

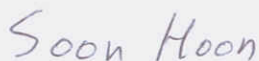
FCC EVALUATION REPORT FOR CERTIFICATION

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 : November 19, 2009****Order Number: GETEC-C1-09-228****Test Report Number: GETEC-E3-09-131****Test Site: Gumi College EMC Center****FCC Registration Number: (100749, 443957)****FCC ID.: BEJHS200****Applicant: LG Electronics Inc.**

Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: DLP projector with FM transmitter
Type of Authority	: Certification
Model Name	: HS200-JE, HS200G-JE, HS201-JE, HS201G-JE
Trade Name	: LG

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

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the vest of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested by,**Reviewed by,**

Soon-Hoon Jeong, Engineer
GUMI College EMC center



Tae-Sig Park, Technical Manager
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.** BEJHS200
- **EUT Type** DLP projector with FM transmitter
- **Model Name** HS200-JE, HS200G-JE, HS201-JE, HS201G-JE
- **Trade Name** LG
- **Serial Number** Prototype
- **Rule Part(s)** FCC Part 15 Subpart B
- **Type of Authority** Certification
- **Test Procedure(s)** ANSI C63.4 (2003) / Canadian standard ICES-003
- **Dates of Test** November 12 ~ 16, 2009
- **Place of Test** **Gumi College EMC Center** (FCC Registration Number: 100749, 443957)
407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.
- **Test Report Number** GETEC-E3-09-131
- **Dates of Issue** November 19, 2009



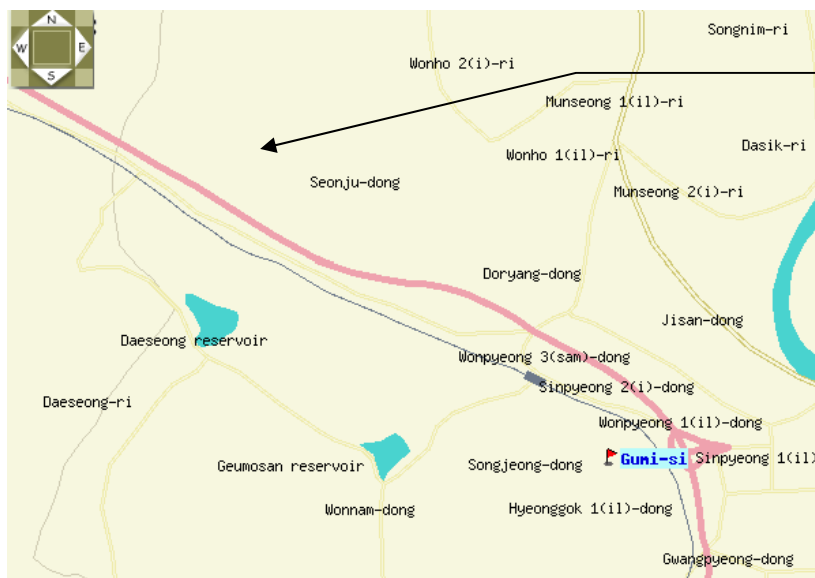
2. Introduction

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. DLP projector with FM transmitter (Model Name: HS200-JE)**

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 on October 19, 1992



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Gyeongbuk 730-711, Korea.
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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. DLP projector with FM transmitter (Model Name: HS200-JE) FCC ID.: BEJHS200**

*This device is certified pursuant to two different Part 15 rules sections.

This is for DLP projector. The certification report for FM transmitter will be submitted with a separate report.

Used AC/DC Adapter	: Model Name : PA-1900-08
	Manufacturer : Dongguang Lite Power 2nd Plant
	Ratings : Input : AC(100 ~ 240) V, (50 ~ 60) Hz, 1.5 A
	Output : DC 19 V, 4.74 A, 90 W Max
	Serial Number : 8Y00014602
Maximum Frequency range	: 400 MHz
External Connector	: RGB in, HDMI in, USB, Video in, Audio in, Headphone
Dimensions	: 60 mm(H) * 183 mm(B) * 122 mm(L)
Weight	: 798 g



3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID
PC	Hewlett Packard	D530	S/N: CNG34800PY FCC ID: DoC
Video card	ATI	ATI RV360(9600)	S/N: SN0402017176 FCC ID: DoC
Key-board	COMPAQ	166516-AD6	S/N: B13BBOR391006D FCC ID: AQ6-23K15
PS2 mouse	LOGITECH	M-S69	S/N: 334684-108 FCC ID: JNZ211443
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
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 Adapter	1.8 m unshielded
Adapter cable	Connected to the EUT and Adapter	1.7 m shielded with a ferrite core
Video(RGB)input cable	Connected to the EUT and PC	1.8 m shielded with two ferrite cores
Video(HDMI)cable	Connected to the EUT and PC	1.95 m shielded
PC sound cable	Connected to the EUT and PC	1.8 m shielded
AV input cable	Connected to the EUT and DVD player	1.8 m shielded
Headset cable	Connected to the EUT	2.75 m shielded

3.3 Modification Item(s)

- None



4. Description of tests

4.1 Test Condition

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

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

- Test Voltage / Frequency : AC 120 V / 60 Hz
- Test Mode(s)
 - . Projection mode
 - . Radiated emission: 1 680 * 1 050 / 60 Hz (RGB: Analog), 1 680 * 1 050 / 60 Hz (HDMI/DVI: Digital)
 - . Conducted emission: 1 680 * 1 050 / 60 Hz (RGB: Analog), 1 680 * 1 050 / 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 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

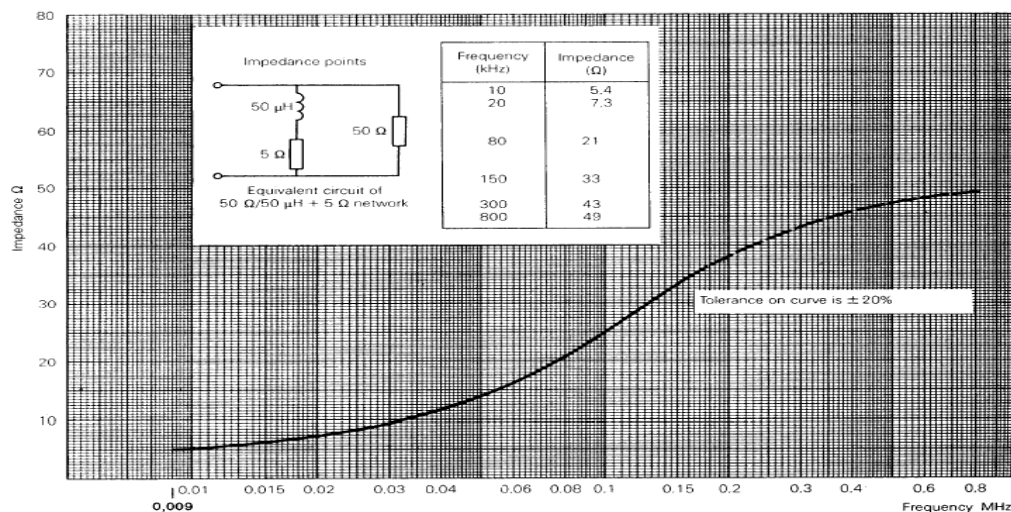


Fig 2. Impedance of LISN



4.3 Radiated Emission

The measurements were conducted in a 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 noted for each frequency found.

The spectrum was scanned from 30 to 1000 MHz, using biconical 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

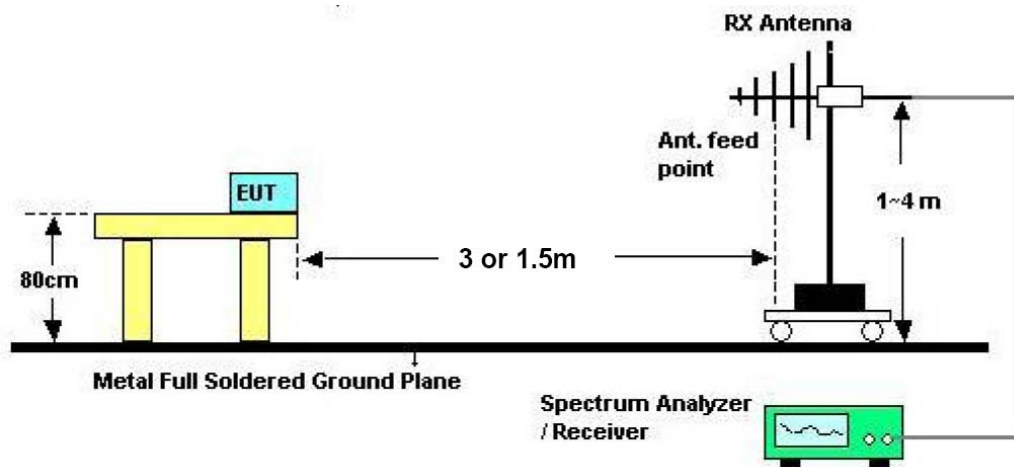


Fig 3. Dimensions of test site.



