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 : May 13, 2010
Order Number: GETEC-C1-10-114
Test Report Number: GETEC-E3-10-056
Test Site: Gumi College EMC Center
FCC Registration Number: (100749, 443957)

FCC ID.: BEJBX327JD

Applicant: LG Electronics Inc.

Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: DLP PROJECTOR
Type of Authority	: Certification
Model Name	: BX327-JD, GX337-JD, BX277-JD
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,

SoonHoon

Soon-Hoon Jeong, Engineer
GUMI College EMC center

Reviewed by,

Jae-Hoon Jeong, Senior Engineer
GUMI College EMC center

CONTENTS

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.** BEJBX327JD
- **EUT Type** DLP PROJECTOR
- **Model Name** BX327-JD, GX337-JD, BX277-JD
  The differences for all models are as follow:

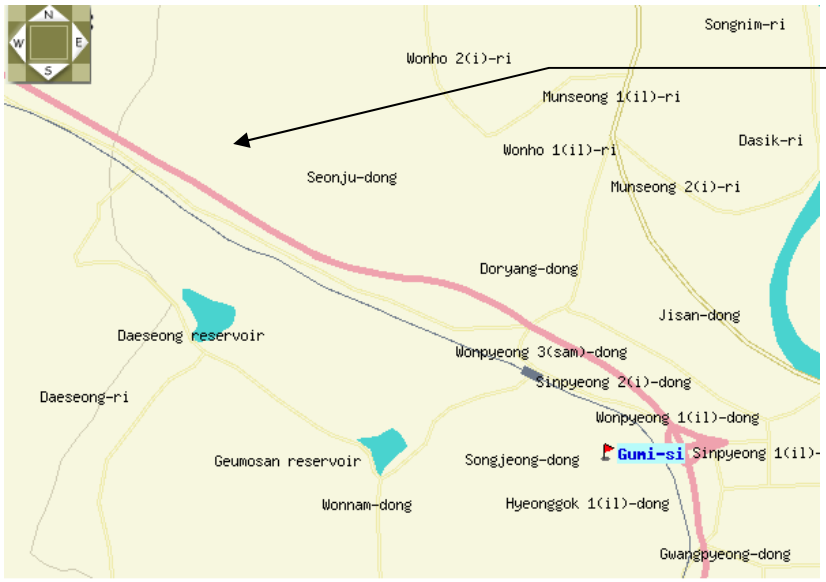
Model Name	Descreiption(color)
BX327-JD	White
GX337-JD	Silver
BX277-JD	Black

- **Trade Name** LG
- **Serial Number** Prototype
- **Rule Part(s)** FCC Part 15 Subpart B
- **Type of Authority** Certification
- **Test Procedure(s)** ANSI C63.4 (2003) / Canadian standard ICES-003
- **Dates of Test** April 26 ~ 27, 2010
- **Place of Test** **Gumi College EMC Center** (FCC Registration Number: 100749, 443957)
  407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.
- **Test Report Number** GETEC-E3-10-056
- **Dates of Issue** May 13, 2010

2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ASNI C63.4-2003) was used in determining radiated and conducted emissions emanating from **LG Electronics Inc. DLP PROJECTOR (Model Name: BX327-JD, GX337-JD, BX277-JD)**

These measurement tests were conducted at **Gumi College EMC Center**.
The site address is 407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.
This test site is one of the highest point of Gumi 1 college at about 200 km away from Seoul city and 40 km away from Daegu city. It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures. The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.4 (2003)



GUMI COLLEGE EMC CENTER
407, Bugok-dong, Gumi-si,
Gyeongbuk 730-711, Korea.
Tel: +82-54-440-1195
Fax: +82-54-440-1199

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

3. Product Information

3.1 Description of EUT

The Equipment under Test (EUT) is the **LG Electronics Inc. DLP PROJECTOR (Model Name: BX327-JD, GX513-JD, BX503G-JD) FCC ID.: BEJBX327JD**

MODEL	BX277 (BX277-JD) / BX327 (BX327-JD)
Resolution	1024 (Horizontal) x 768 (Vertical) pixel
Horizontal / Vertical Ratio	4:3 (horizontal:vertical)
Panel size (mm)	13.97
Projection distance (Screen size)	1.6m ~ 10m (101.6cm ~ 635.0cm)
Projection Offset	115 %
Remote control distance	6 m
Video compatibility	NTSC/PAL/SECAM/NTSC4.43/PAL-M/PAL-N/PAL-60
Power	AC 100 - 240V~50/60Hz, 3.0A
Audio Output	5W + 5W
Height (mm)	90.5 (without foot), 80 (with foot)
Width (mm)	291.5
Length (mm)	260
Weight (kg)	3.5
USB Device	5 V, 0.5 A (max)

-. Maximum Frequency range : 400 MHz

3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID.
PC	Hewlett Packard	D530	S/N: CNG34800PY FCC ID.: DoC
Video card	ATI	ATI RV360(9600)	S/N: SN0402017176 FCC ID.: DoC
Key board	COMPAQ	166516-AD6	S/N: B13BBOR391006D FCC ID.: AQ6-23K15
PS2 mouse	LOGITECH	M-S69	S/N: 334684-108 FCC ID.: JNZ211443
Joy stick	MICROSOFT	X05-92626	S/N: 9262600296169 FCC ID.: DoC
DVD player	LG Electronics Inc.	LC-954	S/N: 3850R-Z674K FCC ID.: DoC
Headset	GOWOONSORI	GW-500M	S/N: N/A FCC ID.: DoC
Printer	Hewlett Packard	970CXI	S/N: MY9B01F1FG FCC ID.: DoC
Monitor	Dell Computer Corporation	1800FP	S/N: N/A FCC ID.: BEJLD803H
USB memory stick	LG Electronics Inc.	UM5 2GB	S/N: 003RLRZN37758 FCC ID.: DoC

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

3.2.2 System configuration

Description	Manufacturer	Model Name	S/N & FCC ID.
None.	-	-	-

3.2.3 Used Cable(s)

Cable Name	**Condition**	**Description**
Power cable	Connected to the EUT	1.80 m unshielded
RGB(Analog) in cable	Connected to the EUT and PC	1.80 m shielded with two ferrite cores
RGB(Analog) out cable	Connected to the EUT and monitor	1.80 m shielded with two ferrite cores
HDMI/DVI(Digital) in cable	Connected to the EUT and PC	2.00 m shielded
RGB audio in cable	Connected to the EUT and PC	1.80 m shielded
Video in cable	Connected to the EUT and DVD player	2.00 m shielded
Video audio in cable	Connected to the EUT and DVD player	1.50 m shielded
RS-232C in cable	Connected to the EUT and PC	1.80 m shielded
LAN cable	Connected to the EUT and network	10.00 m unshielded
Headset cable	Connected to the EUT and headset	2.75 m shielded

3.3 Modification Item(s)

- None

4. Description of tests

4.1 Test Condition

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

- Test Voltage / Frequency : AC 120 V / 60 Hz

- Test Mode(s)

-. Projection mode

Radiated emission: 1 600 × 1 200 / 60 Hz (RGB: Analog, HDMI/DVI: Digital)
Conducted emission: 1 600 × 1 200 / 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
-. Operated DDC function with the eZ manager software
* DDC is a communication channel over which the monitor automatically informs the host system (PC) about its capabilities

-. USB memory stick play mode

♦ Operating test pattern

-. Continuous playback mode with 1 kHz audio files

"The verification report for AV mode would be issued by LG Electronics Inc."

4.2 Conducted Emission

The Line conducted emission test facility is inside a 4 m × 8 m × 2.5 m shielded enclosure. (FCC Registration No.: 100749)
The EUT was placed on a non-conducting 1.0 m by 1.5 m table, which is 0.8 m in height and 0.4 m away from the vertical wall of the shielded enclosure.
The EUT is powered from the Rohde & Schwarz LISN (ESH2-Z5) and the support equipment is powered from the Rohde & Schwarz LISN (ESH3-Z5). Powers to the LISN are filtered by high-current high insertion loss power line filter.
Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.
The RF output of the LISN was connected to the EMI test receiver (Rohde & Schwarz, ESCS30).
The EMI test receiver was scanned from 150 kHz to 30 MHz with 20 ms sweep time to determine the frequency producing the maximum EME from the EUT. The frequency producing the maximum level was re-examined using Quasi-Peak mode of the EMI test receiver.
The bandwidth of Quasi-peak mode was set to 9 kHz. Each emission was maximized consistent with typical applications by varying the configuration of the test sample. Interface cables were connected to the available interface ports of the test unit. The effect of varying the position of cables was investigated to find the configuration that produces maximum diagram emission. Excess cable lengths were bundled at center with 30 cm ~ 40 cm.
Each EME reported was calibrated using the R/S signal generator

