FCC EVALUATION REPORT FOR CERTIFICATION

Applicant : LG Electronics Inc.
19-1, Cheongho-ri, Jinwi-myeon,
Pyeongteak-si, Gyeonggi-do, Korea.
Attn: Mr. Do-Hyung Kim, Chief research engineer

Date of Issue : March 4, 2011
Order Number: GETEC-C1-11-034
Test Report Number: GETEC-E3-11-013
Test Site: Gumi College EMC Center
FCC Registration Number: (100749, 443957)

FCC ID. : BEJLSM4200

Applicant : LG Electronics Inc.

Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: LCD Monitor
Type of Authority	: Certification
Model Name	: LSM4200
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,

Soon Hoon

Soon-Hoon Jeong, Associate Engineer
GUMI College EMC center

Reviewed by,

Jae-Hoon Jeong, Senior Engineer
GUMI College EMC center

This test report only contains the result of a specific sample supplied for the examination.
It is not allowed to copy this report even partly without the approval of EMC center

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

1. General Information

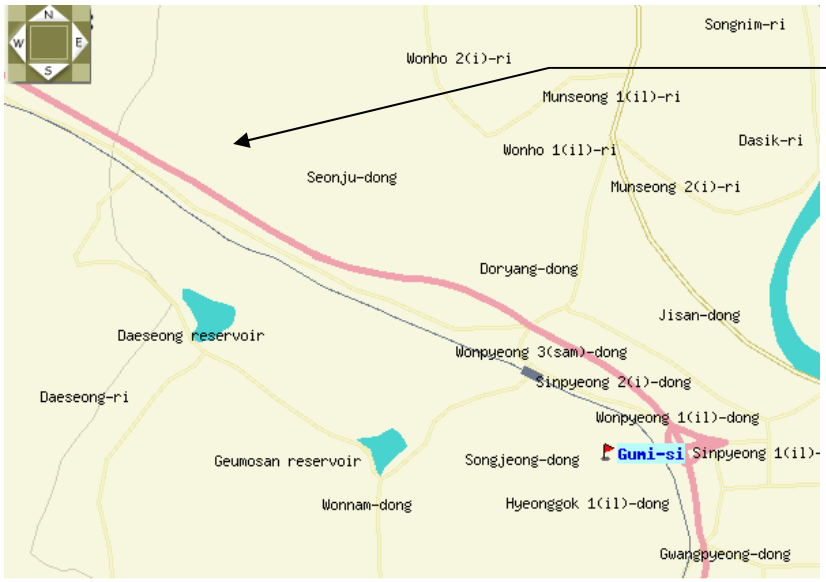
Applicant: LG Electronics Inc.
Applicant Address: 19-1, Cheongho-ri, Jinwi-myeon, Pyeongteak-si, Gyeonggi-do, Korea.
Manufacturer: LG Electronics Inc.
Manufacturer Address: 19-1, Cheongho-ri, Jinwi-myeon, Pyeongteak-si, Gyeonggi-do, Korea.
Contact Person: Mr. Do-Hyung Kim, Chief research engineer
Tel Number: +82-31-610-9623

- **FCC ID.** BEJLSM4200
- **EUT Type** LCD Monitor
- **Model Name** LSM4200
- **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** February 12 ~ March 2, 2011
- **Place of Test** **Gumi College EMC Center** (FCC Registration Number: 100749, 443957) 407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.
- **Test Report Number** GETEC-E3-11-013
- **Dates of Issue** March 4, 2011

2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ASNI C63.4-2003) was used in determining radiated and conducted emissions emanating from **LG Electronics Inc. LCD Monitor (Model Name: LSM4200)**

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. LCD Monitor (Model Name: LSM4200) FCC ID.: BEJLSM4200**

-. LCD Panel	: 106.72 cm (42 inch) TFT (Thin Film Transistor) LCD (Liquid Crystal Display) Panel Visible diagonal size: 106.72 cm 0.484 5 mm × 0.484 5 mm
-. Power	: Rated Voltage: AC (100 – 240) V~, (50/60) Hz, 2.2 A Power Consumption: 220 W
-. Dimensions	: 99.56 cm(W) × 67.41 cm(H) × 29.30 cm(D)
-. Weight	: 27.1 kg
-. Maximum Resolution	: RGB: 1 920 × 1 080 @ 60 Hz HDMI/DVI: 1 920 × 1 080 @ 60 Hz
-. Horizontal Frequency	: RGB: 30 kHz to 83 kHz HDMI/DVI: 30 kHz to 83 kHz
-. Vertical Frequency	: RGB: 56 Hz to 75 Hz HDMI/DVI: 56 Hz to 60 Hz
-. I/O Ports	: RS-232C(CONTROL) IN/OUT PORT, HDMI/DVI PORT, RGB IN/OUT PORT, AUDIO(RGB/DVI) IN PORT, REMOTE CONTROL IN PORT, COMPONENT IN PORT, AV IN/OUT PORT, S-VIDEO PORT, SPEAKET PORT
-. Maximum Frequency Range	: 210 MHz

3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID.
PC	SAMSUNG	DB-P60	S/N: 729W97AP500001M FCC ID.: DoC
Video card	SUMA	Geforce FX 7600GT	S/N: NE/7600GXTD21V407003711 FCC ID.: DoC
PS2 keyboard	COMPAQ	166516-AD6	S/N: B13BBOR391006D FCC ID.: AQ6-23K15
PS2 mouse	LOGITECH	M-S69	S/N: 334684-108 FCC ID.: JNZ211443
Joy stick	MICROSOFT	X05-92626	S/N: 9262600296169 FCC ID.: DoC
Monitor	MAJESTIC	TM154	S/N: D07030LP01003 FCC ID.: DoC
Printer	Hewlett Packard	970CXI	S/N: MY9B01F1FG FCC ID: DoC
DVD player	LG Electronics Inc.	LC-954	S/N: 3850R-Z674K 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.
Stand	LG Electronics Inc.	ST-0000K	S/N: N/A FCC ID.: N/A
Speaker	LG Electronics Inc.	SP-0000K	S/N: N/A FCC ID.: N/A

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
Audio(RGB/DVI) in cable	Connected to the EUT and PC	1.80 m shielded with a ferrite core
RS-232C in/out cable	Connected to the EUT (in) and EUT(out)	1.80 m shielded with two ferrite cores
Remote control in cable	Connected to the EUT and PC	1.80 m shielded
Component in cable	Connected to the EUT and DVD player	3.00 m shielded
AV in cable	Connected to the EUT and DVD player	3.00 m shielded
AV out cable	Connected to the EUT and monitor	3.00 m shielded
S-video in cable	Connected to the EUT and DVD player	1.80 m shielded
Speaker out cable	Connected to the EUT and speaker	0.40 m unshielded

3.3 Modification Item(s)

- None

4. Description of tests

4.1 Test Condition

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

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

- Test Mode(s)

-. Monitor mode

Radiated emission: 1 920 × 1 080 / 60 Hz (RGB: Analog, HDMI/DVI: Digital)
Conducted emission: 1 920 × 1 080 / 60 Hz (RGB: Analog, HDMI/DVI: Digital)
1 280 × 1 024 / 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