5. Conducted Emission

5.1 Operating Environment

Temperature : 23 °C
Relative Humidity : 43 % 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

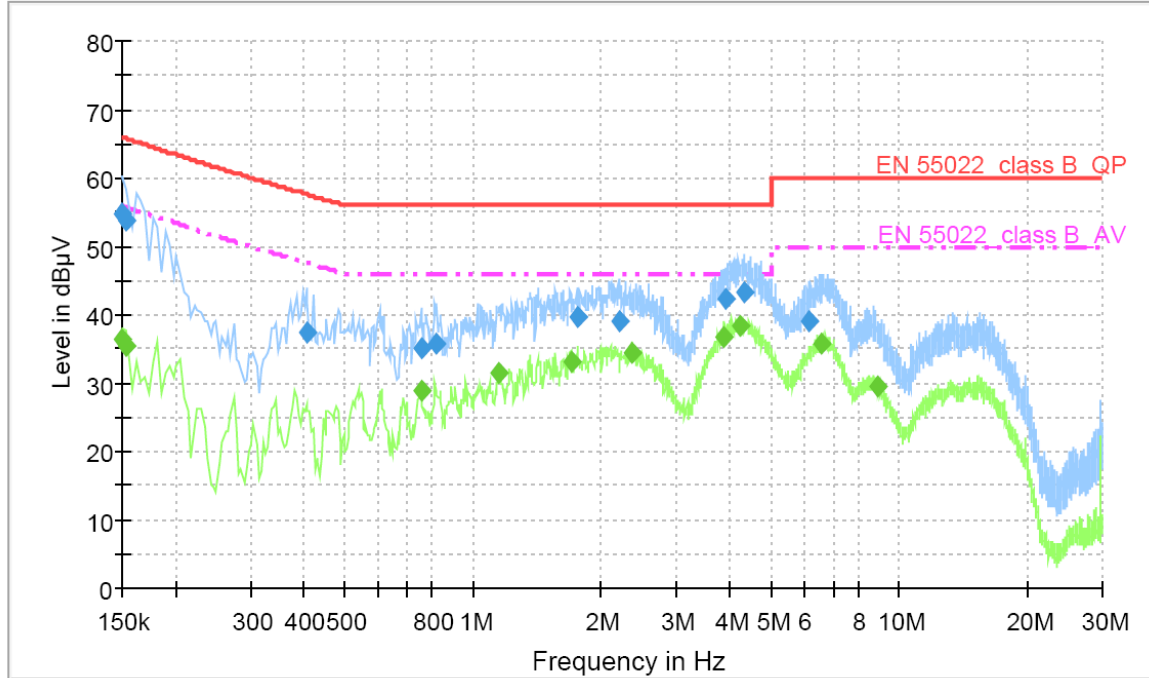
5.6 Test data for Conducted Emission

- . Test Date : November 12, 2009
- . Resolution Bandwidth : 9 kHz
- . Frequency Range : 0.15 MHz ~ 30 MHz



◆ Operating condition: 1 680 * 1 050 / 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
0.150000	54.7	1000.000	9.000	GND	L1	9.9	11.3	66.0	
0.154000	53.8	1000.000	9.000	GND	L1	9.9	12.0	65.8	
0.406000	37.2	1000.000	9.000	GND	L1	10.0	20.4	57.6	
0.758000	35.2	1000.000	9.000	GND	L1	10.0	20.8	56.0	
0.822000	35.7	1000.000	9.000	GND	L1	10.0	20.3	56.0	
1.754000	39.6	1000.000	9.000	GND	L1	10.1	16.4	56.0	
2.210000	39.1	1000.000	9.000	GND	L1	10.1	16.9	56.0	
3.918000	42.2	1000.000	9.000	GND	L1	10.2	13.8	56.0	
4.322000	43.4	1000.000	9.000	GND	L1	10.2	12.6	56.0	
6.158000	39.1	1000.000	9.000	GND	L1	10.2	20.9	60.0	

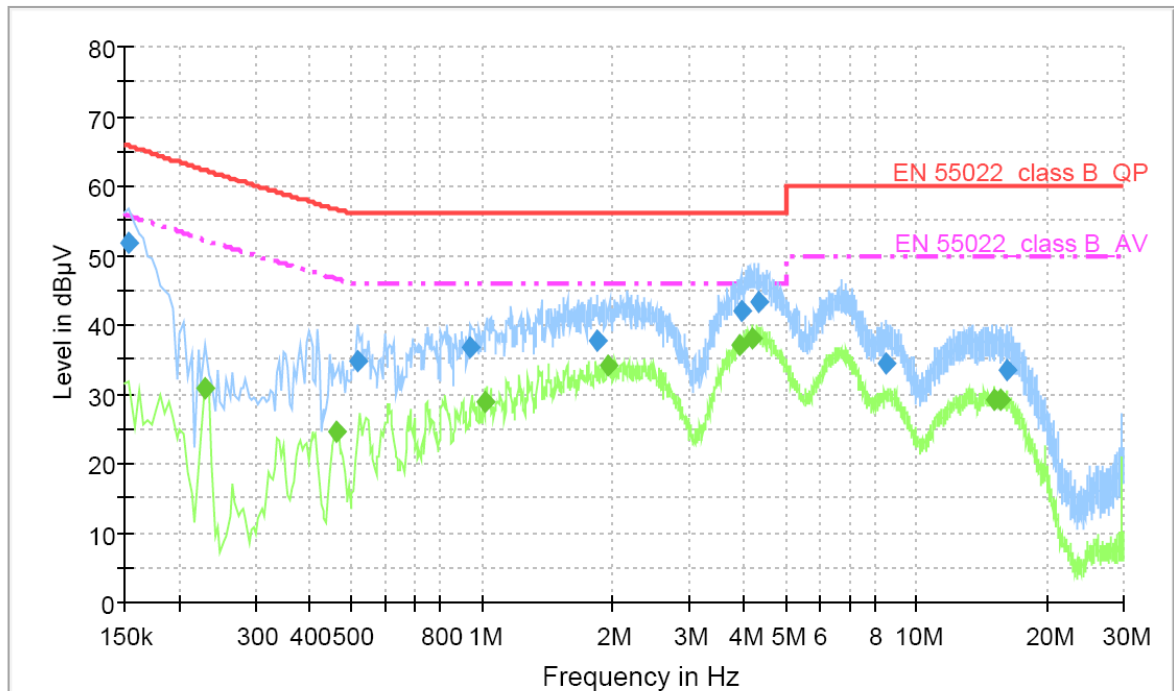
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	36.4	1000.000	9.000	GND	L1	9.9	19.6	56.0	
0.154000	35.5	1000.000	9.000	GND	L1	9.9	20.3	55.8	
0.754000	28.7	1000.000	9.000	GND	L1	10.0	17.3	46.0	
1.150000	31.3	1000.000	9.000	GND	L1	10.0	14.7	46.0	
1.694000	33.2	1000.000	9.000	GND	L1	10.1	12.8	46.0	
2.370000	34.4	1000.000	9.000	GND	L1	10.1	11.6	46.0	
3.894000	36.7	1000.000	9.000	GND	L1	10.2	9.3	46.0	
4.246000	38.2	1000.000	9.000	GND	L1	10.2	7.8	46.0	
6.590000	35.7	1000.000	9.000	GND	L1	10.2	14.3	50.0	
8.930000	29.5	1000.000	9.000	GND	L1	10.3	20.5	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
0.154000	51.9	1000.000	9.000	GND	N	9.9	13.9	65.8	
0.518000	34.8	1000.000	9.000	GND	N	10.0	21.2	56.0	
0.942000	36.6	1000.000	9.000	GND	N	10.0	19.4	56.0	
1.846000	37.9	1000.000	9.000	GND	N	10.1	18.1	56.0	
3.942000	41.9	1000.000	9.000	GND	N	10.2	14.1	56.0	
4.326000	43.1	1000.000	9.000	GND	N	10.2	12.9	56.0	
8.514000	34.4	1000.000	9.000	GND	N	10.3	25.6	60.0	
16.130000	33.5	1000.000	9.000	GND	N	10.6	26.5	60.0	

Final Measurement Detector 2

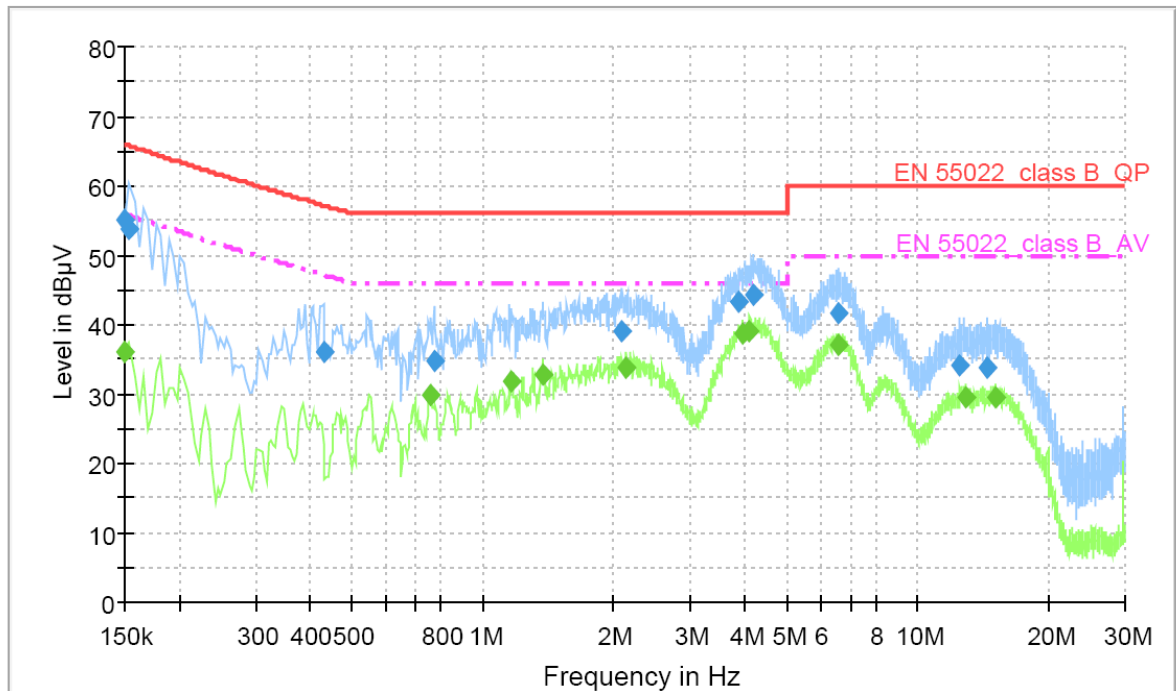
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.230000	30.9	1000.000	9.000	GND	N	10.0	21.3	52.2	
0.462000	24.5	1000.000	9.000	GND	N	10.0	22.1	46.6	
1.018000	28.9	1000.000	9.000	GND	N	10.0	17.1	46.0	
1.954000	34.0	1000.000	9.000	GND	N	10.1	12.0	46.0	
3.914000	37.1	1000.000	9.000	GND	N	10.2	8.9	46.0	
4.186000	38.1	1000.000	9.000	GND	N	10.2	7.9	46.0	
15.110000	29.2	1000.000	9.000	GND	N	10.6	20.8	50.0	
15.694000	29.0	1000.000	9.000	GND	N	10.6	21.0	50.0	