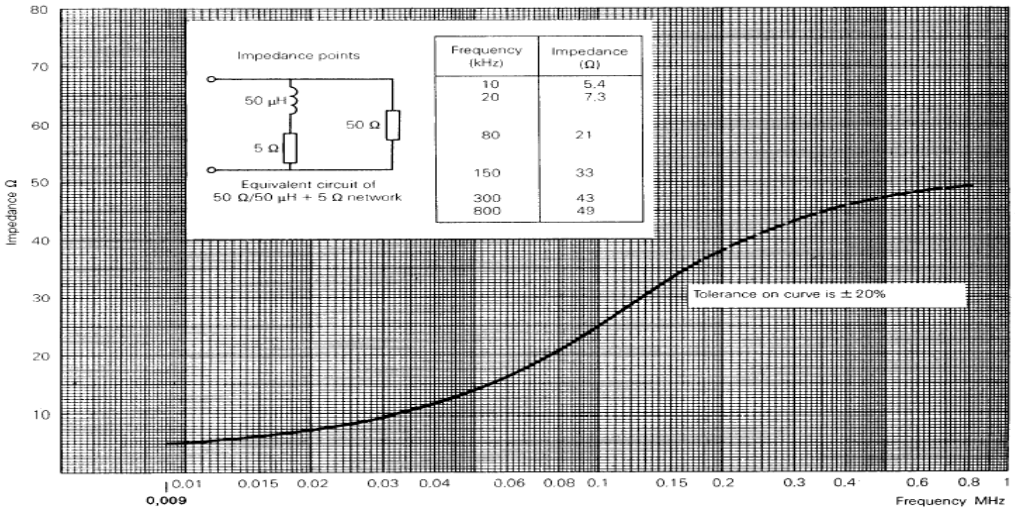


Fig 2. Impedance of LISN

4.3 Radiated Emission

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

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

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

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

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

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

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

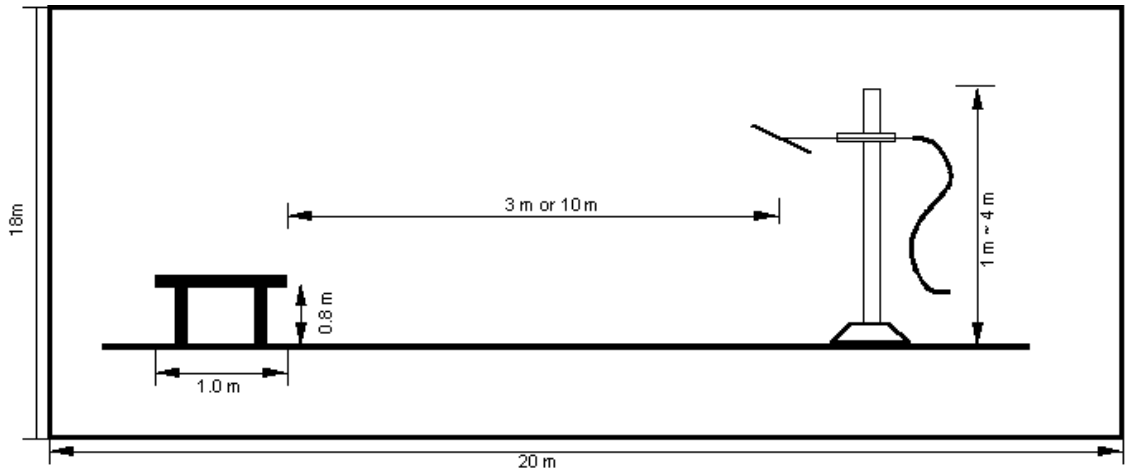


Fig 3. Dimensions of test site.

5. Conducted Emission

5.1 Operating Environment

Temperature : 23 ℃
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.
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 μV/m) Class B	
Freq. Range	Quasi-Peak	Average
150 kHz ~ 0.5 MHz	66 ~ 56*	56 ~ 46*
0.5 MHz ~ 5 MHz	56	46
5 MHz ~ 30 MHz	60	50
*Limits decreases linearly with the logarithm of frequency.		

5.5 Test Equipment used

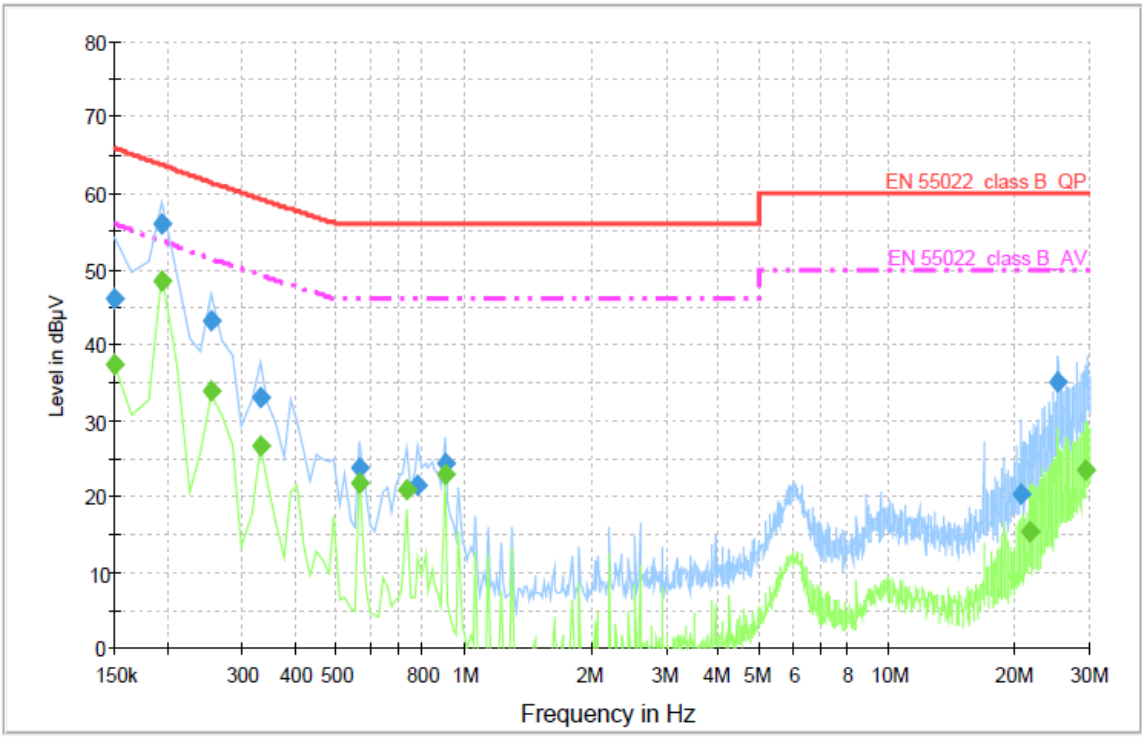
	Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ -	ESCS30	Rohde & Schwarz	EMI Test Receiver	839809/003	12. 10. 2010
■ -	ESH3-Z5	Rohde & Schwarz	LISN	838979/020	12. 10. 2010
■ -	ESH2-Z5	Rohde & Schwarz	LISN	829991/009	12. 10. 2010
■ -	ISN T8	TESEQ. GmbH	Impedance Network	24568	10. 16. 2010

5.6 Test data for Conducted Emission

-. Test Date : April 26, 2010
-. Resolution Bandwidth : 9 kHz
-. Frequency Range : 0.15 MHz ~ 30 MHz

♦ **Operating condition: 1 600 × 1 200 / 60 Hz (RGB: Analog)**

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

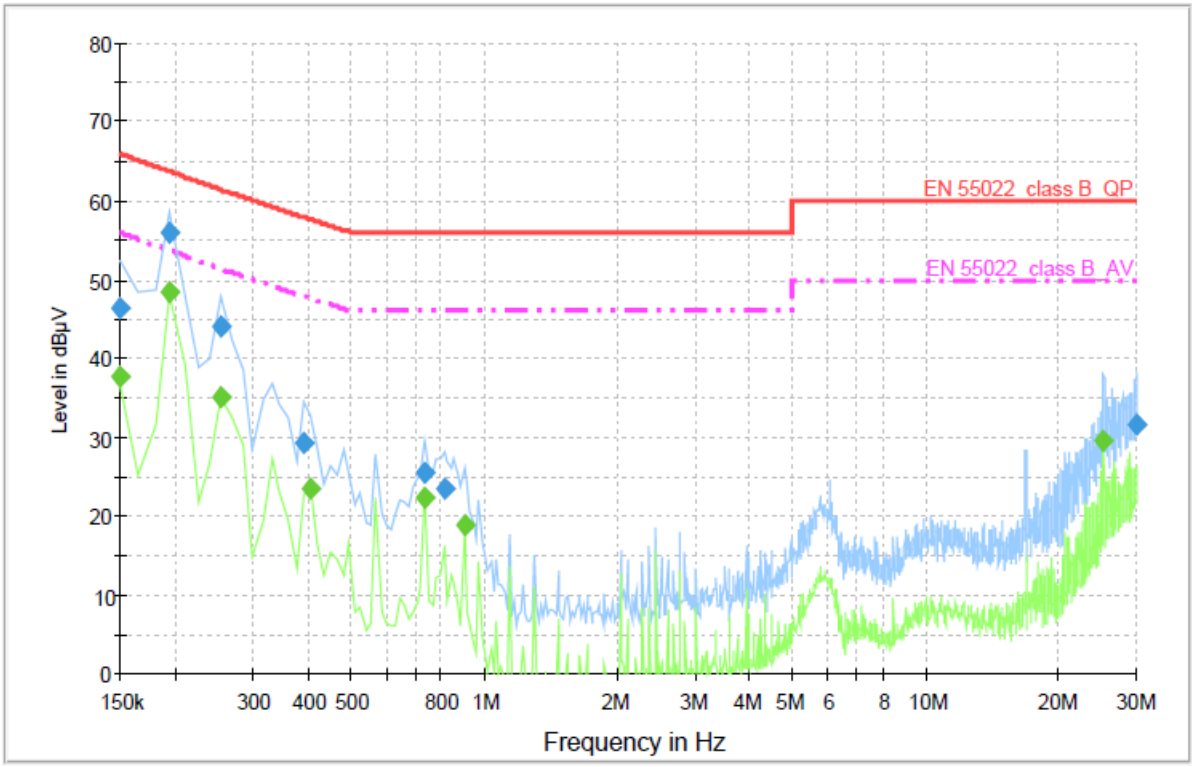
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	46.0	1000.000	9.000	GND	L1	10.0	20.0	66.0	
0.195000	55.9	1000.000	9.000	GND	L1	10.0	7.8	63.7	
0.255000	43.2	1000.000	9.000	GND	L1	10.0	18.2	61.4	
0.330000	33.0	1000.000	9.000	GND	L1	10.0	26.3	59.3	
0.570000	23.8	1000.000	9.000	GND	L1	10.0	32.2	56.0	
0.780000	21.4	1000.000	9.000	GND	L1	10.0	34.6	56.0	
0.900000	24.4	1000.000	9.000	GND	L1	10.0	31.6	56.0	
20.655000	20.3	1000.000	9.000	GND	L1	11.1	39.7	60.0	
25.320000	35.2	1000.000	9.000	GND	L1	11.3	24.8	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	37.4	1000.000	9.000	GND	L1	10.0	18.6	56.0	
0.195000	48.5	1000.000	9.000	GND	L1	10.0	5.3	53.7	
0.255000	33.9	1000.000	9.000	GND	L1	10.0	17.4	51.3	
0.330000	26.5	1000.000	9.000	GND	L1	10.0	22.7	49.2	
0.570000	21.8	1000.000	9.000	GND	L1	10.0	24.2	46.0	
0.735000	20.9	1000.000	9.000	GND	L1	10.0	25.1	46.0	
0.900000	23.0	1000.000	9.000	GND	L1	10.0	23.0	46.0	
21.555000	15.5	1000.000	9.000	GND	L1	11.1	34.5	50.0	
29.475000	23.4	1000.000	9.000	GND	L1	11.5	26.6	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
0.150000	46.4	1000.000	9.000	GND	N	10.0	19.6	66.0	
0.195000	55.9	1000.000	9.000	GND	N	10.0	7.8	63.7	
0.255000	44.0	1000.000	9.000	GND	N	10.0	17.4	61.4	
0.390000	29.1	1000.000	9.000	GND	N	10.0	28.8	57.9	
0.735000	25.6	1000.000	9.000	GND	N	10.0	30.4	56.0	
0.810000	23.4	1000.000	9.000	GND	N	10.0	32.6	56.0	
29.850000	31.6	1000.000	9.000	GND	N	10.8	28.4	60.0	