"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

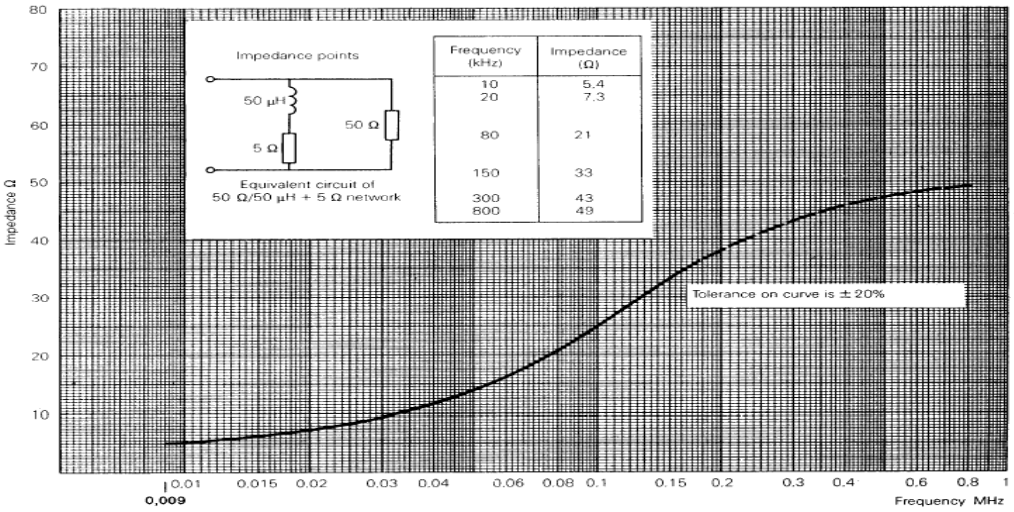


Fig 2. Impedance of LISN

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

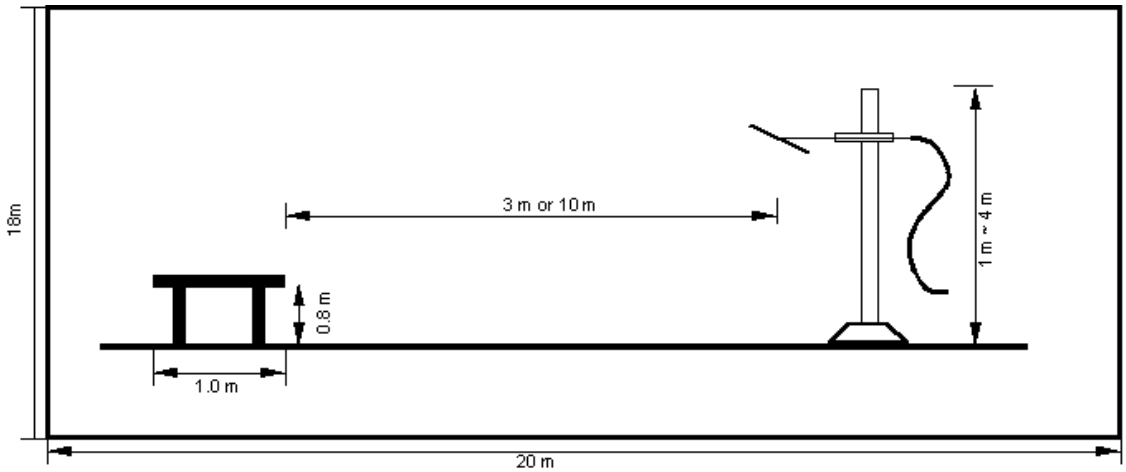


Fig 3. Dimensions of test site

5. Conducted Emission

5.1 Operating Environment

Temperature : 25 ℃
Relative Humidity : 38 % R.H.

5.2 Test Set-up

The conducted emission measurements were performed in the shielded room.
The EUT was placed on wooden table, 0.8 m heights above the floor, 0.4 m from the reference ground plane (GRP) wall and 0.8 m from AMN &ISN.
AMN is bonded on horizontal reference ground plane.
The ground plane, which was electrically bonded to the shield room, ground system and all power lines entering the shield room, were filtered.

5.3 Measurement Uncertainty

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

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

5.4 Limit

RFI Conducted	FCC Limit(dB 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

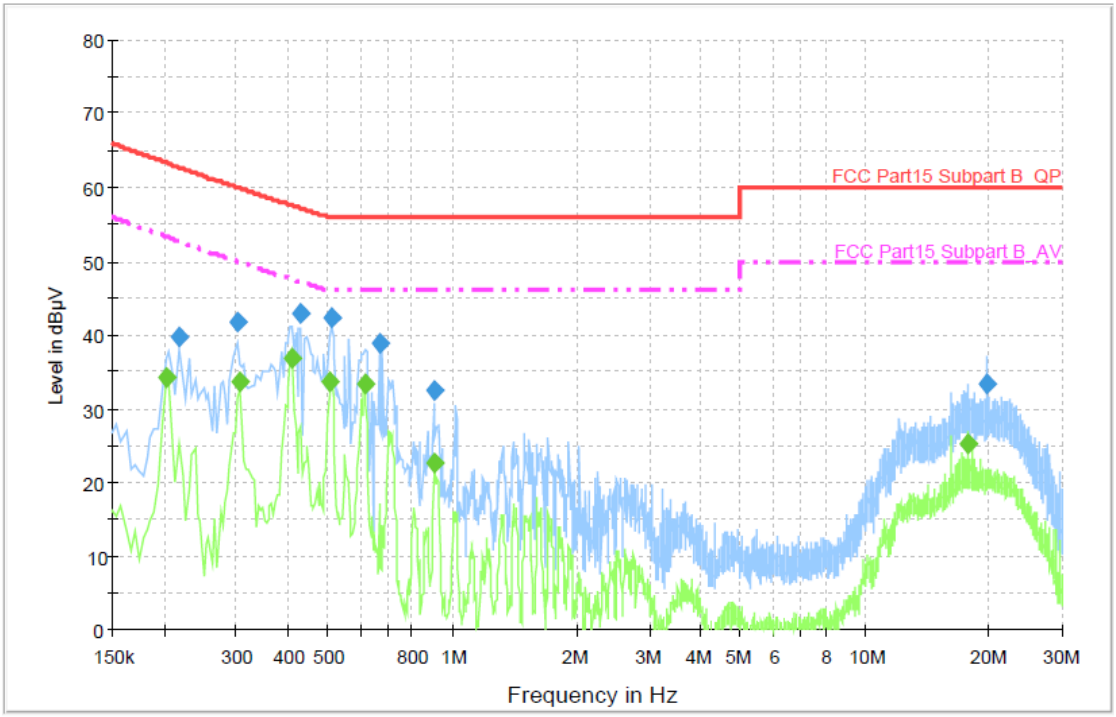
	Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ -	ESCS30	Rohde & Schwarz	EMI Test Receiver	839809/003	12. 10. 2011
■ -	ESH3-Z5	Rohde & Schwarz	LISN	838979/020	12. 10. 2011
■ -	ESH2-Z5	Rohde & Schwarz	LISN	829991/009	12. 10. 2011
□ -	ISN T8	TESEQ. GmbH	ISN	24568	11. 09. 2011

5.6 Test data for Conducted Emission

-. Test Date : February 21, 2011
-. Resolution Bandwidth : 9 kHz
-. Frequency Range : 0.15 MHz ~ 30 MHz

♦ Operating condition: 1 920 × 1 080 / 60 Hz (RGB: Analog)