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



◆ Operating condition: 1 680 * 1 050 / 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
0.150000	54.9	1000.000	9.000	GND	L1	9.9	11.1	66.0	
0.154000	53.9	1000.000	9.000	GND	L1	9.9	11.9	65.8	
0.430000	36.1	1000.000	9.000	GND	L1	10.0	21.1	57.2	
0.774000	34.6	1000.000	9.000	GND	L1	10.0	21.4	56.0	
2.094000	39.1	1000.000	9.000	GND	L1	10.1	16.9	56.0	
3.886000	43.2	1000.000	9.000	GND	L1	10.2	12.8	56.0	
4.190000	44.2	1000.000	9.000	GND	L1	10.2	11.8	56.0	
6.562000	41.7	1000.000	9.000	GND	L1	10.2	18.3	60.0	
12.466000	34.0	1000.000	9.000	GND	L1	10.5	26.0	60.0	
14.438000	33.9	1000.000	9.000	GND	L1	10.6	26.1	60.0	

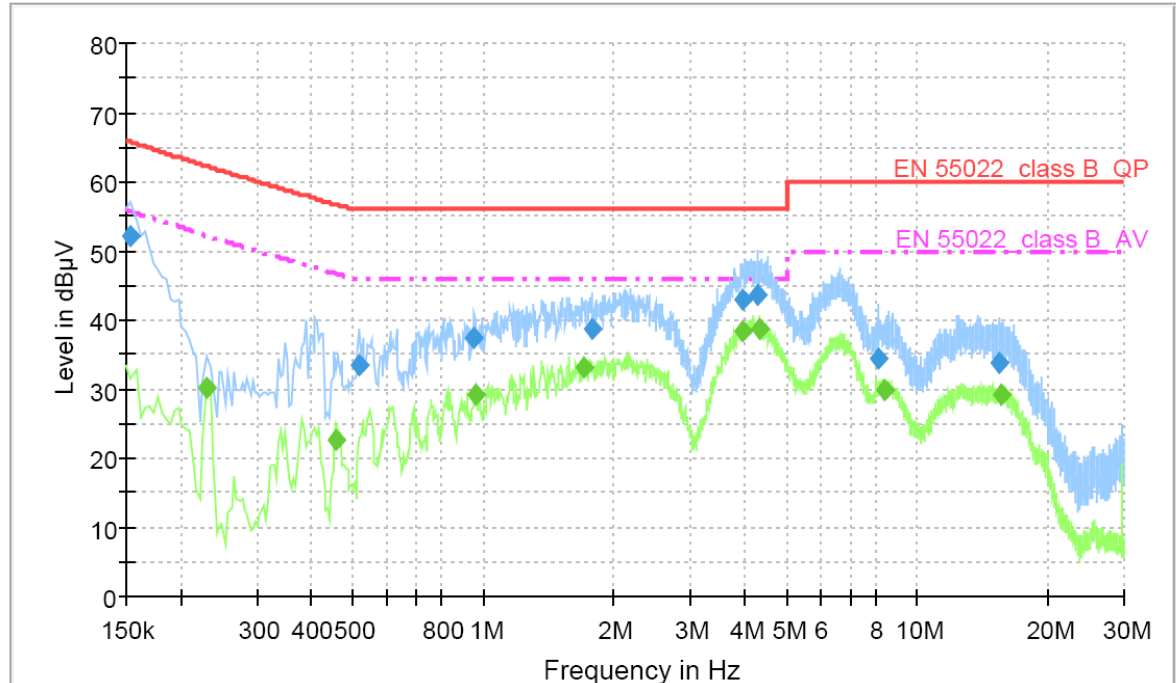
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	36.2	1000.000	9.000	GND	L1	9.9	19.8	56.0	
0.754000	29.7	1000.000	9.000	GND	L1	10.0	16.3	46.0	
1.166000	32.0	1000.000	9.000	GND	L1	10.0	14.0	46.0	
1.378000	32.8	1000.000	9.000	GND	L1	10.0	13.2	46.0	
2.142000	33.7	1000.000	9.000	GND	L1	10.1	12.3	46.0	
3.946000	38.7	1000.000	9.000	GND	L1	10.2	7.3	46.0	
4.118000	39.1	1000.000	9.000	GND	L1	10.2	6.9	46.0	
6.578000	37.2	1000.000	9.000	GND	L1	10.2	12.8	50.0	
12.894000	29.5	1000.000	9.000	GND	L1	10.5	20.5	50.0	
15.178000	29.4	1000.000	9.000	GND	L1	10.6	20.6	50.0	

< Fig 6. Conducted emission result (Live line)>



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.154000	52.0	1000.000	9.000	GND	N	9.9	13.8	65.8	
0.518000	33.5	1000.000	9.000	GND	N	10.0	22.5	56.0	
0.954000	37.4	1000.000	9.000	GND	N	10.0	18.6	56.0	
1.778000	38.7	1000.000	9.000	GND	N	10.1	17.3	56.0	
3.942000	43.1	1000.000	9.000	GND	N	10.2	12.9	56.0	
4.290000	43.5	1000.000	9.000	GND	N	10.2	12.5	56.0	
8.162000	34.3	1000.000	9.000	GND	N	10.3	25.7	60.0	
15.470000	33.9	1000.000	9.000	GND	N	10.6	26.1	60.0	

Final Measurement Detector 2

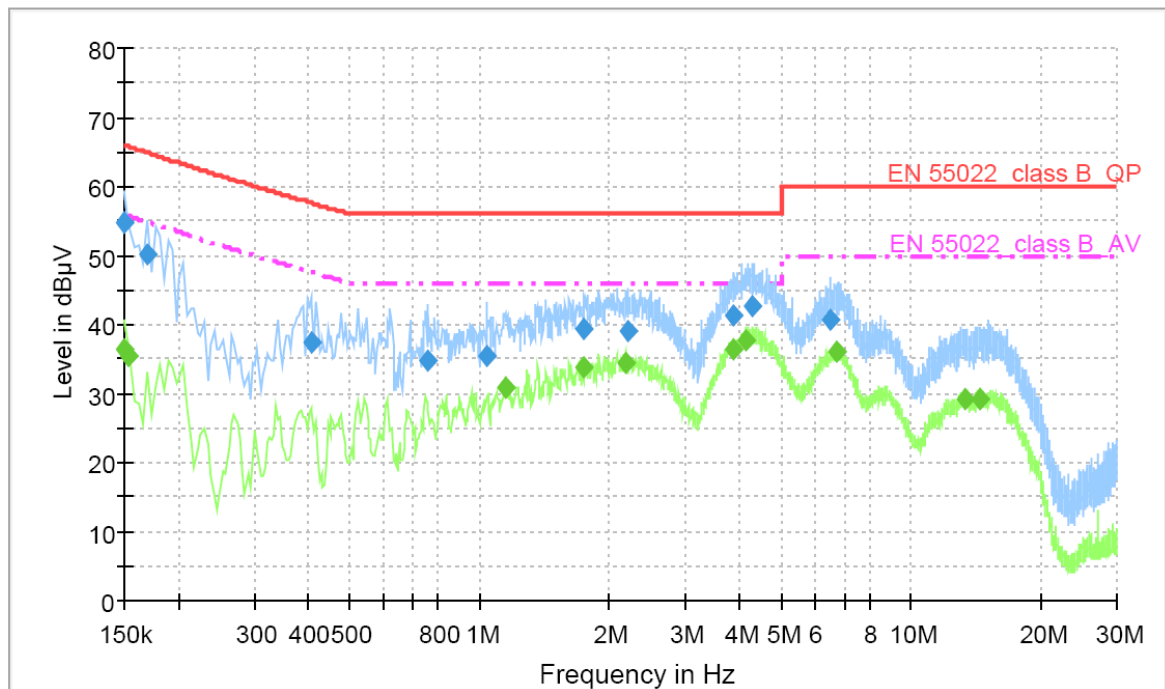
Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.230000	30.2	1000.000	9.000	GND	N	10.0	22.0	52.2	
0.458000	22.7	1000.000	9.000	GND	N	10.0	24.0	46.7	
0.958000	29.3	1000.000	9.000	GND	N	10.0	16.7	46.0	
1.706000	33.2	1000.000	9.000	GND	N	10.1	12.8	46.0	
3.942000	38.2	1000.000	9.000	GND	N	10.2	7.8	46.0	
4.350000	38.6	1000.000	9.000	GND	N	10.2	7.4	46.0	
8.442000	30.0	1000.000	9.000	GND	N	10.3	20.0	50.0	
15.554000	29.2	1000.000	9.000	GND	N	10.6	20.8	50.0	