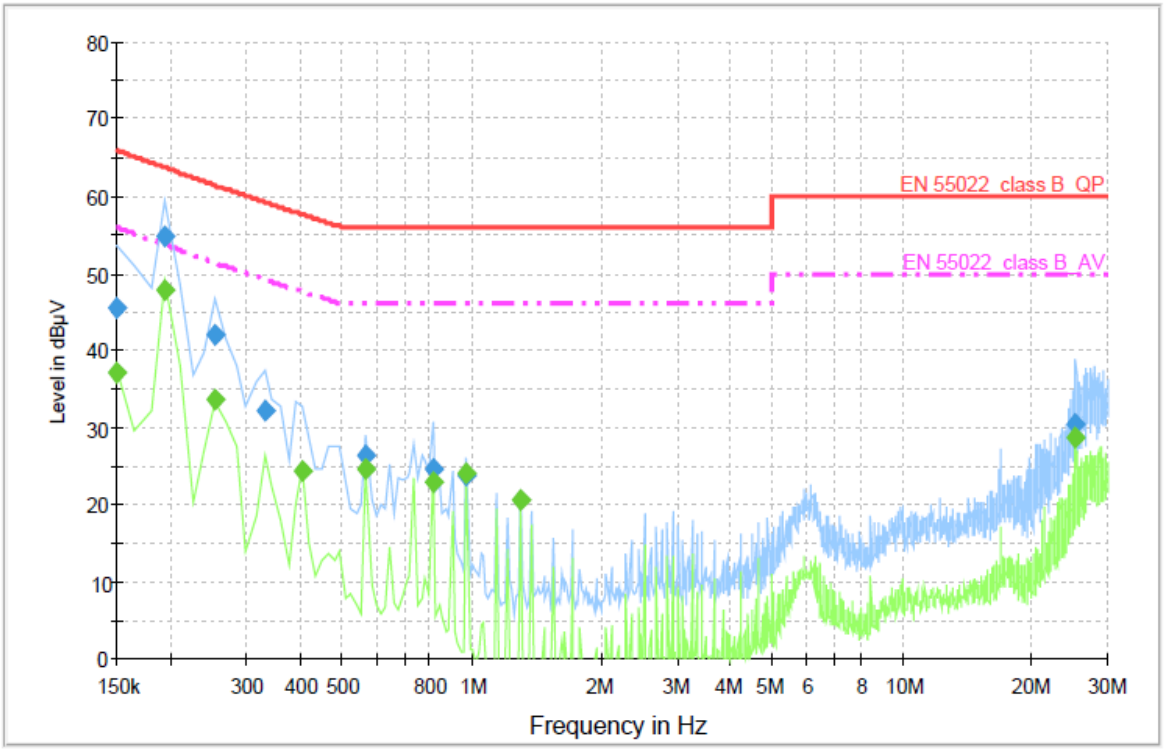
Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	37.7	1000.000	9.000	GND	N	10.0	18.3	56.0	
0.195000	48.5	1000.000	9.000	GND	N	10.0	5.2	53.7	
0.255000	35.2	1000.000	9.000	GND	N	10.0	16.1	51.3	
0.405000	23.6	1000.000	9.000	GND	N	10.0	24.0	47.6	
0.735000	22.5	1000.000	9.000	GND	N	10.0	23.5	46.0	
0.900000	18.7	1000.000	9.000	GND	N	10.0	27.3	46.0	
25.320000	29.4	1000.000	9.000	GND	N	10.8	20.6	50.0	

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

♦ **Operating condition: 1 024 × 768 / 60 Hz (RGB: Analog)**

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

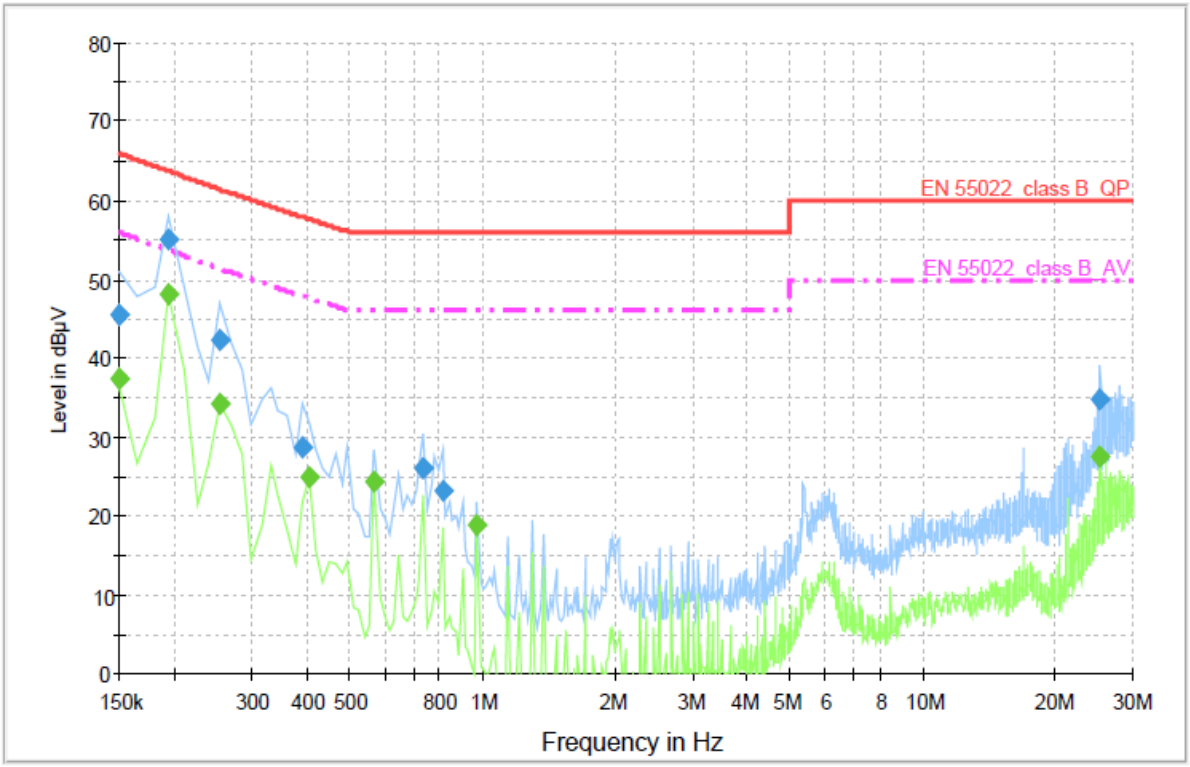
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	45.5	1000.000	9.000	GND	L1	10.0	20.6	66.0	
0.195000	54.8	1000.000	9.000	GND	L1	10.0	8.9	63.7	
0.255000	42.1	1000.000	9.000	GND	L1	10.0	19.3	61.4	
0.330000	32.3	1000.000	9.000	GND	L1	10.0	27.0	59.3	
0.570000	26.4	1000.000	9.000	GND	L1	10.0	29.6	56.0	
0.810000	24.7	1000.000	9.000	GND	L1	10.0	31.3	56.0	
0.975000	23.9	1000.000	9.000	GND	L1	10.0	32.1	56.0	
25.290000	30.5	1000.000	9.000	GND	L1	11.3	29.5	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	37.2	1000.000	9.000	GND	L1	10.0	18.8	56.0	
0.195000	48.0	1000.000	9.000	GND	L1	10.0	5.7	53.7	
0.255000	33.7	1000.000	9.000	GND	L1	10.0	17.6	51.3	
0.405000	24.5	1000.000	9.000	GND	L1	10.0	23.1	47.6	
0.570000	24.7	1000.000	9.000	GND	L1	10.0	21.3	46.0	
0.810000	22.9	1000.000	9.000	GND	L1	10.0	23.1	46.0	
0.975000	23.9	1000.000	9.000	GND	L1	10.0	22.1	46.0	
1.305000	20.5	1000.000	9.000	GND	L1	10.1	25.5	46.0	
25.320000	28.7	1000.000	9.000	GND	L1	11.3	21.3	50.0	

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

Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	45.5	1000.000	9.000	GND	N	10.0	20.5	66.0	
0.195000	55.1	1000.000	9.000	GND	N	10.0	8.6	63.7	
0.255000	42.3	1000.000	9.000	GND	N	10.0	19.1	61.4	
0.390000	28.6	1000.000	9.000	GND	N	10.0	29.3	57.9	
0.735000	26.2	1000.000	9.000	GND	N	10.0	29.8	56.0	
0.810000	23.3	1000.000	9.000	GND	N	10.0	32.7	56.0	
25.320000	34.8	1000.000	9.000	GND	N	10.8	25.2	60.0	

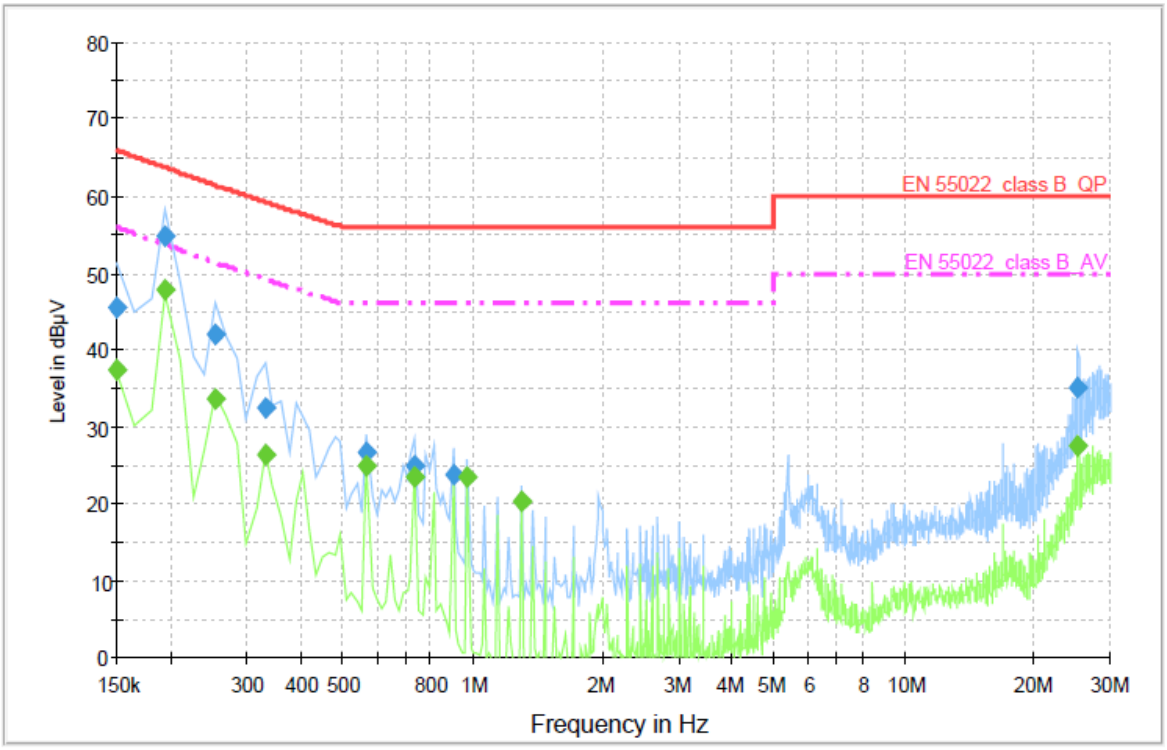
Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	37.3	1000.000	9.000	GND	N	10.0	18.7	56.0	
0.195000	48.0	1000.000	9.000	GND	N	10.0	5.7	53.7	
0.255000	34.1	1000.000	9.000	GND	N	10.0	17.2	51.3	
0.405000	25.0	1000.000	9.000	GND	N	10.0	22.6	47.6	
0.570000	24.4	1000.000	9.000	GND	N	10.0	21.6	46.0	
0.975000	18.8	1000.000	9.000	GND	N	10.0	27.2	46.0	
25.320000	27.6	1000.000	9.000	GND	N	10.8	22.4	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

