

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: February 14, 2012

Order Number: GETEC-C1-12-040

Test Report Number: GETEC-E3-12-014

Test Site: GUMI COLLEGE EMC CENTER

FCC Registration Number: (100749, 443957)

FCC ID. : BEJ55WV70MS

Applicant : LG Electronics Inc.

Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: MONITOR SIGNAGE
Type of Authority	: Certification
Model Name	: 55WV70MS
Trade Name	: LG

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

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

Tested by,

Reviewed by,



Soon-Hoon Jeong / Associate Engineer
GUMI COLLEGE EMC CENTER



Jae-Hoon Jeong, Senior Engineer
GUMI COLLEGE EMC CENTER



CONTENTS

1. GENERAL INFORMATION	3
2. INTRODUCTION	4
3. PRODUCT INFORMATION	5
3.1 DESCRIPTION OF EUT.....	5
3.2 SUPPORT EQUIPMENT / CABLES USED	6
3.3 MODIFICATION ITEM(S).....	7
4. DESCRIPTION OF TESTS.....	8
4.1 TEST CONDITION.....	8
4.2 CONDUCTED EMISSION	9
4.3 RADIATED EMISSION.....	10
5. CONDUCTED EMISSION.....	11
5.1 OPERATING ENVIRONMENT	11
5.2 TEST SET-UP	11
5.3 MEASUREMENT UNCERTAINTY.....	11
5.4 LIMIT	12
5.5 TEST EQUIPMENT USED.....	12
5.6 TEST DATA FOR CONDUCTED EMISSION	12
6. RADIATED EMISSION	19
6.1 OPERATING ENVIRONMENT	19
6.2 TEST SET-UP	19
6.3 MEASUREMENT UNCERTAINTY.....	19
6.4 LIMIT	20
6.5 TEST EQUIPMENT USED.....	20
6.6 TEST DATA FOR RADIATED EMISSION	20
7. SAMPLE CALCULATIONS.....	27
7.1 EXAMPLE 1 :	27
7.2 EXAMPLE 2 :	27
8. RECOMMENDATION & CONCLUSION.....	28
 APPENDIX A – ATTESTATION STATEMENT	
APPENDIX B – ID SAMPLE LABEL & LOCATION	
APPENDIX C – BLOCK DIAGRAM	
APPENDIX D – TEST SET-UP PHOTOGRAPHS	
APPENDIX E – EXTERNAL PHOTOGRAPHS	
APPENDIX F – INTERNAL PHOTOGRAPHS	
APPENDIX G – USER’S MANUAL	



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.** BEJ55WV70MS
- **EUT Type** MONITOR SIGNAGE
- **Model Name** 55WV70MS
- **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 4 ~ 6, 2012
- **Place of Test** **GUMI COLLEGE EMC CENTER** (FCC Registration Number: 100749, 443957)
407, Bugok-Dong, Gumi-City, Gyungbok, 730-711, Republic of Korea
- **Test Report Number** GETEC-E3-12-014
- **Dates of Issue** February 14, 2012



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.**

MONITOR SIGNAGE (Model Name: 55WV70MS)

These measurement tests were conducted at **GUMI COLLEGE EMC CENTER**

The site address is 407, Bugok-Dong, Gumi-City, Gyungbok, 730-711, Republic of 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-City,
Gyungbok, 730-711, Republic of Korea
Tel.: +82-54-440-1195
Fax: +82-54-440-1199