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



◆ Operating condition: 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
0.150000	54.7	1000.000	9.000	GND	L1	9.9	11.3	66.0	
0.170000	50.2	1000.000	9.000	GND	L1	9.9	14.7	64.9	
0.406000	37.4	1000.000	9.000	GND	L1	10.0	20.2	57.6	
0.758000	34.7	1000.000	9.000	GND	L1	10.0	21.3	56.0	
1.038000	35.5	1000.000	9.000	GND	L1	10.0	20.5	56.0	
1.750000	39.2	1000.000	9.000	GND	L1	10.1	16.8	56.0	
2.210000	39.1	1000.000	9.000	GND	L1	10.1	16.9	56.0	
3.894000	41.4	1000.000	9.000	GND	L1	10.2	14.6	56.0	
4.302000	42.7	1000.000	9.000	GND	L1	10.2	13.3	56.0	
6.486000	40.7	1000.000	9.000	GND	L1	10.2	19.3	60.0	

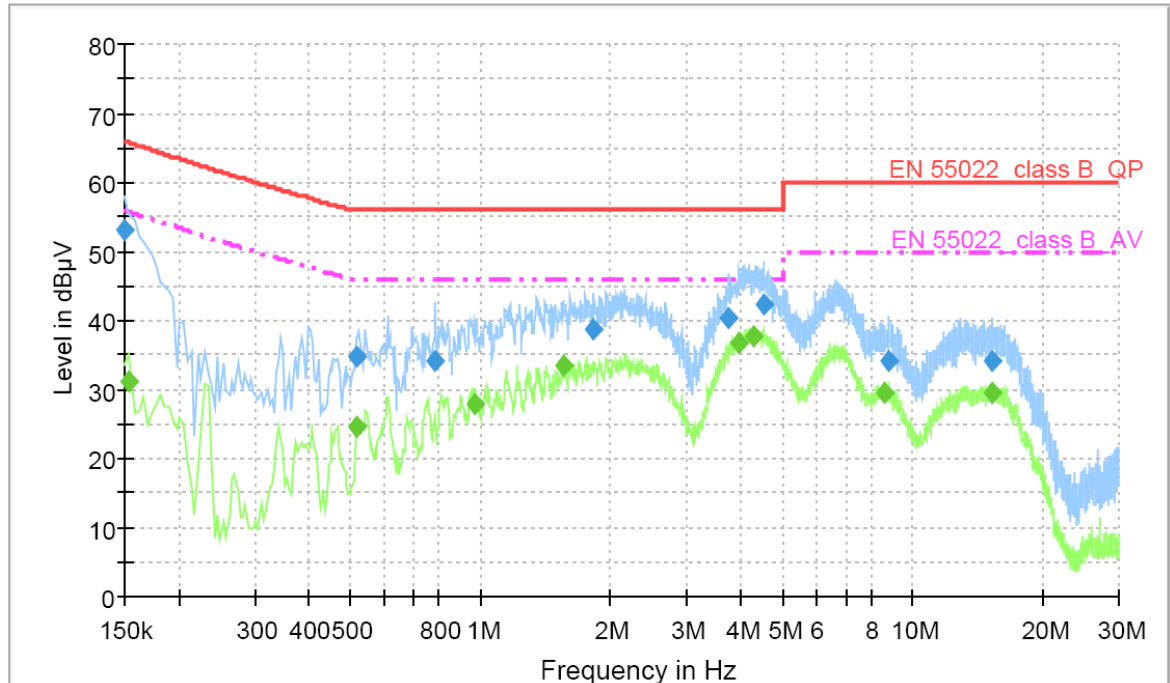
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	36.3	1000.000	9.000	GND	L1	9.9	19.7	56.0	
0.154000	35.5	1000.000	9.000	GND	L1	9.9	20.3	55.8	
1.146000	30.9	1000.000	9.000	GND	L1	10.0	15.1	46.0	
1.750000	33.7	1000.000	9.000	GND	L1	10.1	12.3	46.0	
2.170000	34.5	1000.000	9.000	GND	L1	10.1	11.5	46.0	
3.858000	36.5	1000.000	9.000	GND	L1	10.2	9.5	46.0	
4.130000	37.8	1000.000	9.000	GND	L1	10.2	8.2	46.0	
6.730000	36.1	1000.000	9.000	GND	L1	10.2	13.9	50.0	
13.290000	29.2	1000.000	9.000	GND	L1	10.5	20.8	50.0	
14.490000	29.1	1000.000	9.000	GND	L1	10.6	20.9	50.0	

< Fig 8. Conducted emission result (Live line)>



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	53.1	1000.000	9.000	GND	N	9.9	12.9	66.0	
0.518000	34.9	1000.000	9.000	GND	N	10.0	21.1	56.0	
0.786000	34.0	1000.000	9.000	GND	N	10.0	22.0	56.0	
1.830000	38.6	1000.000	9.000	GND	N	10.1	17.4	56.0	
3.758000	40.2	1000.000	9.000	GND	N	10.2	15.8	56.0	
4.526000	42.3	1000.000	9.000	GND	N	10.2	13.7	56.0	
8.846000	34.1	1000.000	9.000	GND	N	10.3	25.9	60.0	
15.330000	34.1	1000.000	9.000	GND	N	10.6	25.9	60.0	

Final Measurement Detector 2

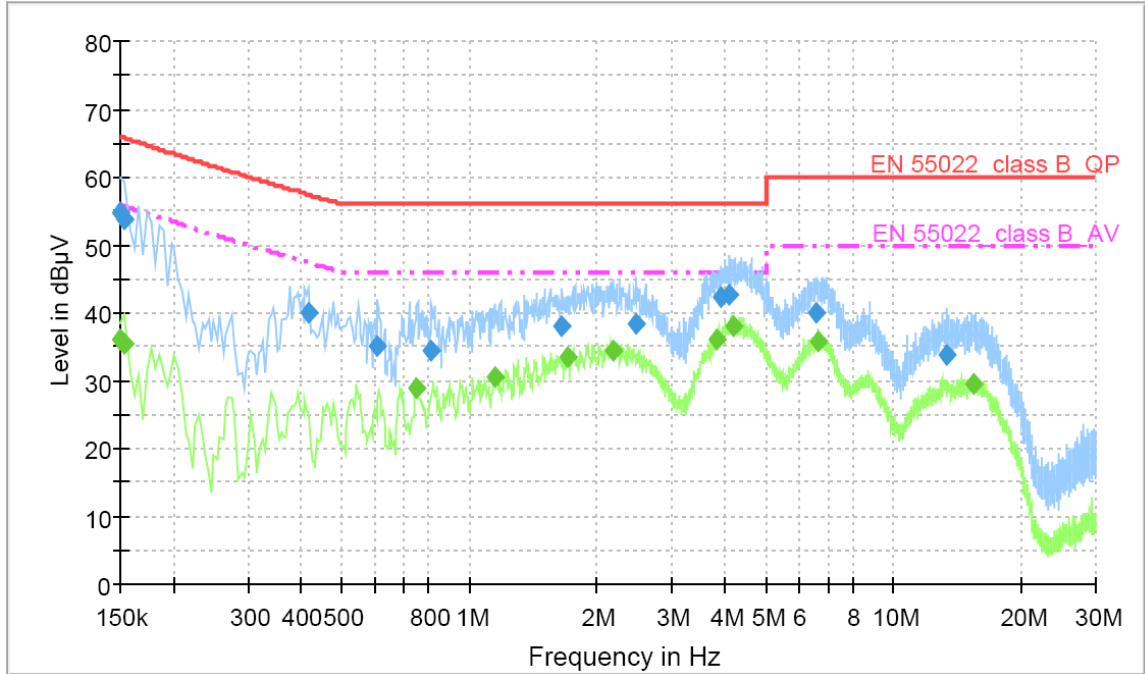
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.154000	31.2	1000.000	9.000	GND	N	9.9	24.6	55.8	
0.518000	24.5	1000.000	9.000	GND	N	10.0	21.5	46.0	
0.974000	28.0	1000.000	9.000	GND	N	10.0	18.0	46.0	
1.558000	33.4	1000.000	9.000	GND	N	10.1	12.6	46.0	
3.942000	36.8	1000.000	9.000	GND	N	10.2	9.2	46.0	
4.306000	37.8	1000.000	9.000	GND	N	10.2	8.2	46.0	
8.614000	29.6	1000.000	9.000	GND	N	10.3	20.4	50.0	
15.346000	29.4	1000.000	9.000	GND	N	10.6	20.6	50.0	

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



◆ Operating condition: 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
0.150000	54.7	1000.000	9.000	GND	L1	9.9	11.3	66.0	
0.154000	53.7	1000.000	9.000	GND	L1	9.9	12.1	65.8	
0.418000	39.9	1000.000	9.000	GND	L1	10.0	17.5	57.4	
0.606000	34.9	1000.000	9.000	GND	L1	10.0	21.1	56.0	
0.814000	34.5	1000.000	9.000	GND	L1	10.0	21.5	56.0	
1.654000	38.0	1000.000	9.000	GND	L1	10.1	18.0	56.0	
2.478000	38.3	1000.000	9.000	GND	L1	10.1	17.7	56.0	
3.930000	42.2	1000.000	9.000	GND	L1	10.2	13.8	56.0	
4.118000	42.8	1000.000	9.000	GND	L1	10.2	13.2	56.0	
6.586000	39.9	1000.000	9.000	GND	L1	10.2	20.1	60.0	
13.298000	33.9	1000.000	9.000	GND	L1	10.5	26.1	60.0	