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

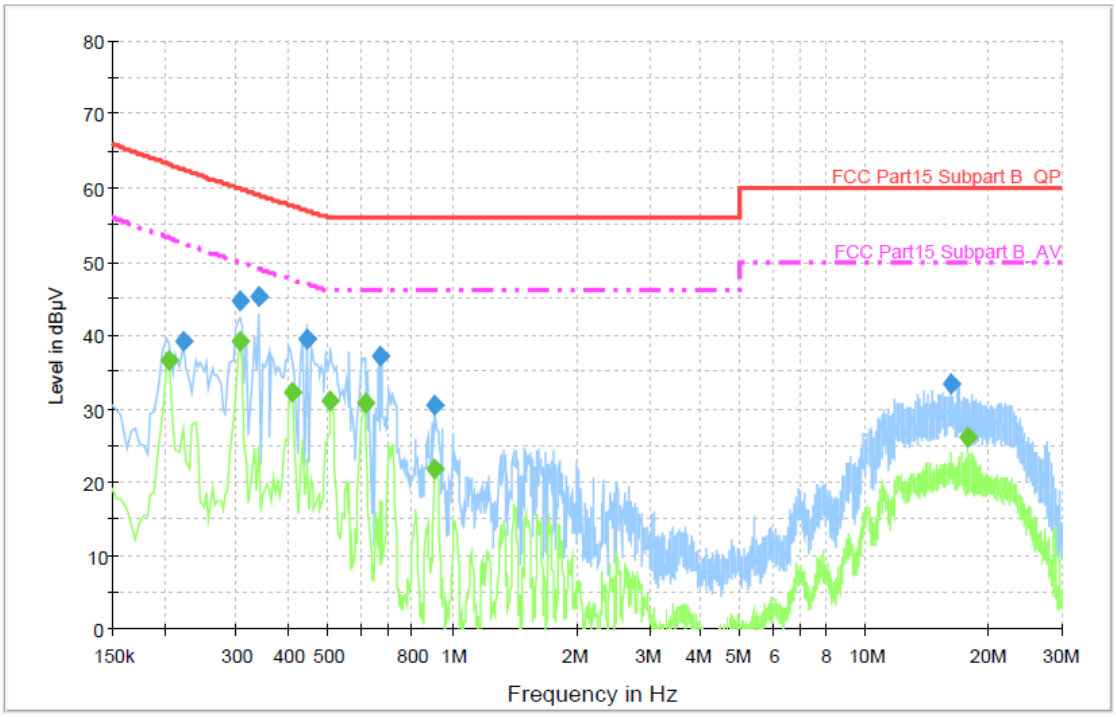
Frequency (MHz)	MaxPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.218000	39.6	1000.000	9.000	GND	L1	10.1	23.1	62.7	
0.302000	41.6	1000.000	9.000	GND	L1	10.1	18.4	60.0	
0.430000	42.8	1000.000	9.000	GND	L1	10.1	14.4	57.2	
0.510000	42.2	1000.000	9.000	GND	L1	10.1	13.8	56.0	
0.666000	38.9	1000.000	9.000	GND	L1	10.1	17.1	56.0	
0.906000	32.4	1000.000	9.000	GND	L1	10.1	23.6	56.0	
19.698000	33.2	1000.000	9.000	GND	L1	11.2	26.8	60.0	

Final Measurement Detector 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.202000	34.1	1000.000	9.000	GND	L1	10.1	19.2	53.3	
0.306000	33.6	1000.000	9.000	GND	L1	10.1	16.2	49.8	
0.410000	36.8	1000.000	9.000	GND	L1	10.1	10.7	47.5	
0.506000	33.8	1000.000	9.000	GND	L1	10.1	12.2	46.0	
0.614000	33.2	1000.000	9.000	GND	L1	10.1	12.8	46.0	
0.906000	22.7	1000.000	9.000	GND	L1	10.1	23.3	46.0	
17.694000	25.4	1000.000	9.000	GND	L1	11.1	24.6	50.0	

< Fig 4. Conducted emission result (Live line) >

Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	MaxPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.222000	39.1	1000.000	9.000	GND	N	10.1	23.5	62.6	
0.306000	44.7	1000.000	9.000	GND	N	10.1	15.2	59.9	
0.338000	45.4	1000.000	9.000	GND	N	10.1	13.7	59.1	
0.446000	39.3	1000.000	9.000	GND	N	10.1	17.6	56.9	
0.670000	37.2	1000.000	9.000	GND	N	10.1	18.8	56.0	
0.910000	30.4	1000.000	9.000	GND	N	10.1	25.6	56.0	
16.166000	33.4	1000.000	9.000	GND	N	10.8	26.6	60.0	

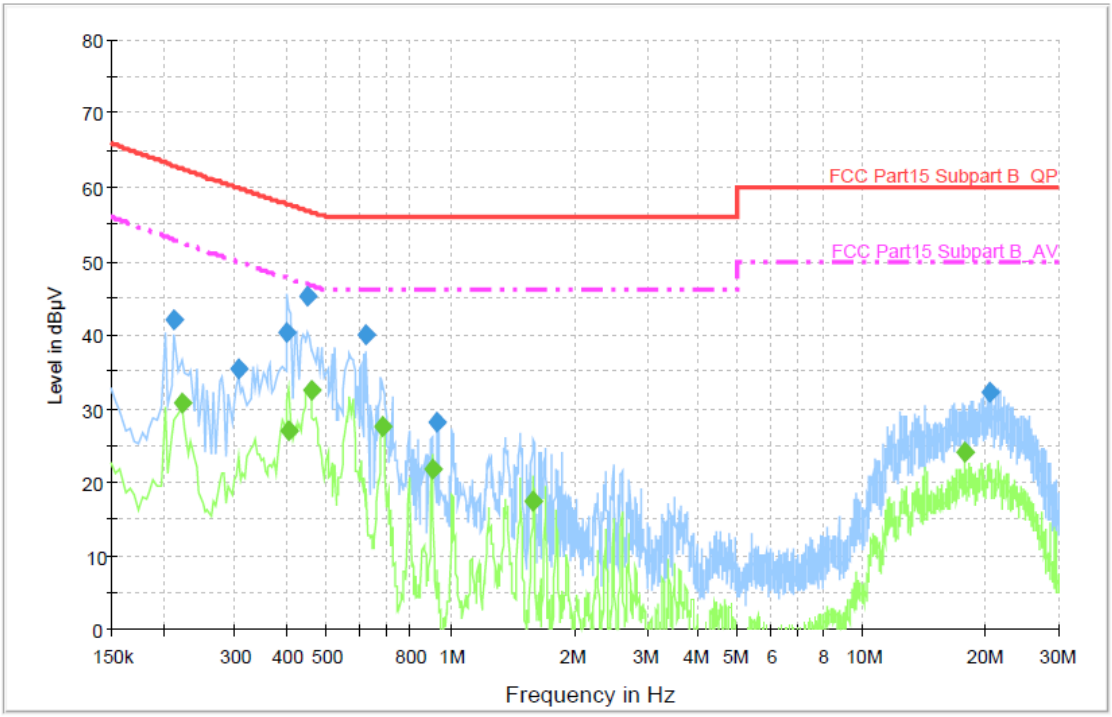
Final Measurement Detector 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.206000	36.5	1000.000	9.000	GND	N	10.1	16.7	53.2	
0.306000	39.0	1000.000	9.000	GND	N	10.1	10.8	49.8	
0.410000	32.1	1000.000	9.000	GND	N	10.1	15.4	47.5	
0.506000	31.1	1000.000	9.000	GND	N	10.1	14.9	46.0	
0.614000	30.9	1000.000	9.000	GND	N	10.1	15.1	46.0	
0.906000	21.8	1000.000	9.000	GND	N	10.1	24.2	46.0	
17.694000	26.1	1000.000	9.000	GND	N	10.9	23.9	50.0	