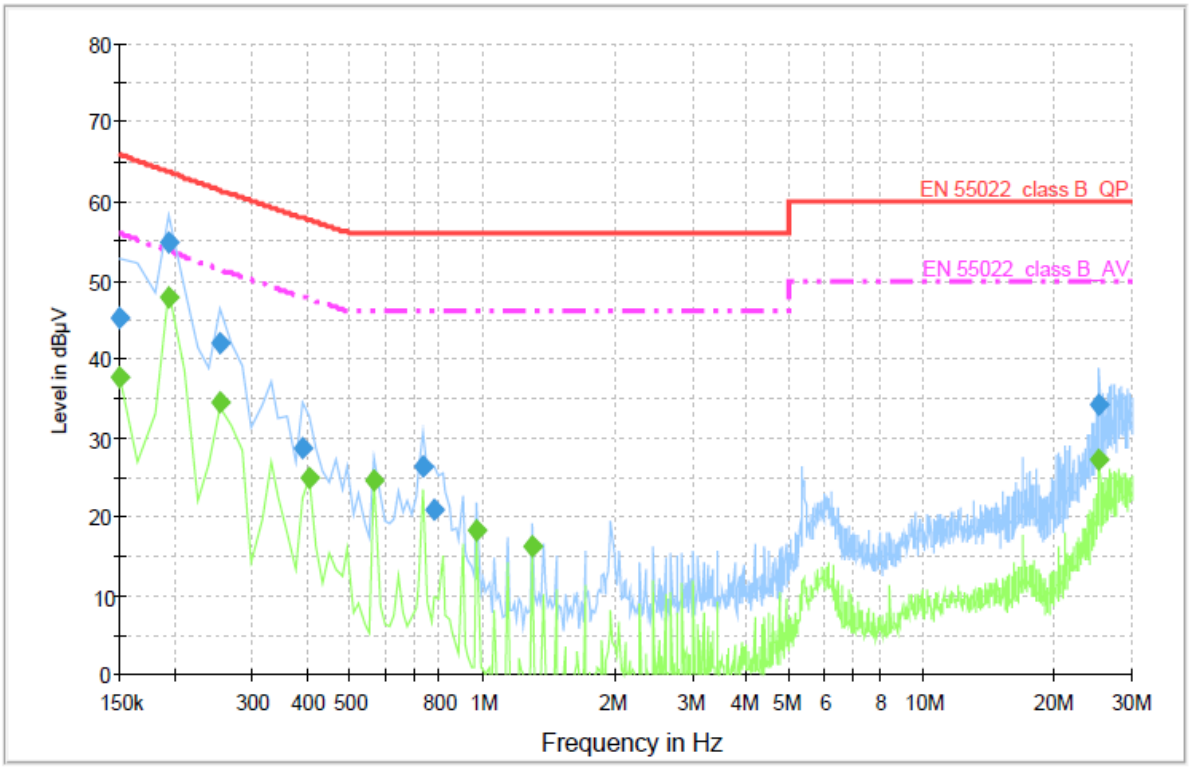
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	45.6	1000.000	9.000	GND	L1	10.0	20.4	66.0	
0.195000	54.8	1000.000	9.000	GND	L1	10.0	8.9	63.7	
0.255000	42.0	1000.000	9.000	GND	L1	10.0	19.4	61.4	
0.330000	32.4	1000.000	9.000	GND	L1	10.0	26.9	59.3	
0.570000	26.7	1000.000	9.000	GND	L1	10.0	29.3	56.0	
0.735000	25.0	1000.000	9.000	GND	L1	10.0	31.0	56.0	
0.900000	23.9	1000.000	9.000	GND	L1	10.0	32.1	56.0	
25.320000	35.1	1000.000	9.000	GND	L1	11.3	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
0.150000	37.4	1000.000	9.000	GND	L1	10.0	18.6	56.0	
0.195000	47.8	1000.000	9.000	GND	L1	10.0	5.9	53.7	
0.255000	33.8	1000.000	9.000	GND	L1	10.0	17.5	51.3	
0.330000	26.5	1000.000	9.000	GND	L1	10.0	22.7	49.2	
0.570000	24.9	1000.000	9.000	GND	L1	10.0	21.1	46.0	
0.735000	23.3	1000.000	9.000	GND	L1	10.0	22.7	46.0	
0.975000	23.6	1000.000	9.000	GND	L1	10.0	22.4	46.0	
1.305000	20.3	1000.000	9.000	GND	L1	10.1	25.7	46.0	
25.320000	27.6	1000.000	9.000	GND	L1	11.3	22.4	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	45.3	1000.000	9.000	GND	N	10.0	20.7	66.0	
0.195000	54.8	1000.000	9.000	GND	N	10.0	8.9	63.7	
0.255000	42.0	1000.000	9.000	GND	N	10.0	19.4	61.4	
0.390000	28.7	1000.000	9.000	GND	N	10.0	29.2	57.9	
0.735000	26.4	1000.000	9.000	GND	N	10.0	29.6	56.0	
0.780000	20.7	1000.000	9.000	GND	N	10.0	35.3	56.0	
25.320000	34.2	1000.000	9.000	GND	N	10.8	25.8	60.0	

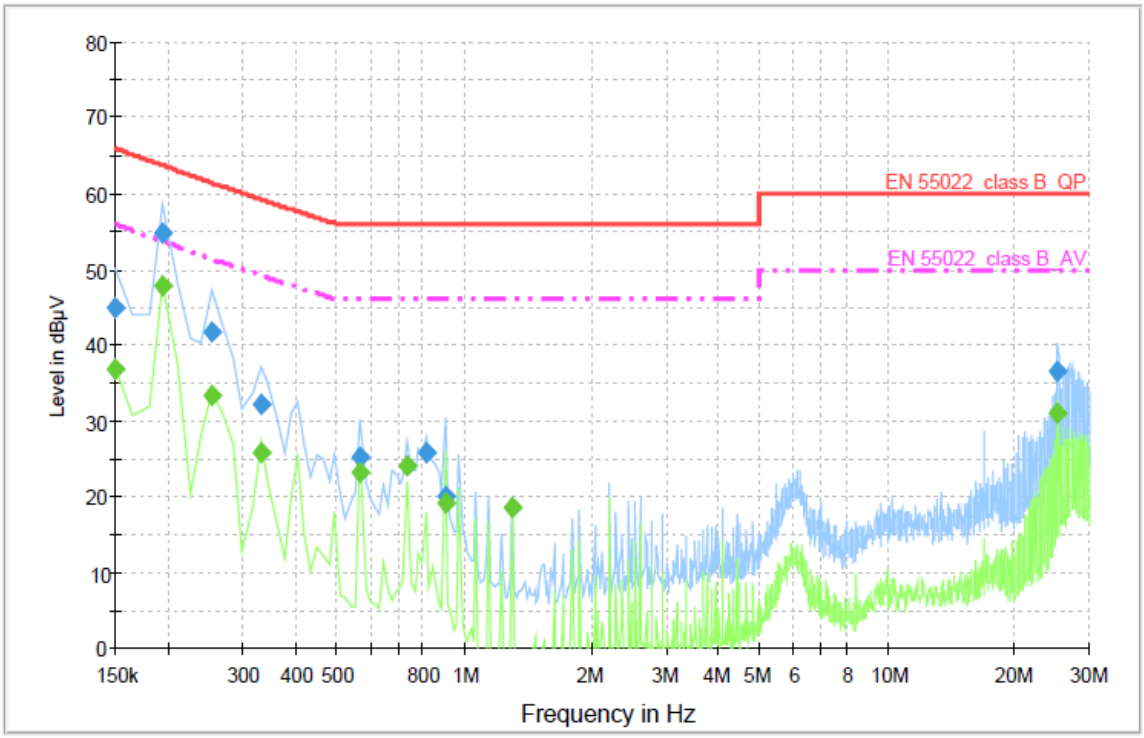
Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	37.6	1000.000	9.000	GND	N	10.0	18.4	56.0	
0.195000	48.0	1000.000	9.000	GND	N	10.0	5.7	53.7	
0.255000	34.4	1000.000	9.000	GND	N	10.0	16.9	51.3	
0.405000	24.9	1000.000	9.000	GND	N	10.0	22.7	47.6	
0.570000	24.6	1000.000	9.000	GND	N	10.0	21.4	46.0	
0.975000	18.3	1000.000	9.000	GND	N	10.0	27.7	46.0	
1.305000	16.3	1000.000	9.000	GND	N	10.1	29.7	46.0	
25.320000	27.2	1000.000	9.000	GND	N	10.8	22.8	50.0	