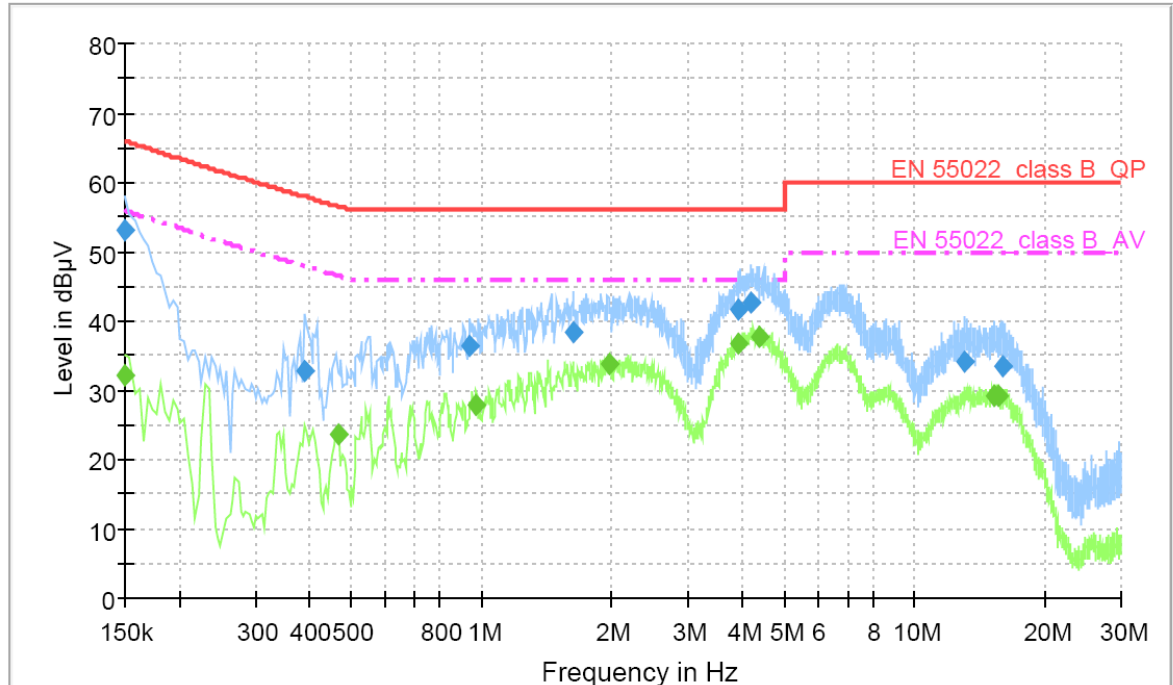
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	36.2	1000.000	9.000	GND	L1	9.9	19.8	56.0	
0.154000	35.5	1000.000	9.000	GND	L1	9.9	20.3	55.8	
0.750000	28.8	1000.000	9.000	GND	L1	10.0	17.2	46.0	
1.146000	30.6	1000.000	9.000	GND	L1	10.0	15.4	46.0	
1.698000	33.3	1000.000	9.000	GND	L1	10.1	12.7	46.0	
2.178000	34.4	1000.000	9.000	GND	L1	10.1	11.6	46.0	
3.830000	36.0	1000.000	9.000	GND	L1	10.2	10.0	46.0	
4.202000	38.0	1000.000	9.000	GND	L1	10.2	8.0	46.0	
6.670000	35.7	1000.000	9.000	GND	L1	10.2	14.3	50.0	
15.378000	29.4	1000.000	9.000	GND	L1	10.6	20.6	50.0	

< Fig 10. Conducted emission result (Live line)>



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	53.1	1000.000	9.000	GND	N	9.9	12.9	66.0	
0.390000	32.8	1000.000	9.000	GND	N	10.0	25.1	57.9	
0.942000	36.3	1000.000	9.000	GND	N	10.0	19.7	56.0	
1.630000	38.2	1000.000	9.000	GND	N	10.1	17.8	56.0	
3.918000	41.8	1000.000	9.000	GND	N	10.2	14.2	56.0	
4.202000	42.6	1000.000	9.000	GND	N	10.2	13.4	56.0	
13.014000	34.0	1000.000	9.000	GND	N	10.5	26.0	60.0	
15.890000	33.6	1000.000	9.000	GND	N	10.6	26.4	60.0	

Final Measurement Detector 2

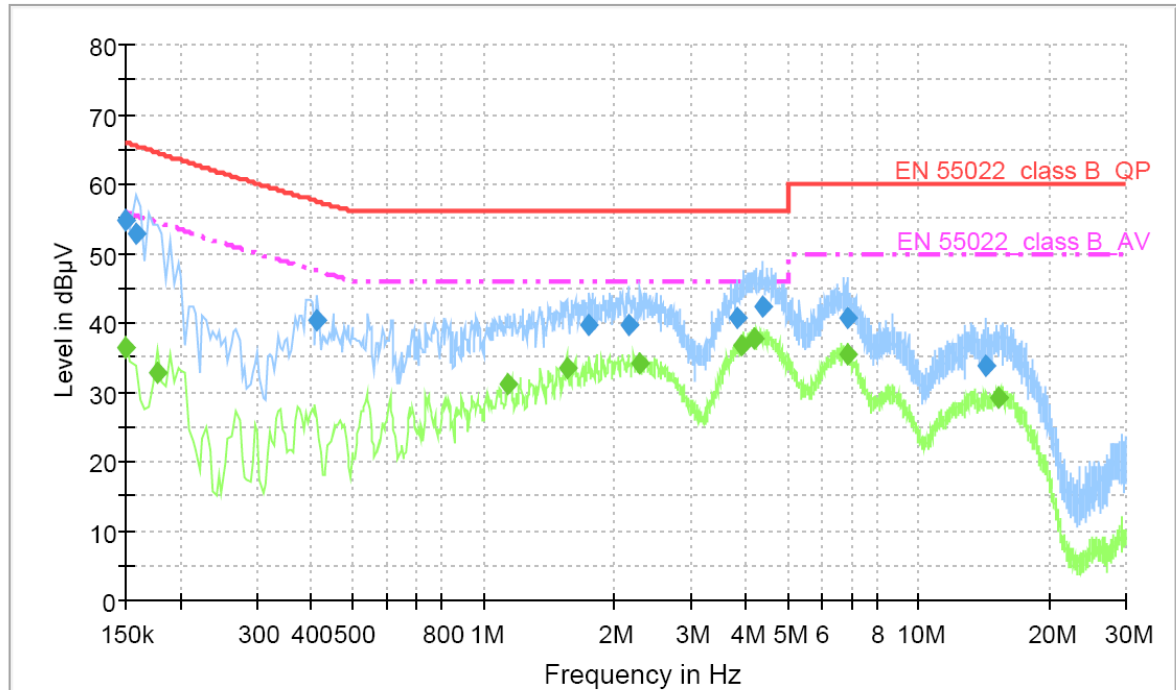
Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	32.2	1000.000	9.000	GND	N	9.9	23.8	56.0	
0.466000	23.7	1000.000	9.000	GND	N	10.0	22.8	46.5	
0.974000	27.8	1000.000	9.000	GND	N	10.0	18.2	46.0	
1.962000	33.9	1000.000	9.000	GND	N	10.1	12.1	46.0	
3.918000	36.7	1000.000	9.000	GND	N	10.2	9.3	46.0	
4.366000	37.5	1000.000	9.000	GND	N	10.2	8.5	46.0	
15.242000	29.3	1000.000	9.000	GND	N	10.6	20.7	50.0	
15.594000	29.1	1000.000	9.000	GND	N	10.6	20.9	50.0	

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



◆ Operating condition: USB 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
0.150000	54.7	1000.000	9.000	GND	L1	9.9	11.3	66.0	
0.158000	52.9	1000.000	9.000	GND	L1	9.9	12.6	65.5	
0.414000	40.2	1000.000	9.000	GND	L1	10.0	17.3	57.5	
1.750000	39.5	1000.000	9.000	GND	L1	10.1	16.5	56.0	
2.162000	39.7	1000.000	9.000	GND	L1	10.1	16.3	56.0	
3.814000	40.6	1000.000	9.000	GND	L1	10.2	15.4	56.0	
4.402000	42.1	1000.000	9.000	GND	L1	10.2	13.9	56.0	
6.858000	40.6	1000.000	9.000	GND	L1	10.2	19.4	60.0	
14.234000	33.6	1000.000	9.000	GND	L1	10.6	26.4	60.0	

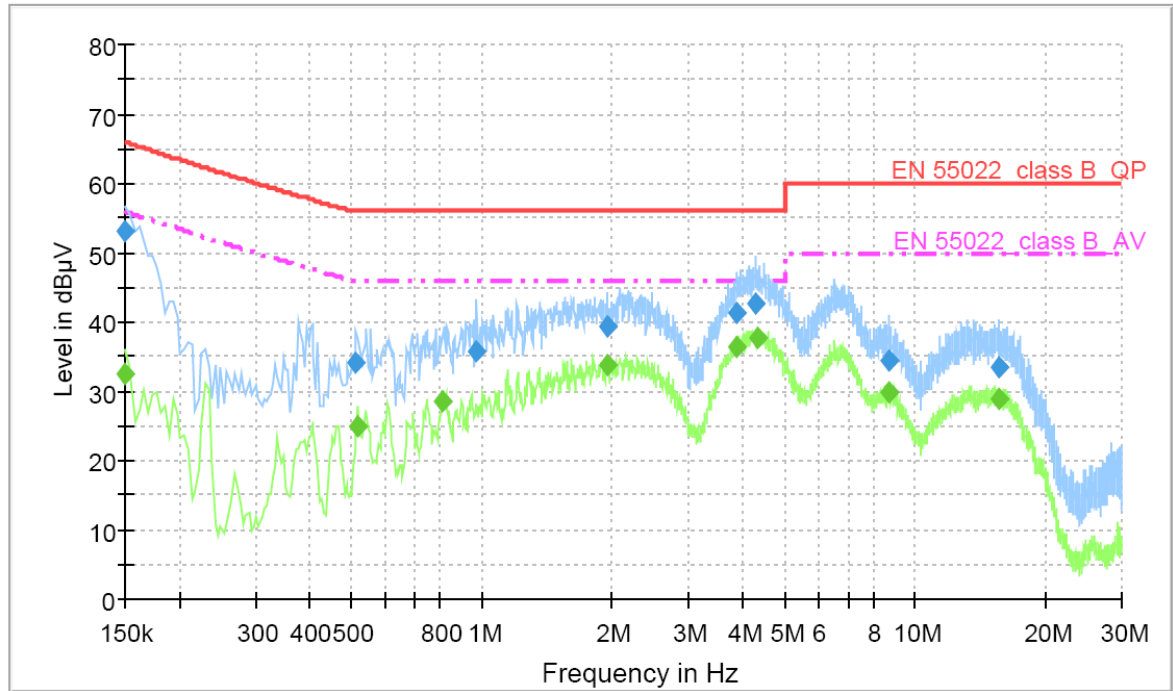
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	36.5	1000.000	9.000	GND	L1	9.9	19.5	56.0	
0.178000	32.8	1000.000	9.000	GND	L1	9.9	21.7	54.5	
1.142000	31.2	1000.000	9.000	GND	L1	10.0	14.8	46.0	
1.550000	33.4	1000.000	9.000	GND	L1	10.1	12.6	46.0	
2.282000	34.2	1000.000	9.000	GND	L1	10.1	11.8	46.0	
3.906000	36.7	1000.000	9.000	GND	L1	10.2	9.3	46.0	
4.206000	37.6	1000.000	9.000	GND	L1	10.2	8.4	46.0	
6.866000	35.2	1000.000	9.000	GND	L1	10.2	14.8	50.0	
15.354000	29.3	1000.000	9.000	GND	L1	10.6	20.7	50.0	