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

♦ Operating condition: 1 280 × 1 024 / 60 Hz (RGB: Analog)

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

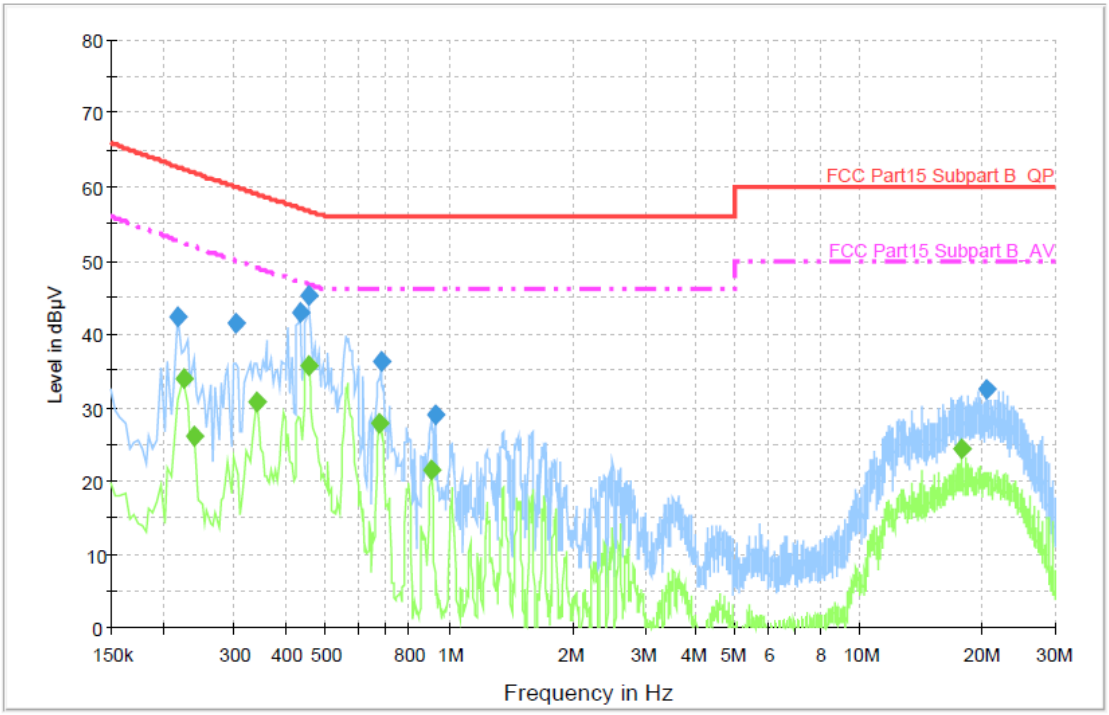
Frequency (MHz)	MaxPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.214000	41.9	1000.000	9.000	GND	L1	10.1	21.0	62.9	
0.306000	35.2	1000.000	9.000	GND	L1	10.1	24.7	59.9	
0.402000	40.4	1000.000	9.000	GND	L1	10.1	17.3	57.7	
0.450000	45.3	1000.000	9.000	GND	L1	10.1	11.5	56.8	
0.626000	40.1	1000.000	9.000	GND	L1	10.1	15.9	56.0	
0.926000	28.1	1000.000	9.000	GND	L1	10.1	27.9	56.0	
20.522000	32.2	1000.000	9.000	GND	L1	11.3	27.8	60.0	

Final Measurement Detector 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.222000	30.8	1000.000	9.000	GND	L1	10.1	21.7	52.5	
0.406000	26.9	1000.000	9.000	GND	L1	10.1	20.7	47.6	
0.458000	32.4	1000.000	9.000	GND	L1	10.1	14.3	46.7	
0.686000	27.6	1000.000	9.000	GND	L1	10.1	18.4	46.0	
0.902000	21.6	1000.000	9.000	GND	L1	10.1	24.4	46.0	
1.586000	17.4	1000.000	9.000	GND	L1	10.1	28.6	46.0	
17.694000	24.0	1000.000	9.000	GND	L1	11.1	26.0	50.0	

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

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	MaxPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.218000	42.4	1000.000	9.000	GND	L1	10.1	20.3	62.7	
0.302000	41.6	1000.000	9.000	GND	L1	10.1	18.4	60.0	
0.434000	42.8	1000.000	9.000	GND	L1	10.1	14.3	57.1	
0.454000	45.1	1000.000	9.000	GND	L1	10.1	11.6	56.7	
0.682000	36.2	1000.000	9.000	GND	L1	10.1	19.8	56.0	
0.922000	28.9	1000.000	9.000	GND	L1	10.1	27.1	56.0	
20.466000	32.5	1000.000	9.000	GND	L1	11.3	27.5	60.0	

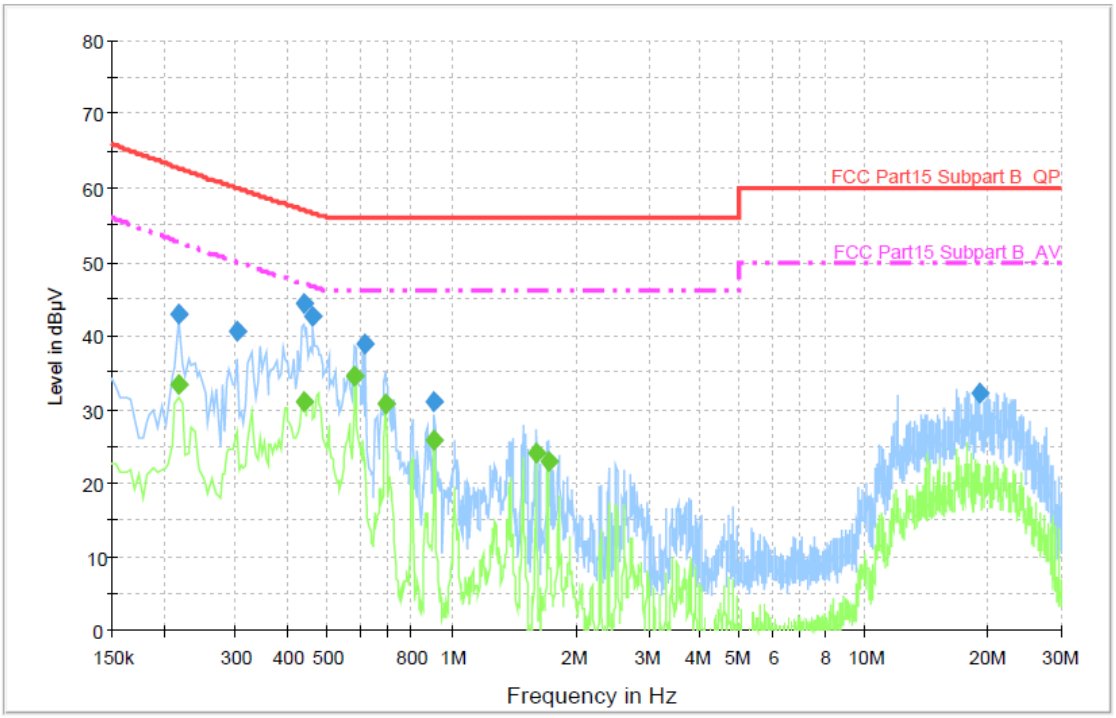
Final Measurement Detector 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.226000	33.8	1000.000	9.000	GND	L1	10.1	18.6	52.4	
0.238000	26.2	1000.000	9.000	GND	L1	10.1	25.7	51.9	
0.338000	30.8	1000.000	9.000	GND	L1	10.1	18.2	49.0	
0.454000	35.7	1000.000	9.000	GND	L1	10.1	11.0	46.7	
0.674000	27.8	1000.000	9.000	GND	L1	10.1	18.2	46.0	
0.910000	21.6	1000.000	9.000	GND	L1	10.1	24.4	46.0	
17.694000	24.4	1000.000	9.000	GND	L1	11.1	25.6	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