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

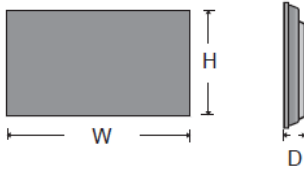


3. Product Information

3.1 Description of EUT

The Equipment under Test (EUT) is the **LG Electronics Inc.**

MONITOR SIGNAGE (Model Name: 55WV70MS) FCC ID.: BEJ55WV70MS

LCD Panel	Screen Type	1387.80 mm Wide (55 inch) TFT (Thin Film Transistor) LCD (Liquid Crystal Display) Panel. Visible diagonal size : 1387.80 mm
	Pixel Pitch	0.630 mm (H) x 0.630 mm (V)
Video Signal	Max. Resolution	RGB : 1920 x 1080 @ 60 Hz HDMI/DVI : 1920 x 1080 @ 60 Hz - It may not be supported depending on the OS or video card type.
	Recommended Resolution	RGB : 1920 x 1080 @ 60 Hz HDMI/DVI : 1920 x 1080 @ 60 Hz - It may not be supported depending on the OS or video card type.
	Horizontal Frequency	RGB : 30 kHz to 83 kHz HDMI/DVI : 30kHz to 83 kHz
	Vertical Frequency	RGB : 56 Hz to 75 Hz HDMI/DVI : 56 Hz to 60 Hz
	Synchronization Type	Separate Sync, Composite Sync, Digital, SOG
Input Connector		15-pin D-Sub type (RGB / Component), HDMI/DVI/DP(digital), Composite, RS-232C, LAN, USB
Power	Rated Voltage	AC 100-240 V, 50 / 60 Hz 3 A
	Power Consumption	On Mode : 210 W Typ. Smart Energy Saving Mode : 120 W Typ. Off Mode : ≤ 0.5 W
Dimensions (Width x Height x Depth) / Weight	 * Wall Bracket available VESA 600 x 400	
	1215.2 mm X 686 mm X 99 mm / 33.4 Kg	

- Maximum Frequency Range : 667 MHz



3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID.
PC (Main board)	ASLOCK	770iCafe	S/N: 0AM0X3097310 FCC ID.: DoC
Video card	Absolute Korea Co., Ltd.	HIS6770	S/N: H110838565 FCC ID.: DoC
PS2 keyboard	COMPAQ	166516-AD6	S/N: B13BBOR391006D FCC ID.: AQ6-23K15
USB mouse	Great Pleasure Electronics Co., Ltd.	GP-M3100UE	S/N: 14036766 FCC ID: DoC
DVD player	LG Electronics Inc.	DV492H	S/N: 004INLV013640 FCC ID.: Verification
USB memory stick	SAMSUNG	SUM-PSB4	S/N: TBBB202478F FCC ID.: DoC
Monitor	Dell computer corporation	1800FP	S/N: KR-07R477-48324-33J-03WH FCC ID.: DoC
IR sensor	LG Electronics Inc.	None.	S/N: None. FCC ID.: N/A

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

3.2.2 System configuration

Description	Manufacturer	Model Name	S/N & FCC ID.
IR remote controller	LG Electronics Inc.	AKB72915219	S/N: None. 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	1.50 m shielded
RGB(Analog) out cable	Connected to the EUT and monitor	1.80 m shielded with two ferrite cores
DVI(Digital) in cable	Connected to the EUT and PC	1.50 m shielded
DVI(Digital) out cable	Connected to the EUT and monitor	2.00 m shielded with two ferrite cores
HDMI(Digital) in cable	Connected to the EUT and PC	2.00 m shielded
DP(Digital) in cable	Connected to the EUT and PC	2.00 m shielded
RS-232C cable	Connected to the EUT(in port) and EUT(out port)	1.50 m shielded
Audio(RGB/DVI) in cable	Connected to the EUT and PC	1.50 m shielded
Speaker(Left, Right) out Cable	Connected to the EUT and PC	1.80 m shielded
Remote control in cable	Connected to the EUT and IR sensor	1.50 m shielded
Composite in cable	Connected to the EUT and DVD player	1.50 m shielded
LAN cable	Connected to the EUT and Network	10.00 m unshielded

3.3 Modification Item(s)

- None



4. Description of tests

4.1 Test Condition

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

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

- Test Voltage / Frequency : AC 120 V / 60 Hz
- Test Mode(s)

-. Monitor mode

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

Conducted emission: 1 920 × 1 080 / 60 Hz (RGB: Analog, DVI: Digital, HDMI: Digital, DP: 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
- Connected to internet via LAN interface
- USB memory stick was connected to the USB port