< 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
0.150000	53.1	1000.000	9.000	GND	N	9.9	12.9	66.0	
0.514000	34.1	1000.000	9.000	GND	N	10.0	21.9	56.0	
0.974000	35.7	1000.000	9.000	GND	N	10.0	20.3	56.0	
1.954000	39.3	1000.000	9.000	GND	N	10.1	16.7	56.0	
3.890000	41.4	1000.000	9.000	GND	N	10.2	14.6	56.0	
4.302000	42.6	1000.000	9.000	GND	N	10.2	13.4	56.0	
8.670000	34.5	1000.000	9.000	GND	N	10.3	25.5	60.0	
15.702000	33.6	1000.000	9.000	GND	N	10.6	26.4	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	32.3	1000.000	9.000	GND	N	9.9	23.7	56.0	
0.518000	24.9	1000.000	9.000	GND	N	10.0	21.1	46.0	
0.814000	28.5	1000.000	9.000	GND	N	10.0	17.5	46.0	
1.946000	33.9	1000.000	9.000	GND	N	10.1	12.1	46.0	
3.890000	36.4	1000.000	9.000	GND	N	10.2	9.6	46.0	
4.326000	37.9	1000.000	9.000	GND	N	10.2	8.1	46.0	
8.670000	29.7	1000.000	9.000	GND	N	10.3	20.3	50.0	
15.614000	28.9	1000.000	9.000	GND	N	10.6	21.1	50.0	

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



6. Radiated Emission

6.1 Operating Environment

Temperature : 20 °C
Relative Humidity : 49 % 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, 3m, Vertical)	± 3.54 dB	Confidence levels of 95 % (k=2)
Radiated emission (30 MHz ~ 300 MHz, 3m, Horizontal)	± 3.49 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 3m, Vertical)	± 3.70 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 3m, Horizontal)	± 3.61 dB	Confidence levels of 95 % (k=2)
Radiated emission (30 MHz ~ 300 MHz, 10m, Vertical)	± 3.21 dB	Confidence levels of 95 % (k=2)
Radiated emission (30 MHz ~ 300 MHz, 10m, Horizontal)	± 3.32 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 10m, Vertical)	± 3.63 dB	Confidence levels of 95 % (k=2)
Radiated emission (300 MHz ~ 1 000 MHz, 10m, Horizontal)	± 3.69 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	maturo GmbH	MCU066	1390306	N/A
■ - TT2.5SI	maturo GmbH	Turntable	1390307	N/A
■ - AM 4.0	maturo GmbH	Antenna Mast	1390308	N/A
■ - AFS 44 00101800- 25-10P-44	MITEQ	Preamplifier	1258943	11. 12. 2010

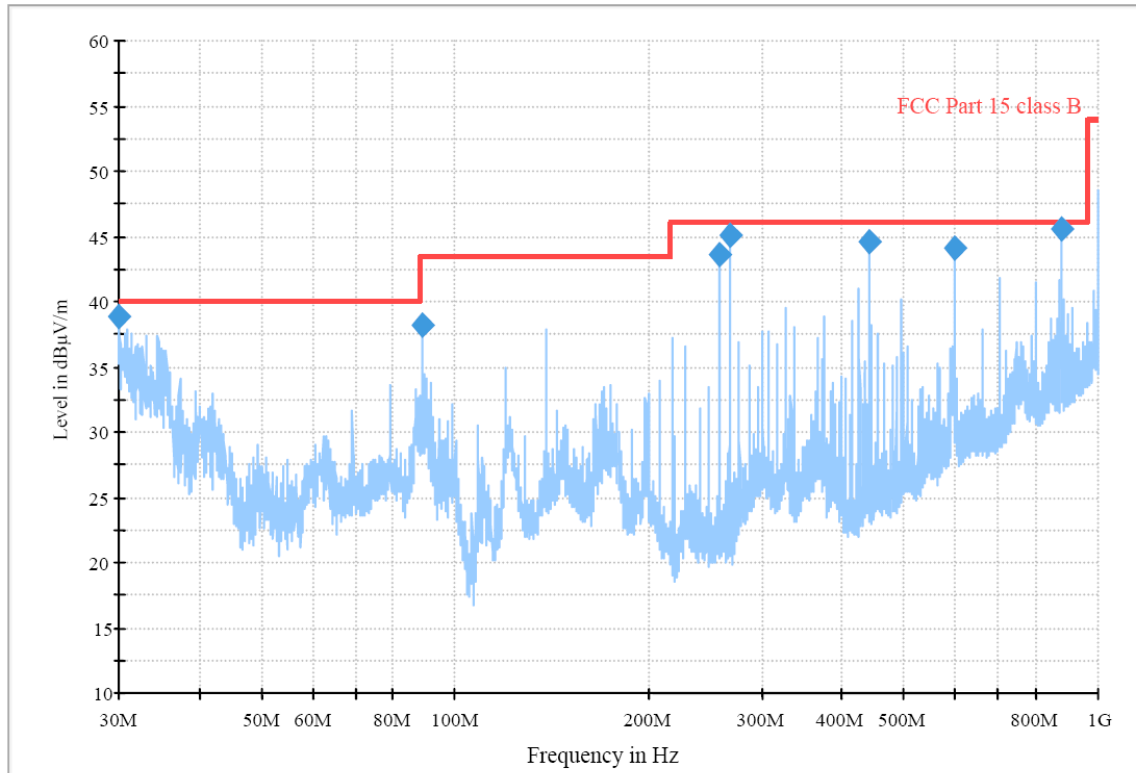
6.6 Test data for Radiated Emission

- Test Date : November 16, 2009
- Resolution Bandwidth : 120 kHz/1 MHz
- Frequency Range : 30 MHz ~ 2 000 MHz
- Measurement Distance : 3 m
- Note : The highest frequency of the internal source of the EUT is between 108 MHz and 500 MHz (400 MHz). The measurement was made up to 2 000 MHz



- ◆ Operating Condition: 1 680 * 1 050 / 60 Hz (RGB: Analog mode)
Detector mode: Quasi- peak detector mode

ESIB_Direct_RE with Scans



Final Result 1

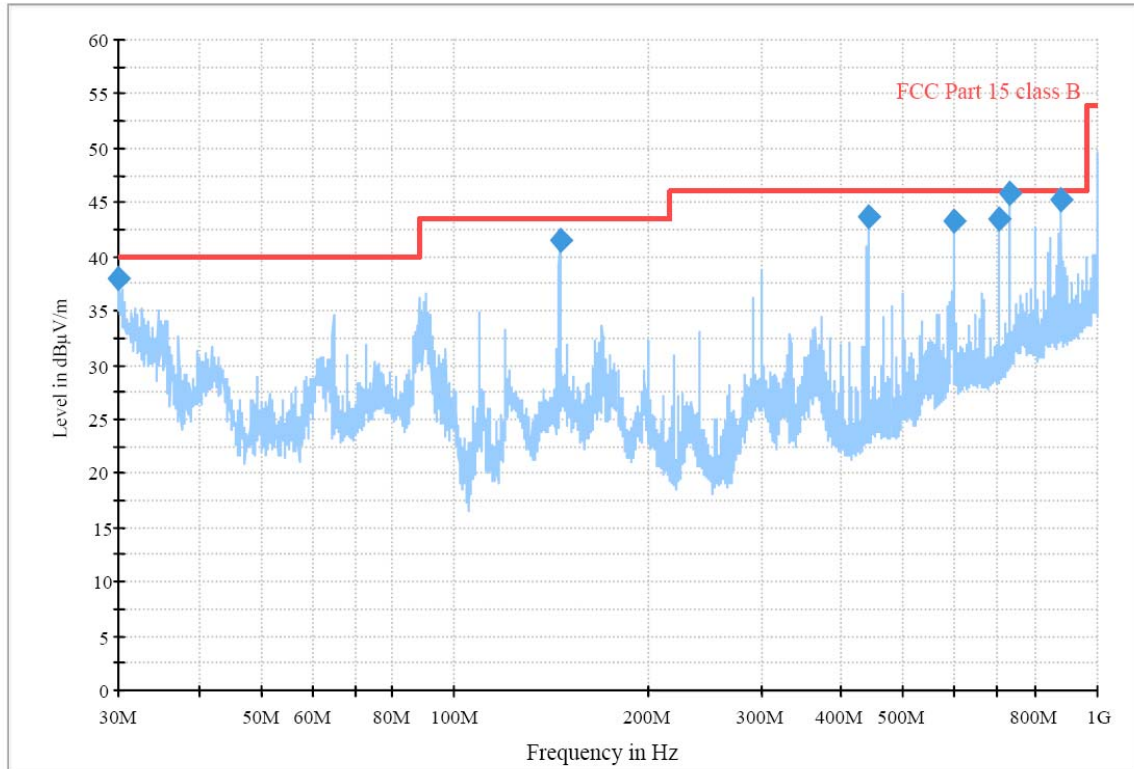
Frequency (MHz)	MaxPeak-ClearWrite (dBuV/m)	Quasi-Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
30.000000	38.8	29.53	100.0	V	154.0	12.9	10.47	40.00
89.100000	38.3	36.14	200.0	H	237.0	10.0	7.36	43.50
257.400000	43.7	40.73	115.0	H	91.0	15.1	5.27	46.00
267.300000	45.0	42.00	112.0	H	84.0	15.4	4.00	46.00
439.950000	44.7	41.97	100.0	H	15.0	21.3	4.03	46.00
600.000000	44.1	41.61	170.0	H	171.0	25.9	4.39	46.00
879.950000	45.6	42.00	100.0	H	190.0	30.9	4.00	46.00