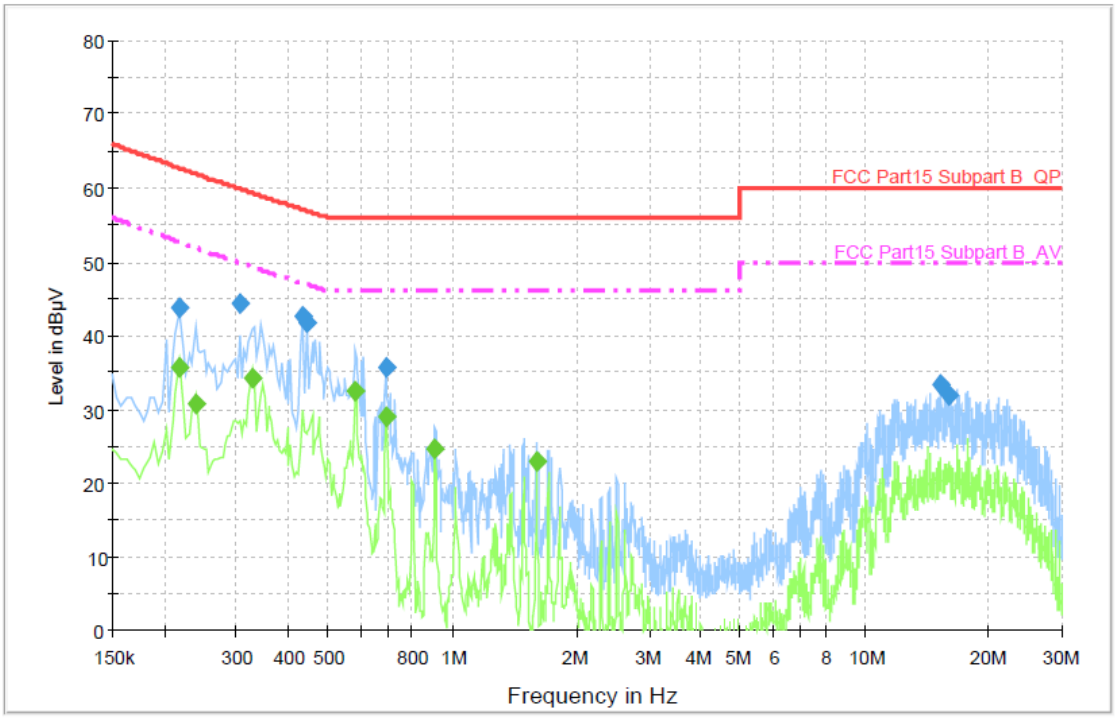
Frequency (MHz)	MaxPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.218000	42.8	1000.000	9.000	GND	L1	10.1	19.9	62.7	
0.302000	40.5	1000.000	9.000	GND	L1	10.1	19.5	60.0	
0.438000	44.3	1000.000	9.000	GND	L1	10.1	12.7	57.0	
0.462000	42.5	1000.000	9.000	GND	L1	10.1	14.1	56.6	
0.618000	39.0	1000.000	9.000	GND	L1	10.1	17.0	56.0	
0.910000	31.1	1000.000	9.000	GND	L1	10.1	24.9	56.0	
18.982000	32.0	1000.000	9.000	GND	L1	11.2	28.0	60.0	

Final Measurement Detector 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.218000	33.3	1000.000	9.000	GND	L1	10.1	19.4	52.7	
0.438000	31.2	1000.000	9.000	GND	L1	10.1	15.8	47.0	
0.582000	34.5	1000.000	9.000	GND	L1	10.1	11.5	46.0	
0.694000	30.8	1000.000	9.000	GND	L1	10.1	15.2	46.0	
0.910000	25.9	1000.000	9.000	GND	L1	10.1	20.1	46.0	
1.602000	24.1	1000.000	9.000	GND	L1	10.1	21.9	46.0	
1.710000	22.9	1000.000	9.000	GND	L1	10.2	23.1	46.0	

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

Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	MaxPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.218000	43.7	1000.000	9.000	GND	N	10.1	19.0	62.7	
0.306000	44.3	1000.000	9.000	GND	N	10.1	15.6	59.9	
0.434000	42.7	1000.000	9.000	GND	N	10.1	14.4	57.1	
0.446000	41.7	1000.000	9.000	GND	N	10.1	15.2	56.9	
0.690000	35.5	1000.000	9.000	GND	N	10.1	20.5	56.0	
15.254000	33.2	1000.000	9.000	GND	N	10.8	26.8	60.0	
16.030000	31.9	1000.000	9.000	GND	N	10.8	28.1	60.0	

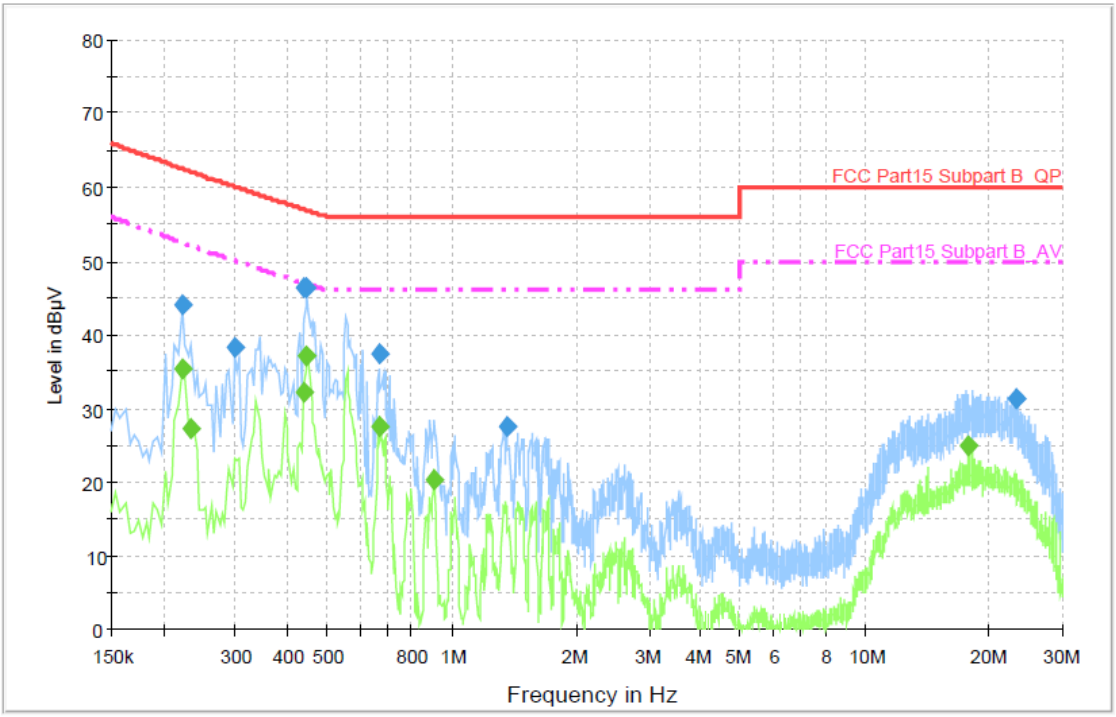
Final Measurement Detector 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.218000	35.6	1000.000	9.000	GND	N	10.1	17.1	52.7	
0.238000	30.8	1000.000	9.000	GND	N	10.1	21.1	51.9	
0.326000	34.2	1000.000	9.000	GND	N	10.1	15.1	49.3	
0.582000	32.6	1000.000	9.000	GND	N	10.1	13.4	46.0	
0.694000	29.1	1000.000	9.000	GND	N	10.1	16.9	46.0	
0.910000	24.6	1000.000	9.000	GND	N	10.1	21.4	46.0	
1.602000	22.8	1000.000	9.000	GND	N	10.1	23.2	46.0	