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

♦ **Operating condition: 1 600 × 1 200 / 60 Hz (HDMI/DVI: Digital)**

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

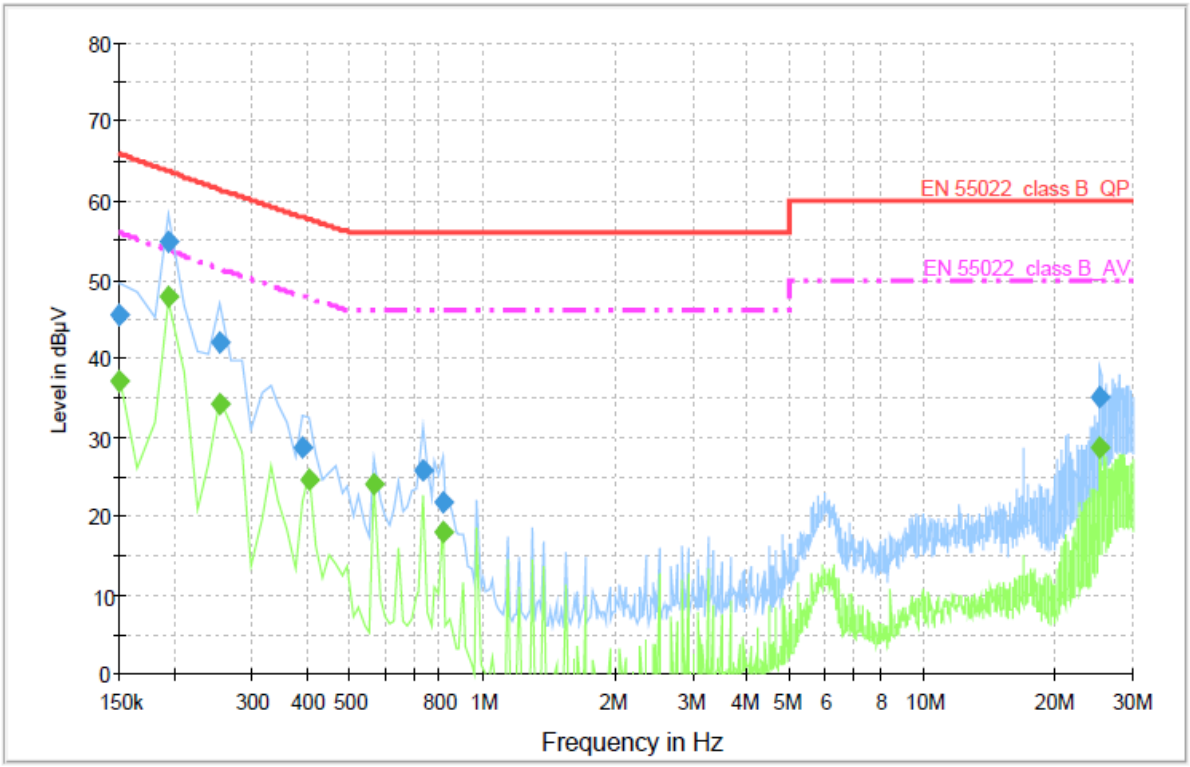
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	44.9	1000.000	9.000	GND	L1	10.0	21.1	66.0	
0.195000	54.9	1000.000	9.000	GND	L1	10.0	8.8	63.7	
0.255000	41.9	1000.000	9.000	GND	L1	10.0	19.5	61.4	
0.330000	32.1	1000.000	9.000	GND	L1	10.0	27.2	59.3	
0.570000	25.1	1000.000	9.000	GND	L1	10.0	30.9	56.0	
0.810000	25.9	1000.000	9.000	GND	L1	10.0	30.1	56.0	
0.900000	20.0	1000.000	9.000	GND	L1	10.0	36.0	56.0	
25.320000	36.4	1000.000	9.000	GND	L1	11.3	23.6	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	36.7	1000.000	9.000	GND	L1	10.0	19.3	56.0	
0.195000	47.7	1000.000	9.000	GND	L1	10.0	6.0	53.7	
0.255000	33.3	1000.000	9.000	GND	L1	10.0	18.0	51.3	
0.330000	25.7	1000.000	9.000	GND	L1	10.0	23.5	49.2	
0.570000	23.1	1000.000	9.000	GND	L1	10.0	22.9	46.0	
0.735000	24.0	1000.000	9.000	GND	L1	10.0	22.0	46.0	
0.900000	19.1	1000.000	9.000	GND	L1	10.0	26.9	46.0	
1.305000	18.7	1000.000	9.000	GND	L1	10.1	27.3	46.0	
2.205000	-1.0	1000.000	9.000	GND	L1	10.1	47.0	46.0	
25.320000	30.9	1000.000	9.000	GND	L1	11.3	19.1	50.0	

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

Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	45.5	1000.000	9.000	GND	N	10.0	20.5	66.0	
0.195000	54.7	1000.000	9.000	GND	N	10.0	9.0	63.7	
0.255000	42.1	1000.000	9.000	GND	N	10.0	19.3	61.4	
0.390000	28.6	1000.000	9.000	GND	N	10.0	29.3	57.9	
0.735000	25.8	1000.000	9.000	GND	N	10.0	30.2	56.0	
0.810000	21.7	1000.000	9.000	GND	N	10.0	34.3	56.0	
25.320000	35.1	1000.000	9.000	GND	N	10.8	24.9	60.0	

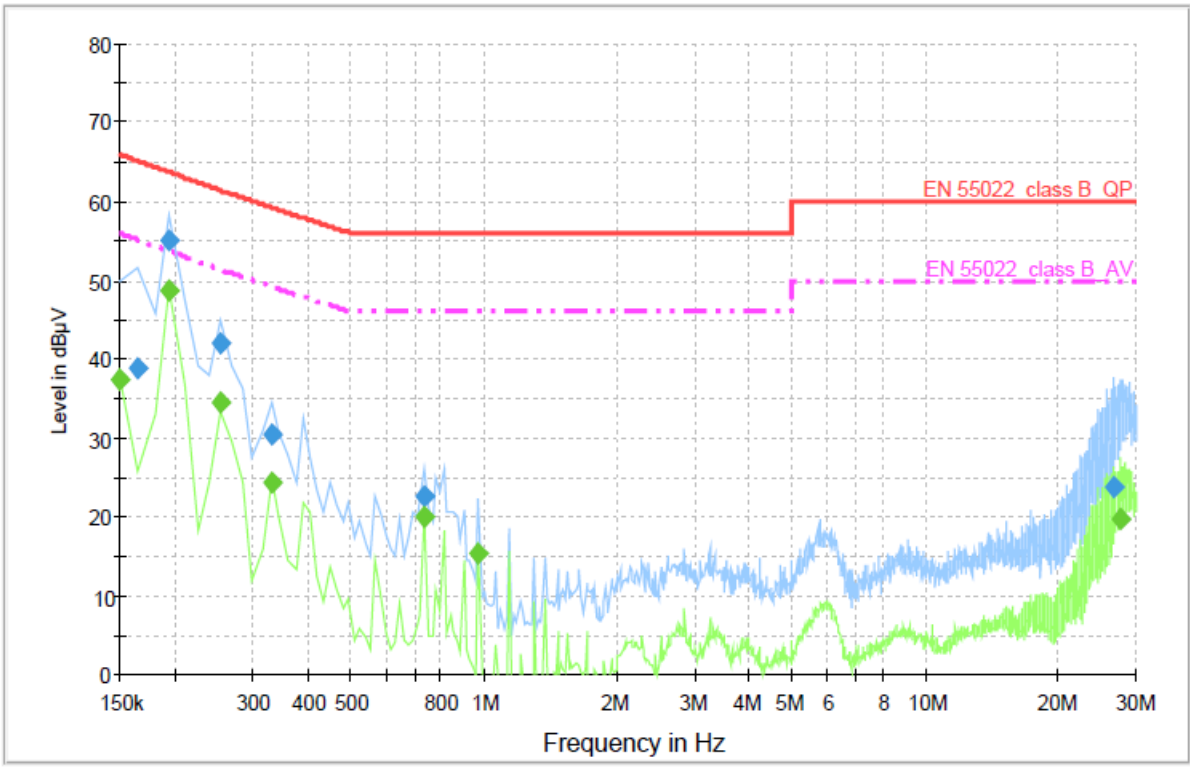
Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	37.2	1000.000	9.000	GND	N	10.0	18.8	56.0	
0.195000	48.0	1000.000	9.000	GND	N	10.0	5.7	53.7	
0.255000	34.3	1000.000	9.000	GND	N	10.0	17.0	51.3	
0.405000	24.7	1000.000	9.000	GND	N	10.0	22.9	47.6	
0.570000	24.0	1000.000	9.000	GND	N	10.0	22.0	46.0	
0.810000	17.9	1000.000	9.000	GND	N	10.0	28.1	46.0	
25.320000	28.7	1000.000	9.000	GND	N	10.8	21.3	50.0	