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



- ◆ Operating Condition: 1 680 * 1 050 / 60 Hz (HDMI/DVI: Digital mode)
Detector mode: Quasi- peak detector mode

ESIB_Direct_RE with Scans



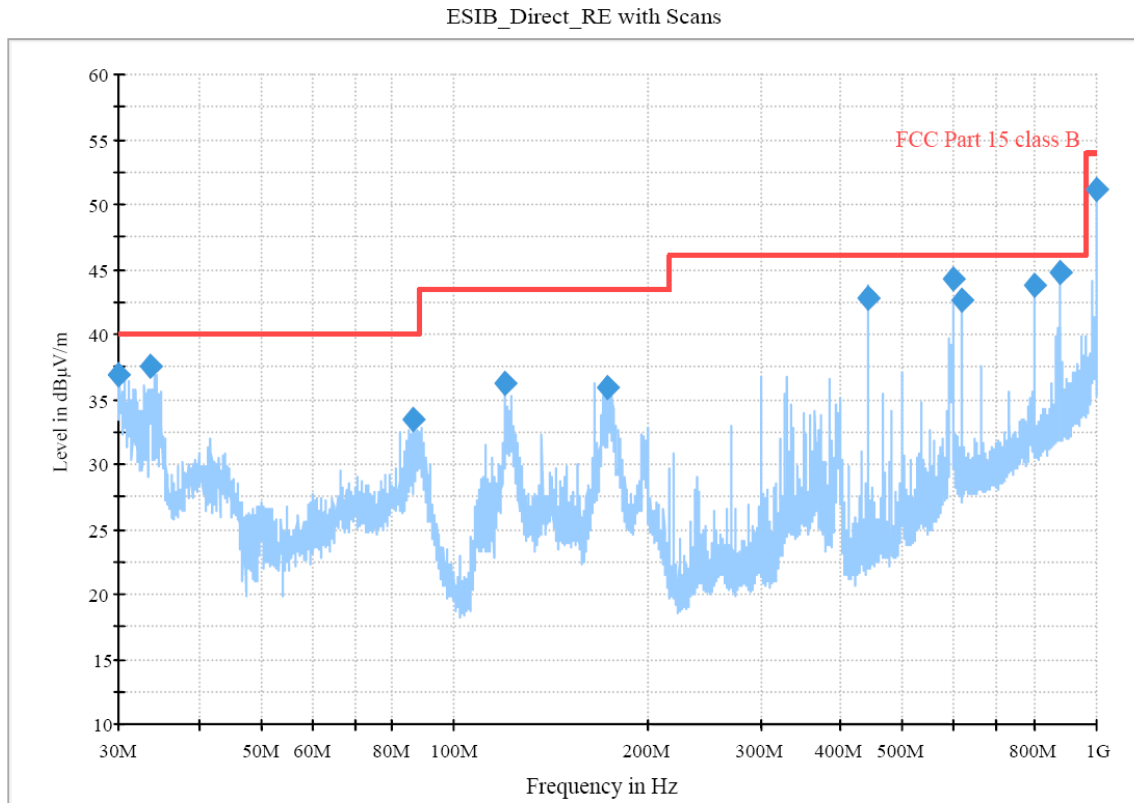
Final Result 1

Frequency (MHz)	MaxPeak-ClearWrite (dBuV/m)	Quasi-Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
30.100000	37.9	29.31	100.0	V	145.0	12.9	10.69	40.00
145.800000	41.5	39.24	100.0	V	284.0	15.1	4.26	43.50
440.000000	43.6	40.74	110.0	H	11.0	21.3	5.26	46.00
600.000000	43.3	40.92	154.0	H	159.0	25.9	5.08	46.00
702.000000	43.5	39.29	200.0	V	181.0	27.7	6.71	46.00
729.050000	45.8	42.00	200.0	V	215.0	28.5	4.00	46.00
879.940000	45.3	41.16	100.0	H	181.0	30.9	4.84	46.00

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



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



Final Result 1

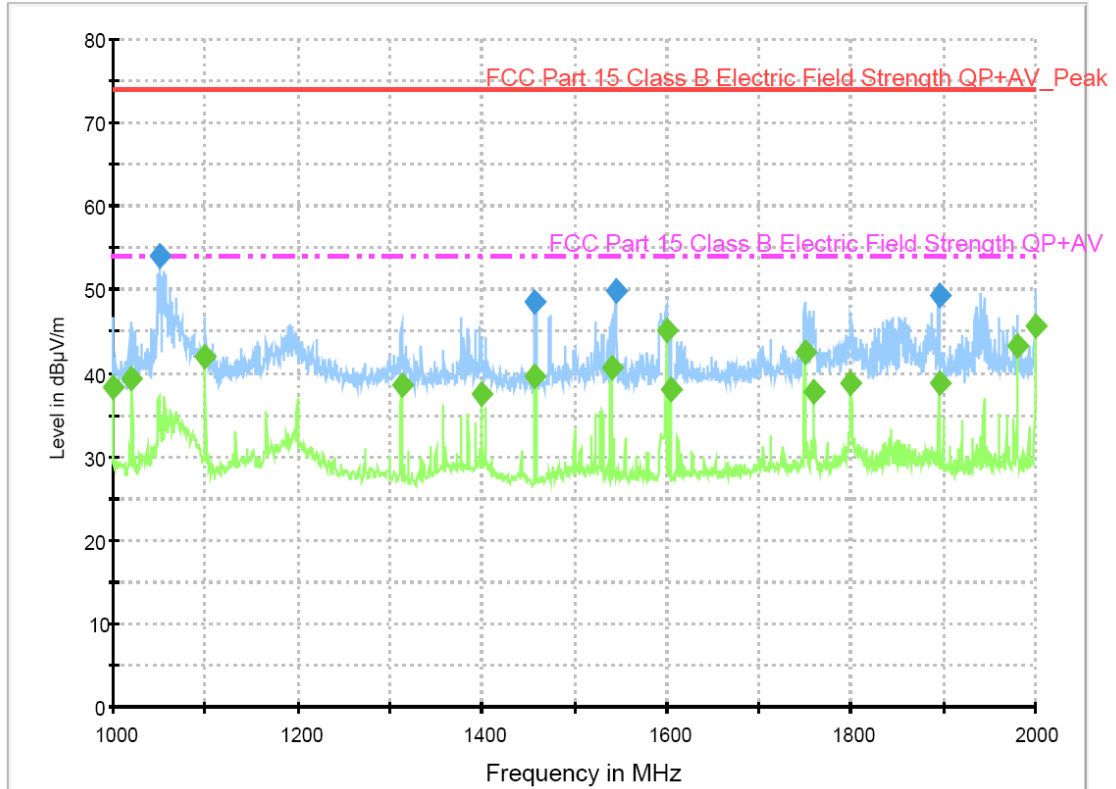
Frequency (MHz)	MaxPeak-ClearWrite (dBuV/m)	Quasi-Peak (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)
30.100000	36.9	28.40	100.0	V	148.0	12.9	11.60	40.00
33.650000	37.6	27.15	100.0	V	139.0	12.8	12.85	40.00
86.300000	33.4	22.18	200.0	H	144.0	9.9	17.82	40.00
120.000000	36.3	32.90	100.0	V	247.0	13.5	10.60	43.50
172.900000	35.9	30.01	165.0	H	107.0	14.8	13.49	43.50
440.000000	42.7	41.52	100.0	H	18.0	21.3	4.48	46.00
600.000000	44.3	41.70	171.0	H	43.0	25.9	4.30	46.00
617.150000	42.7	30.45	100.0	V	180.0	26.2	15.55	46.00
799.950000	43.8	40.00	100.0	V	0.0	29.7	6.00	46.00
879.950000	44.8	42.00	100.0	H	194.0	30.9	4.00	46.00
999.950000	51.1	45.63	100.0	H	180.0	32.9	8.37	54.00

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



- ◆ Operating Condition: 1 680 * 1 050 / 60 Hz (RGB: Analog 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
1051.200000	54.1	200.0	V	0.0	-15.7	19.9	74.0	
1458.000000	48.5	100.0	H	180.0	14.2	25.5	74.0	
1544.400000	49.8	100.0	V	0.0	13.9	24.2	74.0	
1895.200000	49.4	150.0	V	180.0	13.0	24.6	74.0	