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

♦ Operating condition: 1 920 × 1 080 / 60 Hz (HDMI/DVI: Digital)

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

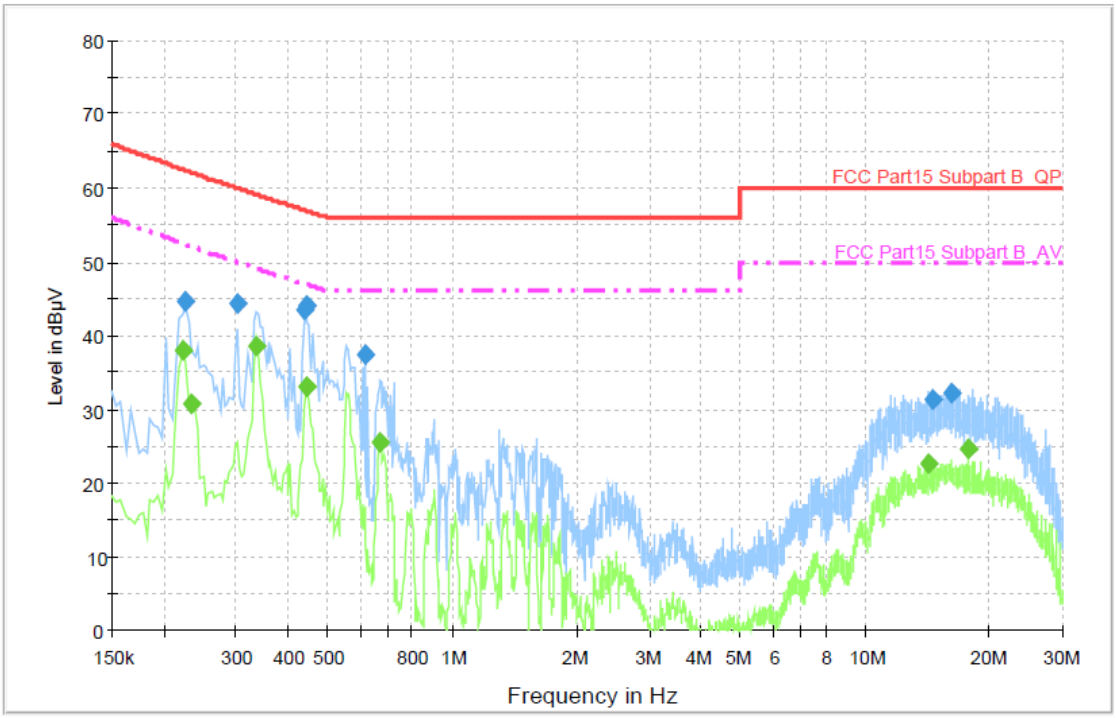
Frequency (MHz)	MaxPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.222000	44.0	1000.000	9.000	GND	L1	10.1	18.6	62.6	
0.298000	38.2	1000.000	9.000	GND	L1	10.1	21.9	60.1	
0.438000	46.3	1000.000	9.000	GND	L1	10.1	10.7	57.0	
0.446000	46.3	1000.000	9.000	GND	L1	10.1	10.6	56.9	
0.666000	37.4	1000.000	9.000	GND	L1	10.1	18.6	56.0	
1.354000	27.5	1000.000	9.000	GND	L1	10.1	28.5	56.0	
23.078000	31.4	1000.000	9.000	GND	L1	11.2	28.6	60.0	

Final Measurement Detector 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.222000	35.3	1000.000	9.000	GND	L1	10.1	17.2	52.5	
0.234000	27.4	1000.000	9.000	GND	L1	10.1	24.7	52.1	
0.438000	32.1	1000.000	9.000	GND	L1	10.1	14.9	47.0	
0.446000	37.1	1000.000	9.000	GND	L1	10.1	9.8	46.9	
0.666000	27.4	1000.000	9.000	GND	L1	10.1	18.6	46.0	
0.910000	20.4	1000.000	9.000	GND	L1	10.1	25.6	46.0	
17.694000	24.9	1000.000	9.000	GND	L1	11.1	25.1	50.0	

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

Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	MaxPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.226000	44.8	1000.000	9.000	GND	N	10.1	17.6	62.4	
0.302000	44.3	1000.000	9.000	GND	N	10.1	15.7	60.0	
0.438000	43.6	1000.000	9.000	GND	N	10.1	13.4	57.0	
0.442000	44.0	1000.000	9.000	GND	N	10.1	13.0	57.0	
0.614000	37.4	1000.000	9.000	GND	N	10.1	18.6	56.0	
14.542000	31.3	1000.000	9.000	GND	N	10.8	28.7	60.0	
16.170000	32.2	1000.000	9.000	GND	N	10.8	27.8	60.0	

Final Measurement Detector 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.222000	38.0	1000.000	9.000	GND	N	10.1	14.5	52.5	
0.234000	30.6	1000.000	9.000	GND	N	10.1	21.5	52.1	
0.334000	38.6	1000.000	9.000	GND	N	10.1	10.5	49.1	
0.446000	33.1	1000.000	9.000	GND	N	10.1	13.8	46.9	
0.666000	25.5	1000.000	9.000	GND	N	10.1	20.5	46.0	
14.150000	22.5	1000.000	9.000	GND	N	10.7	27.5	50.0	
17.694000	24.7	1000.000	9.000	GND	N	10.9	25.3	50.0	

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

6. Radiated Emission

6.1 Operating Environment

Temperature : 1 ℃
Relative Humidity : 26 % R.H.