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

♦ **Operating condition: USB memory stick play mode**

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

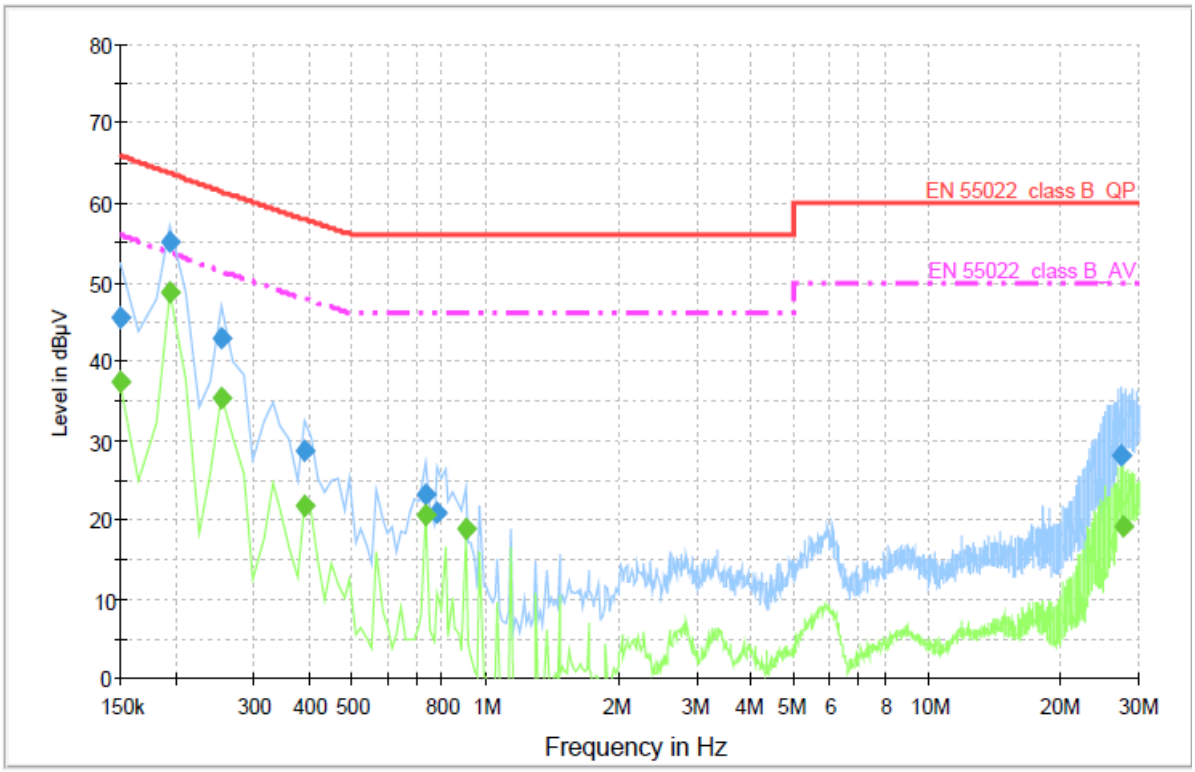
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.165000	38.8	1000.000	9.000	GND	L1	10.0	26.3	65.1	
0.195000	55.0	1000.000	9.000	GND	L1	10.0	8.7	63.7	
0.255000	42.1	1000.000	9.000	GND	L1	10.0	19.3	61.4	
0.330000	30.5	1000.000	9.000	GND	L1	10.0	28.8	59.3	
0.735000	22.7	1000.000	9.000	GND	L1	10.0	33.3	56.0	
26.775000	23.8	1000.000	9.000	GND	L1	11.3	36.2	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	37.5	1000.000	9.000	GND	L1	10.0	18.5	56.0	
0.195000	48.8	1000.000	9.000	GND	L1	10.0	4.9	53.7	
0.255000	34.6	1000.000	9.000	GND	L1	10.0	16.7	51.3	
0.330000	24.3	1000.000	9.000	GND	L1	10.0	24.9	49.2	
0.735000	20.0	1000.000	9.000	GND	L1	10.0	26.0	46.0	
0.975000	15.4	1000.000	9.000	GND	L1	10.0	30.6	46.0	
27.750000	19.6	1000.000	9.000	GND	L1	11.4	30.4	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	45.5	1000.000	9.000	GND	N	10.0	20.5	66.0	
0.195000	55.0	1000.000	9.000	GND	N	10.0	8.7	63.7	
0.255000	42.8	1000.000	9.000	GND	N	10.0	18.6	61.4	
0.390000	28.6	1000.000	9.000	GND	N	10.0	29.3	57.9	
0.735000	23.2	1000.000	9.000	GND	N	10.0	32.8	56.0	
0.780000	20.8	1000.000	9.000	GND	N	10.0	35.2	56.0	
27.240000	28.0	1000.000	9.000	GND	N	10.8	32.0	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	37.5	1000.000	9.000	GND	N	10.0	18.5	56.0	
0.195000	48.8	1000.000	9.000	GND	N	10.0	4.9	53.7	
0.255000	35.3	1000.000	9.000	GND	N	10.0	16.0	51.3	
0.390000	21.8	1000.000	9.000	GND	N	10.0	26.1	47.9	
0.735000	20.5	1000.000	9.000	GND	N	10.0	25.5	46.0	
0.900000	18.8	1000.000	9.000	GND	N	10.0	27.2	46.0	
27.765000	19.1	1000.000	9.000	GND	N	10.8	30.9	50.0	

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

6. Radiated Emission

6.1 Operating Environment

Temperature : 24 ℃
Relative Humidity : 42 % R.H.

6.2 Test Set-up

A preliminary and final measurement was at 3 m anechoic chamber.
The EUT was placed on a non-conductive turntable approximately 0.8 m above the ground plane.
The turntable with EUT was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels.
This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

6.3 Measurement Uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement”.
The measurement uncertainty was given with a confidence of 95 %.

Test Items(Chamber)	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 3 m, Vertical)	± 4.32 dB	Confidence levels of 95 % (k = 2)
Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)	± 4.21 dB	Confidence levels of 95 % (k = 2)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)	± 3.96 dB	Confidence levels of 95 % (k = 2)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal)	± 3.97 dB	Confidence levels of 95 % (k = 2)

6.4 Limit

Frequency (MHz)	FCC Limit @ 3 m. dB μV/m	CISPR Limit @ 10 m. dB μV/m
30 ~ 88	40.0	30.0
88 ~ 216	43.5	30.0
216 ~ 230	46.0	30.0
230 ~ 960	46.0	37.0
960 ~ 1 000	54.0	37.0
> 1 000	54.0	No Specified limit

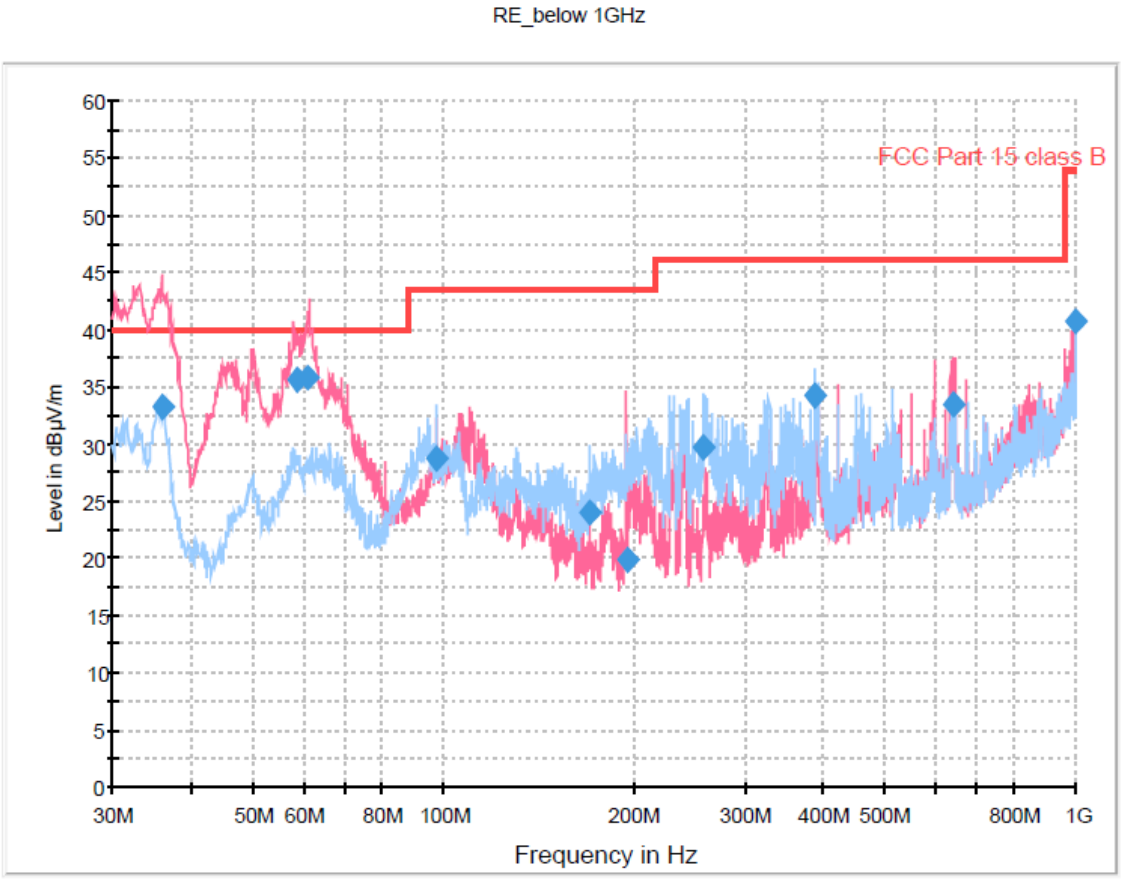
6.5 Test Equipment used

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

6.6 Test data for Radiated Emission

-. Test Date : April 27, 2010
-. Resolution Bandwidth : 120 kHz / 1 MHz
-. Frequency Range : 30 MHz ~ 2 000 MHz
-. Measurement Distance : 3 m
-. Note : The highest frequency of the internal source of the EUT is between 108 MHz and 500 MHz (400 MHz). The measurement was made up to 2 000 MHz

♦ Operating Condition: 1 600 × 1 200 / 60 Hz (RGB: Analog)
Red trace: Vertical polarization, Blue trace: Horizontal polarization

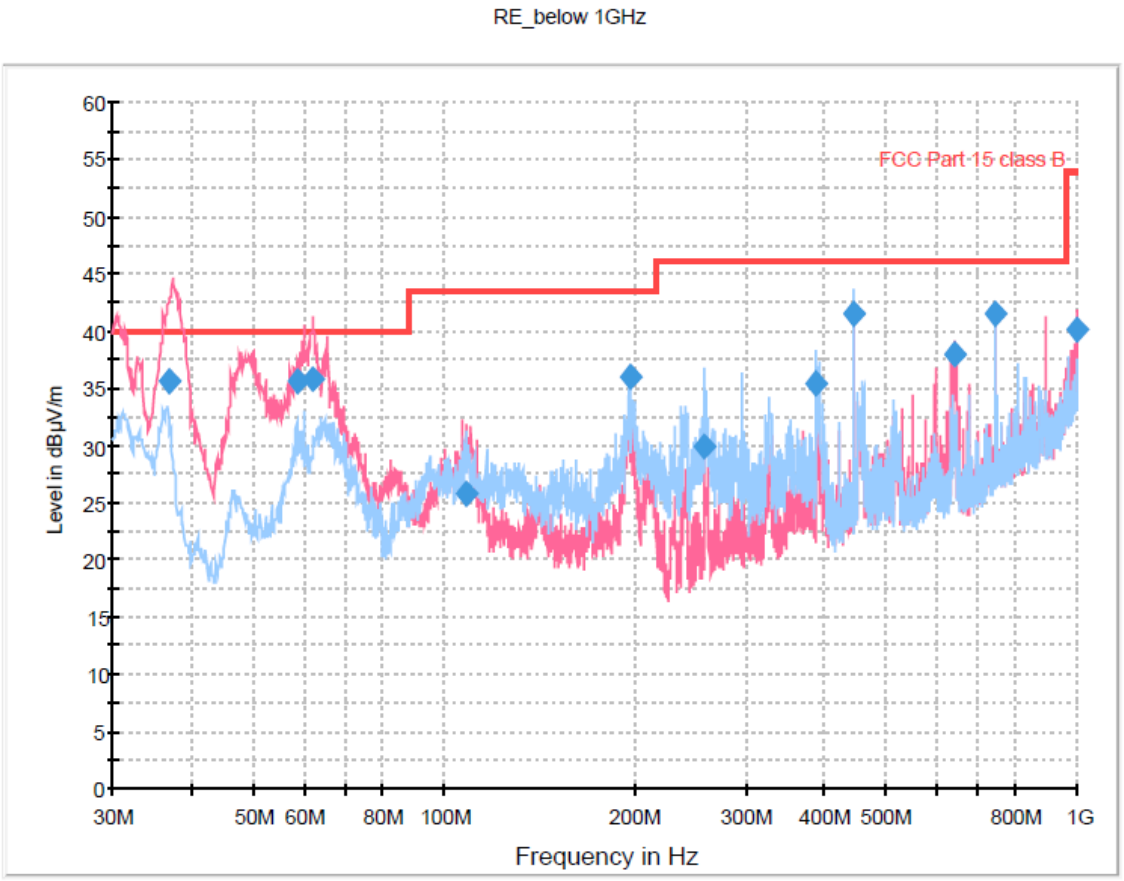


Final Result [1]