Final Result 2

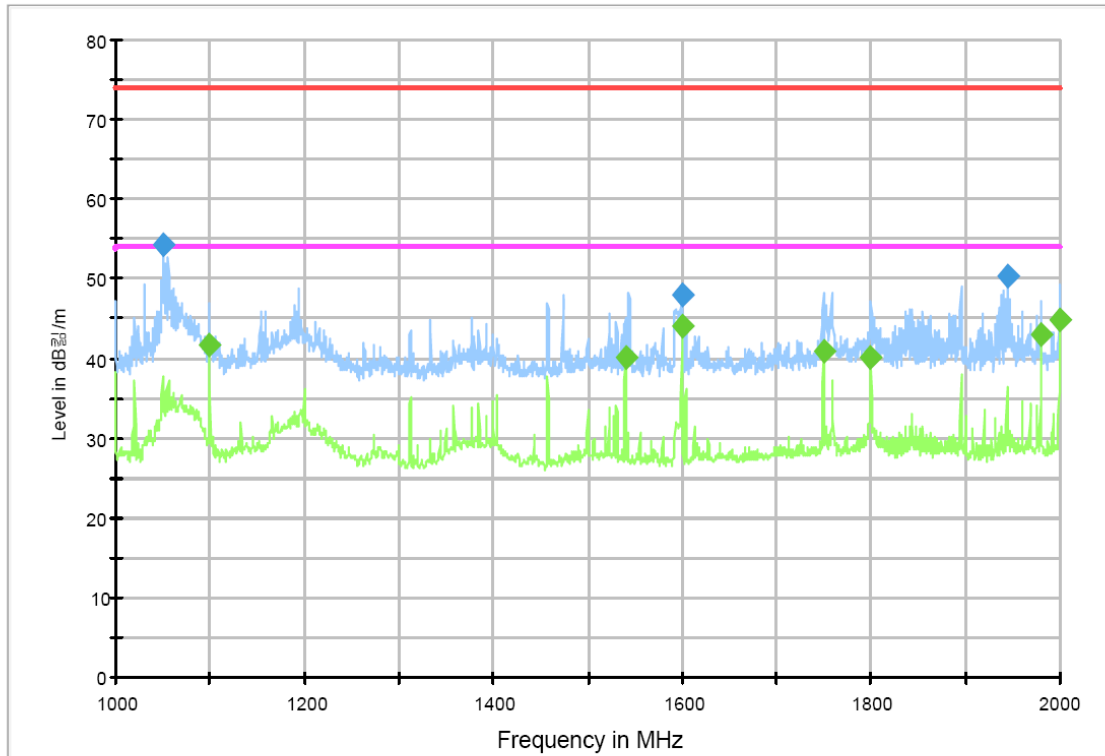
Frequency (MHz)	Average-MaxHold (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
1000.000000	38.2	150.0	H	180.0	-15.9	15.8	54.0	
1020.400000	39.2	100.0	H	180.0	-15.8	14.8	54.0	
1100.000000	42.0	150.0	H	180.0	-15.4	12.0	54.0	
1312.400000	38.4	100.0	V	180.0	-14.4	15.6	54.0	
1400.000000	37.5	200.0	H	0.0	-14.4	16.5	54.0	
1458.000000	39.6	150.0	V	180.0	-14.3	14.4	54.0	
1540.000000	40.6	100.0	H	180.0	-14.0	13.4	54.0	
1600.000000	45.0	150.0	V	180.0	-13.7	9.0	54.0	
1604.000000	38.0	100.0	V	180.0	-13.6	16.0	54.0	
1749.600000	42.6	200.0	V	180.0	-13.3	11.4	54.0	
1760.000000	37.8	200.0	H	180.0	-13.3	16.2	54.0	
1800.000000	38.8	100.0	V	270.0	-13.1	15.2	54.0	
1895.200000	38.9	150.0	V	180.0	-13.0	15.1	54.0	
1980.000000	43.3	150.0	V	180.0	-12.6	10.7	54.0	
2000.000000	45.6	150.0	H	180.0	-12.5	8.4	54.0	

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



- ◆ Operating Condition: 1 680 * 1 050 / 60 Hz (HDMI/DVI: Digital 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
1050.400000	54.2	200.0	V	0.0	-15.7	19.8	74.0	
1600.000000	48.1	150.0	V	180.0	-13.7	25.9	74.0	
1944.400000	50.3	200.0	V	0.0	-12.8	12.8	74.0	

Final Result 2

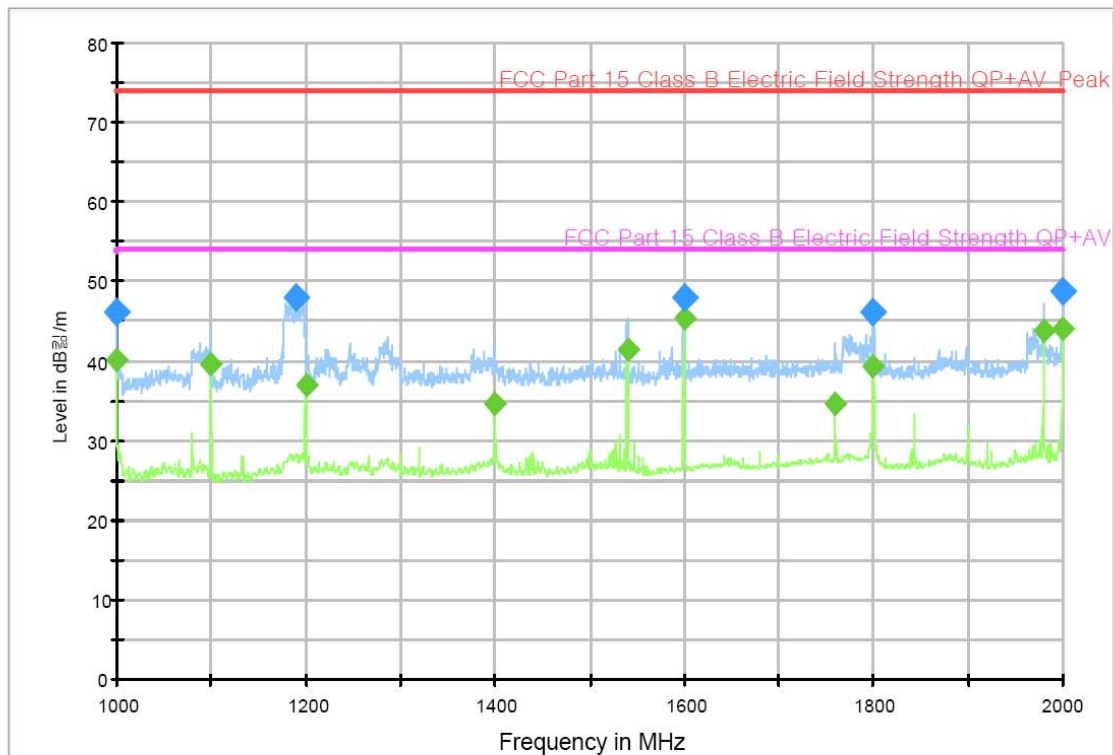
Frequency (MHz)	Average-MaxHold (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)	Comment
1100.000000	41.6	150.0	H	180.0	-15.4	12.4	54.0	
1540.000000	40.2	100.0	H	180.0	-14.0	13.8	54.0	
1600.000000	44.1	150.0	V	180.0	-13.7	9.9	54.0	
1749.600000	40.9	150.0	V	180.0	-13.3	13.1	54.0	
1800.000000	40.2	100.0	V	180.0	-13.1	13.8	54.0	
1980.000000	42.9	150.0	V	180.0	-12.6	11.1	54.0	
2000.000000	44.9	150.0	H	180.0	-12.5	9.1	54.0	

< Fig 15. Radiated emission result (1 000 MHz ~ 2 000 MHz)>



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

FCC_ESIB_Preamplifier with Scans



Final Result 1

Frequency (MHz)	MaxPeak-MaxHold (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)	Comment
1000.000000	46.1	100.0	H	180.0	-15.9	19.8	74.0	
1188.800000	48.1	150.0	V	90.0	-15.2	20.7	74.0	
1600.000000	48.0	100.0	H	180.0	-13.7	20.1	74.0	
1800.000000	46.2	200.0	V	90.0	-13.1	27.8	74.0	
2000.000000	48.7	150.0	H	180.0	-12.5	25.3	74.0	

Final Result 2

Frequency (MHz)	Average-MaxHold (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBuV/m)	Comment
1000.000000	40.1	100.0	H	180.0	-15.9	13.9	54.0	
1100.000000	39.5	150.0	H	180.0	-15.4	14.5	54.0	
1200.000000	36.9	100.0	V	180.0	-15.2	17.1	54.0	
1400.000000	34.7	150.0	V	270.0	-14.4	19.3	54.0	
1540.000000	41.5	100.0	H	180.0	-14.0	12.5	54.0	
1600.000000	45.4	100.0	H	180.0	-13.7	8.6	54.0	
1760.000000	34.7	100.0	V	180.0	-13.3	19.3	54.0	
1800.000000	39.3	200.0	V	90.0	-13.1	14.7	54.0	
1980.000000	43.9	150.0	V	180.0	-12.6	10.1	54.0	
2000.000000	44.2	150.0	H	180.0	-12.5	9.8	54.0	

< Fig 16. Radiated emission result (1 000 MHz ~ 2 000 MHz)>



7. Sample Calculations

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

7.1 Example 1 :

■ 20.3 MHz

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

7.2 Example 2 :

■ 66.7 MHz

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



8. Recommendation & Conclusion

The data collected shows that the **LG Electronics Inc. DLP projector with FM transmitter (Model Name: HS200-JE)** complies with §15.107 and 15.109 of the FCC Rules.