6.2 Test Set-up

A preliminary scan with peak mode was performed in the semi anechoic chamber and found frequency for test site.
The formal radiated emission was measured at 10 m distance open area test site and 3 m distance 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(Open Area Test Site)	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 10 m, Vertical)	± 4.03 dB	Confidence levels of 95 % (*k* = 2)
Radiated emission (30 MHz ~ 300 MHz, 10 m, Horizontal)	± 3.96 dB	Confidence levels of 95 % (*k* = 2)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Vertical)	± 4.01 dB	Confidence levels of 95 % (*k* = 2)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Horizontal)	± 3.88 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

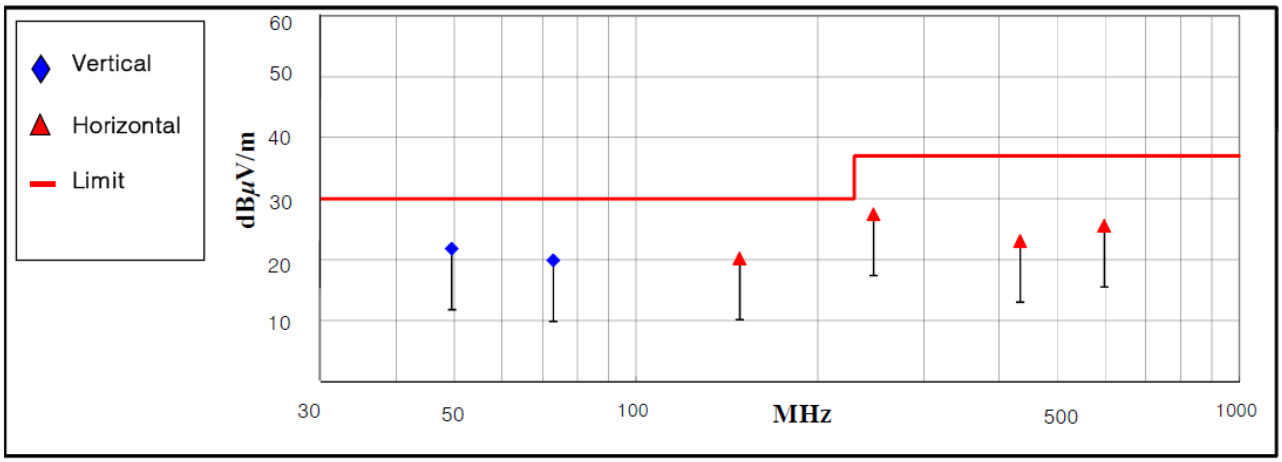
Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESCS30	Rohde & Schwarz	EMI Test Receiver	839809/003	12. 10. 2011
■ - HK116	Rohde & Schwarz	Biconical Antenna	832639/007	03. 15. 2012
■ - HL223	Rohde & Schwarz	Log Periodic Antenna	835998/004	03. 15. 2012
■ - HD100	HD GmbH	Position Controller	100/692/01	N/A
■ - DS415S	HD GmbH	Turntable	415/657/01	N/A
■ - MA240	HD GmbH	Antenna Mast	240/565/01	N/A
■ - ESIB26	Rohde & Schwarz	EMI Test Receiver	830482/010	12. 11. 2011
■ - BBHA9120D	Schwarzbeck	Horn Antenna	207	12. 22. 2011
■ - MCU066	maturo GmbH	Position Controller	1390306	N/A
■ - TT2.5SI	maturo GmbH	Turntable	1390307	N/A
■ - AM 4.0	maturo GmbH	Antenna Mast	1390308	N/A
■ - AFS 44 00101800-25-10P-44	MITEQ	Preamplifier	1258943	11. 12. 2011

6.6 Test data for Radiated Emission

-. Test Date : February 18 ~ March 2, 2011
-. Resolution Bandwidth : 120 kHz/1 MHz
-. Frequency Range : 30 MHz ~ 2 000 MHz
-. Measurement Distance : 10 m/3 m
-. Note : The highest frequency of the internal source of the EUT is between 108 MHz and 500 MHz (210 MHz). The measurement was made up to 2 000 MHz

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

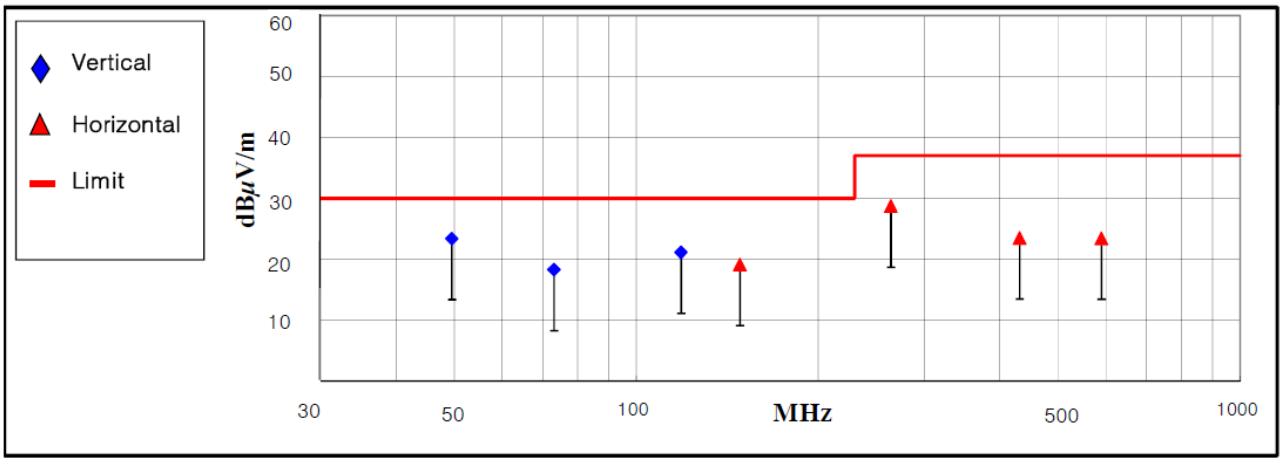
Frequency (MHz)	Measurement Level				Limit (dBμ V/m)	Margin (dB)	Positioning System		
	Reading Value(dBμ V)	Antenna Factor(dB/m)	Cable Loss(dB)	Test Result (dBμ V/m)			Pol. (H/V)	Height (cm)	Angle (°)
49.50	10.68	9.41	1.71	21.80	30.00	8.20	V	100	185
72.90	9.13	8.63	2.12	19.88	30.00	10.12	V	128	0
148.50	5.12	11.94	3.15	20.21	30.00	9.79	H	288	277
247.50	9.80	13.39	4.24	27.43	37.00	9.57	H	109	180
433.15	0.62	16.65	5.80	23.07	37.00	13.93	H	211	176
596.75	-0.41	18.96	7.00	25.55	37.00	11.45	H	100	179