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
35.921250	33.2	1000.0	120.000	100.0	V	122.0	11.8	6.81	40.00
58.668750	35.6	1000.0	120.000	100.0	V	308.0	12.8	4.40	40.00
61.106250	35.9	1000.0	120.000	100.0	V	285.0	12.6	4.10	40.00
97.515000	28.8	1000.0	120.000	200.0	H	210.0	10.8	14.68	43.50
170.670000	24.1	1000.0	120.000	171.0	H	174.0	14.3	19.41	43.50
196.361250	19.8	1000.0	120.000	100.0	V	194.0	12.0	23.68	43.50
257.812500	29.8	1000.0	120.000	118.0	H	170.0	14.8	16.22	46.00
386.661250	34.2	1000.0	120.000	100.0	H	243.0	17.7	11.77	46.00
643.143750	33.5	1000.0	120.000	100.0	V	308.0	23.0	12.53	46.00
997.838750	40.8	1000.0	120.000	100.0	V	353.0	31.6	13.20	54.00

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

♦ Operating Condition: 1 600 × 1 200 / 60 Hz (HDMI/DVI: Digital)
Red trace: Vertical polarization, Blue trace: Horizontal polarization

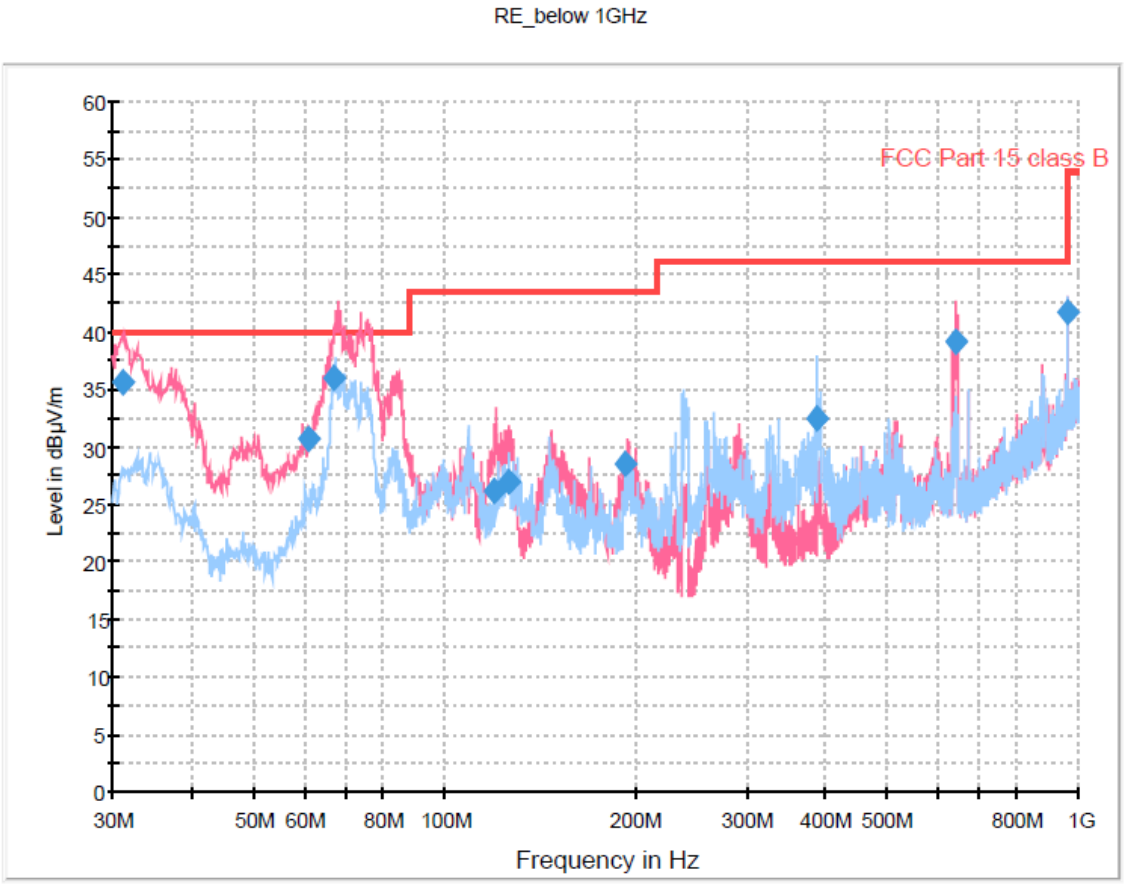


Final Result [1]

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
36.776250	35.7	1000.0	120.000	100.0	V	150.0	12.0	4.30	40.00
58.691250	35.5	1000.0	120.000	100.0	V	332.0	12.8	4.46	40.00
62.031250	35.8	1000.0	120.000	100.0	V	288.0	12.5	4.20	40.00
108.372500	25.7	1000.0	120.000	100.0	V	355.0	12.3	17.76	43.50
196.860000	36.0	1000.0	120.000	173.0	H	295.0	12.0	7.47	43.50
257.848750	29.8	1000.0	120.000	131.0	H	153.0	14.8	16.16	46.00
386.663750	35.5	1000.0	120.000	100.0	H	200.0	17.7	10.50	46.00
444.897500	41.5	1000.0	120.000	192.0	H	145.0	19.1	4.50	46.00
643.345000	38.0	1000.0	120.000	100.0	V	288.0	23.0	8.03	46.00
741.475000	41.6	1000.0	120.000	150.0	V	218.0	24.5	4.40	46.00
997.838750	40.0	1000.0	120.000	100.0	V	0.0	31.6	14.00	54.00

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

♦ Operating Condition: USB memory stick play mode
Red trace: Vertical polarization, Blue trace: Horizontal polarization

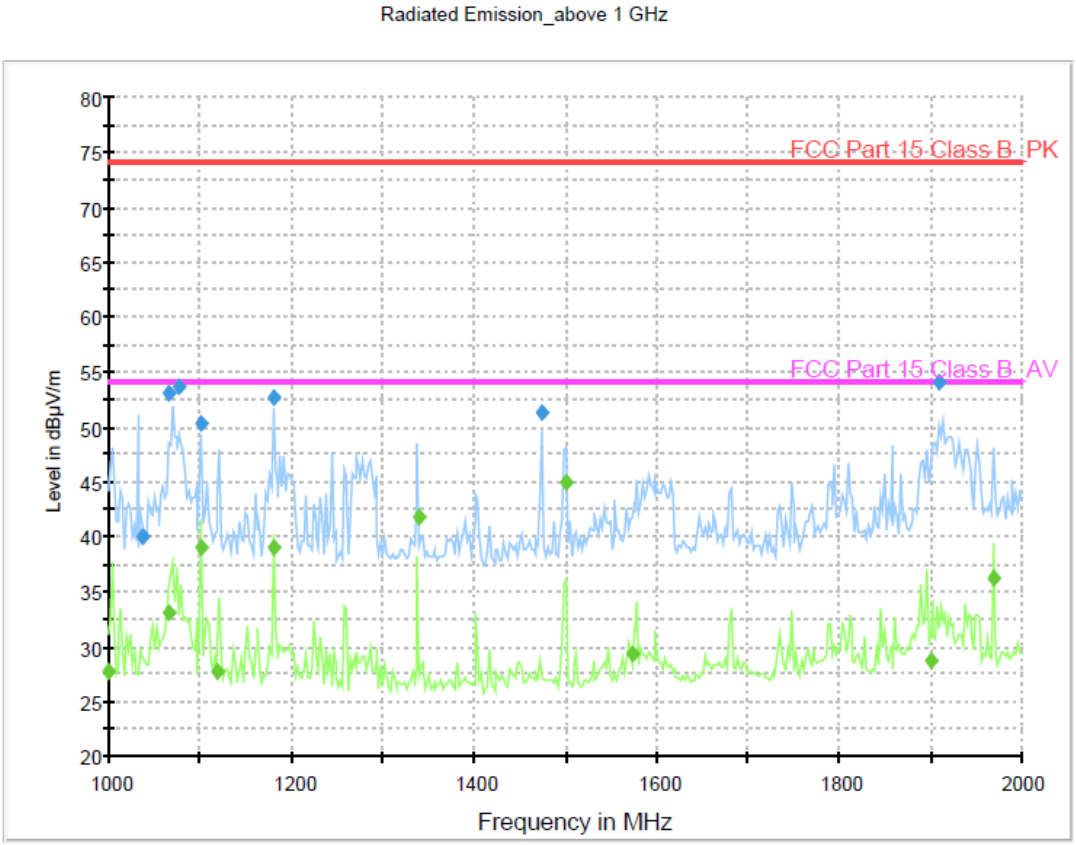


Final Result [1]

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
31.240000	35.7	1000.0	120.000	100.0	V	216.0	11.3	4.30	40.00
61.086250	30.8	1000.0	120.000	100.0	V	336.0	12.6	9.24	40.00
67.013750	36.0	1000.0	120.000	100.0	V	32.0	11.8	4.00	40.00
120.277500	26.2	1000.0	120.000	111.0	V	303.0	13.7	17.26	43.50
126.058750	27.0	1000.0	120.000	100.0	V	314.0	13.9	16.49	43.50
193.428750	28.6	1000.0	120.000	104.0	V	216.0	12.2	14.89	43.50
388.096250	32.5	1000.0	120.000	100.0	H	231.0	17.7	13.51	46.00
643.543750	39.1	1000.0	120.000	100.0	V	0.0	23.0	6.90	46.00
960.050000	41.7	1000.0	120.000	111.0	V	336.0	30.1	12.30	54.00

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

♦ Operating Condition: 1 600 × 1 200 / 60 Hz (RGB: Analog)
Green trace: Average detector, Blue trace: Peak detector



