Example 2 :

■ 66.7 MHz

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



8. Recommendation & Conclusion

The data collected shows that the **LG Electronics Inc. LCD TV/Monitor (Model Name: 47LD450-UA)** was complies with §15.107 and 15.109 of the FCC Rules.