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

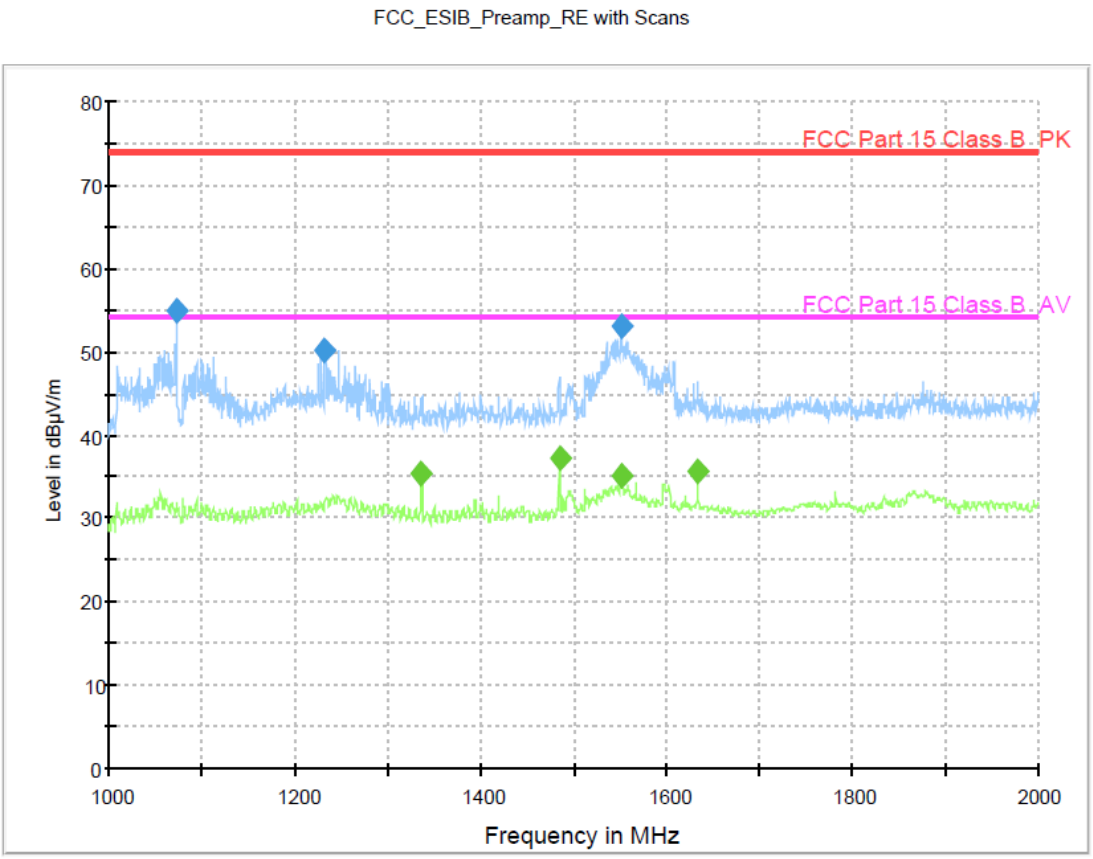
♦ Operating Condition: 1 920 × 1 080 / 60 Hz (HDMI/DVI: Digital)
Detector mode: Quasi-peak detector mode

Frequency (MHz)	Measurement Level				Limit (dBμ V/m)	Margin (dB)	Positioning System		
	Reading Value(dBμ V)	Antenna Factor(dB/m)	Cable Loss(dB)	Test Result (dBμ V/m)			Pol. (H/V)	Height (cm)	Angle (°)
49.50	12.27	9.41	1.71	23.39	30.00	6.61	V	100	96
73.08	7.54	8.63	2.13	18.30	30.00	11.70	V	100	355
118.63	7.26	11.11	2.77	21.14	30.00	8.86	V	109	0
148.45	4.06	11.94	3.15	19.15	30.00	10.85	H	296	3
264.00	9.79	14.55	4.39	28.73	37.00	8.27	H	105	176
431.35	1.08	16.62	5.79	23.49	37.00	13.51	H	283	185
589.15	-2.35	18.85	6.94	23.44	37.00	13.56	H	100	186



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

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



Final Result 1

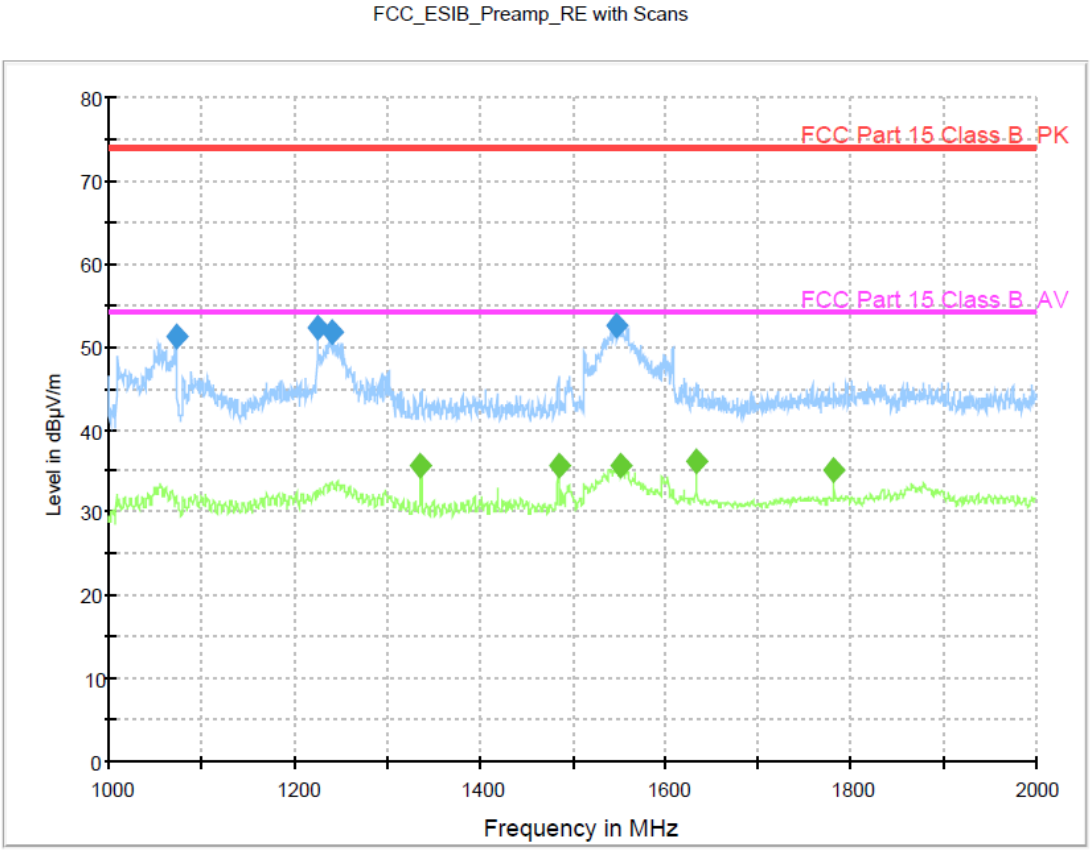
Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1072.400000	54.9	100.0	V	180.0	-15.6	19.1	74.0	
1232.800000	50.3	250.0	V	180.0	-15.0	23.7	74.0	
1550.800000	53.1	100.0	V	180.0	-13.9	20.9	74.0	

Final Result 2

Frequency (MHz)	CAverage-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1336.400000	35.4	100.0	H	180.0	-14.4	18.6	54.0	
1484.800000	37.3	100.0	V	180.0	-14.2	16.7	54.0	
1550.800000	35.0	100.0	V	180.0	-13.9	19.0	54.0	
1633.600000	35.5	100.0	V	180.0	-13.6	18.5	54.0	

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

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



Final Result 1

Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1072.000000	51.3	109.0	V	192.0	-15.6	22.7	74.0	
1225.600000	52.3	256.0	V	177.0	-15.0	21.7	74.0	
1240.400000	51.7	258.0	V	176.0	-14.9	23.0	74.0	
1548.000000	52.6	100.0	V	180.0	-13.9	21.4	74.0	

Final Result 2

Frequency (MHz)	CAverage-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
1336.400000	35.6	100.0	H	189.0	-14.4	18.4	54.0	
1485.200000	35.6	125.0	V	180.0	-14.2	18.4	54.0	
1550.800000	35.6	109.0	V	175.0	-13.9	18.4	54.0	
1633.600000	36.2	100.0	V	180.0	-13.6	17.8	54.0	
1782.000000	35.2	236.0	V	193.0	-13.2	18.8	54.0	

< Fig 15. 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. LCD Monitor (Model Name: LSM4200)** was complies with §15.107 and 15.109 of the FCC Rules.