Final Result 1

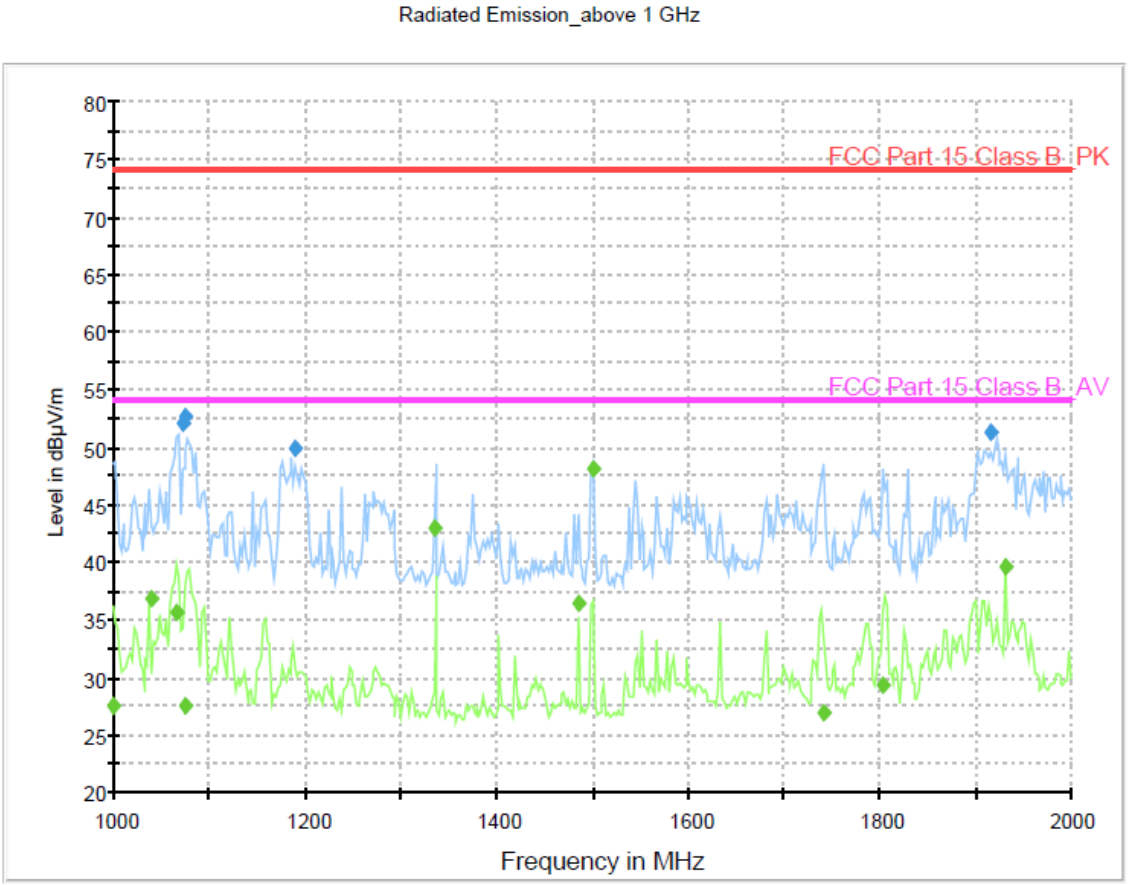
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1036.664128	40.0	100.0	1000.000	272.0	V	313.0	-15.7	34.0	74.0
1066.740281	53.0	100.0	1000.000	100.0	V	312.0	-15.5	21.0	74.0
1077.556313	53.7	100.0	1000.000	200.0	V	0.0	-15.5	20.3	74.0
1102.404409	50.3	100.0	1000.000	198.0	V	266.0	-15.4	23.7	74.0
1181.360722	52.8	100.0	1000.000	100.0	V	232.0	-15.1	21.2	74.0
1474.349900	51.2	100.0	1000.000	298.0	V	320.0	-14.3	22.8	74.0
1909.627655	54.0	100.0	1000.000	181.0	V	159.0	-13.1	20.0	74.0

Final Result 2

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	27.6	100.0	1000.000	100.0	V	331.0	-15.9	26.4	54.0
1066.340281	33.1	100.0	1000.000	284.0	V	0.0	-15.5	20.9	54.0
1102.404409	39.0	100.0	1000.000	198.0	V	266.0	-15.4	15.0	54.0
1120.044489	27.8	100.0	1000.000	100.0	V	0.0	-15.3	26.2	54.0
1181.360722	39.1	100.0	1000.000	100.0	V	232.0	-15.1	14.9	54.0
1338.877355	41.7	100.0	1000.000	100.0	H	151.0	-14.4	12.3	54.0
1500.002004	44.9	100.0	1000.000	121.0	H	143.0	-14.3	9.1	54.0
1574.958317	29.3	100.0	1000.000	130.0	H	326.0	-13.8	24.7	54.0
1900.391583	28.6	100.0	1000.000	100.0	H	225.0	-13.1	25.4	54.0
1968.939880	36.3	100.0	1000.000	100.0	H	138.0	-12.8	17.7	54.0

< Fig 17. Radiated emission result (1 000 MHz ~ 2 000 MHz)>

♦ Operating Condition: 1 600 × 1 200 / 60 Hz (HDMI/DVI: Digital)
Green trace: Average detector, Blue trace: Peak detector



Final Result 1

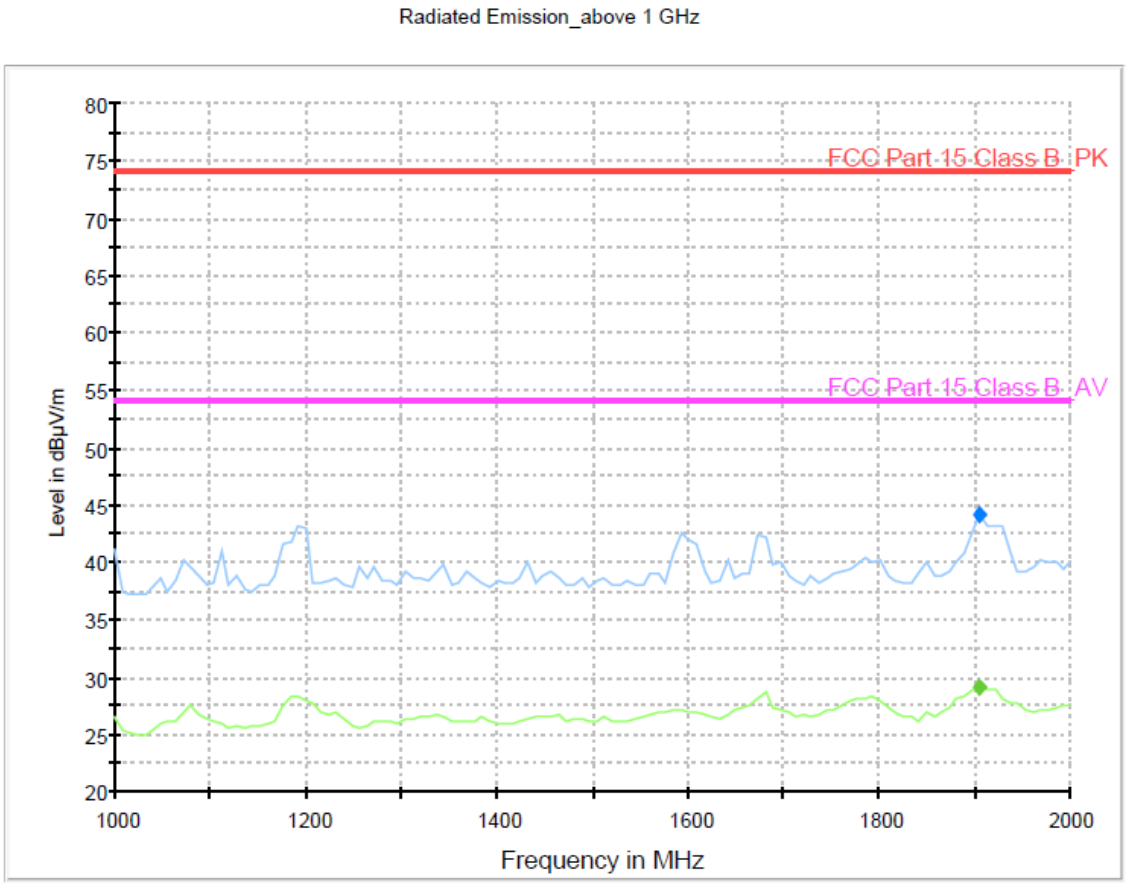
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1072.736273	52.2	100.0	1000.000	215.0	V	15.0	-15.5	21.8	74.0
1073.956313	52.8	100.0	1000.000	198.0	V	0.0	-15.5	21.2	74.0
1189.772746	49.8	100.0	1000.000	100.0	V	234.0	-15.1	24.2	74.0
1916.843687	51.2	100.0	1000.000	200.0	V	338.0	-13.0	22.8	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)
1000.000000	27.5	100.0	1000.000	200.0	V	162.0	-15.9	26.5	54.0
1039.476152	36.8	100.0	1000.000	323.0	V	182.0	-15.7	17.2	54.0
1066.332265	35.7	100.0	1000.000	201.0	V	15.0	-15.5	18.3	54.0
1075.560321	27.5	100.0	1000.000	100.0	V	180.0	-15.5	26.5	54.0
1336.473347	42.9	100.0	1000.000	206.0	H	223.0	-14.4	11.1	54.0
1485.169940	36.4	100.0	1000.000	147.0	H	223.0	-14.3	17.6	54.0
1500.002004	48.1	100.0	1000.000	121.0	H	137.0	-14.3	5.9	54.0
1740.878958	27.0	100.0	1000.000	100.0	H	155.0	-13.4	27.0	54.0
1803.811222	29.3	100.0	1000.000	100.0	H	162.0	-13.1	24.7	54.0
1930.463727	39.7	100.0	1000.000	172.0	H	134.0	-13.0	14.3	54.0

< Fig 18. Radiated emission result (1 000 MHz ~ 2 000 MHz)>

♦ Operating Condition: USB memory stick play mode
Green trace: Average detector, Blue trace: Peak detector



Final Result 1

Frequency (MHz)	Maxpeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1905.811623	44.2	100.0	1000.000	100.0	V	153.0	-13.1	29.8	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)
1905.811623	29.2	100.0	1000.000	205.0	V	125.0	-13.1	24.8	54.0

< Fig 19. Radiated emission result (1 000 MHz ~ 2 000 MHz)>

7. Sample Calculations

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

7.1 Example 1 :

■ **20.3 MHz**

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

7.2 Example 2 :

■ **66.7 MHz**

Class B Limit	**= 100 μV/m = 40.0 dBμV/m**
Reading	**= 31.0 dBμV**
Antenna Factor + Cable Loss = 5.8 dB	
Total	**= 36.8 dBμV/m**
Margin	**= 40.0 dBμV/m – 36.8 dBμV/m**
	= 3.2 dB

8. Recommendation & Conclusion

The data collected shows that the **LG Electronics Inc. DLP PROJECTOR (Model Name: BX327-JD, GX337-JD, BX277-JD)** was complies with §15.107 and 15.109 of the FCC Rules.