"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

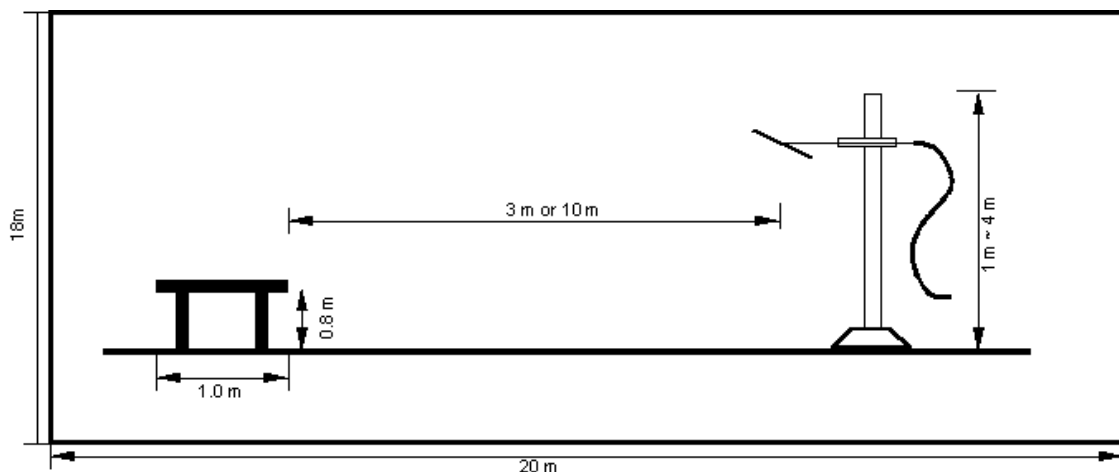


Fig 3. Dimensions of test site



5. Conducted Emission

5.1 Operating Environment

Temperature : 23.0 °C
Relative Humidity : 42.0 % 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 level of approximately 95 % ($k = 2$)
Conducted emission (150 kHz ~ 30 MHz)	± 3.34 dB	Confidence level of approximately 95 % ($k = 2$)



5.4 Limit

RFI Conducted	FCC Limit(dB μ V/m) Class B	
Freq. Range	Quasi-Peak	Average
150 kHz ~ 0.5 MHz	66 ~ 56*	56 ~ 46*
0.5 MHz ~ 5 MHz	56	46
5 MHz ~ 30 MHz	60	50
*Limits decreases linearly with the logarithm of frequency.		

5.5 Test Equipment used

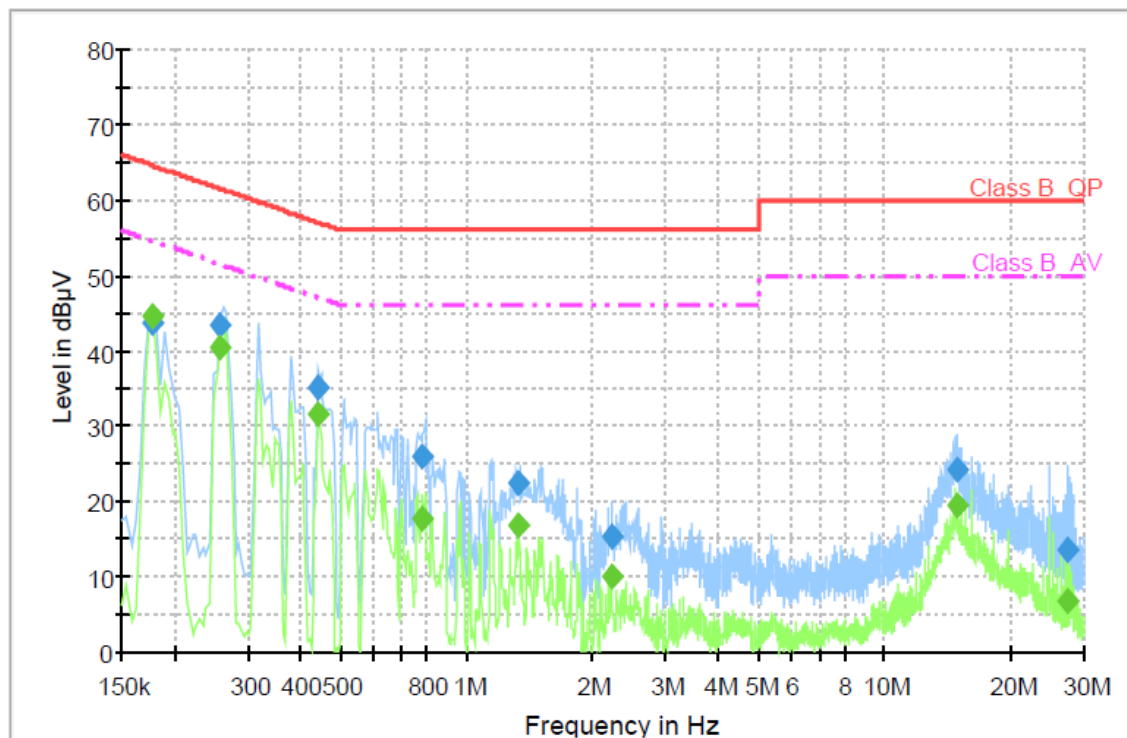
Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESCS30	Rohde & Schwarz	EMI Test Receiver	839809/003	12. 05. 2012
■ - ESH3-Z5	Rohde & Schwarz	LISN	838979/020	12. 07. 2012
■ - ENV216	Rohde & Schwarz	LISN	100173	12. 07. 2012
■ - ENY81-CA6	Rohde & Schwarz	ISN	101573	10. 19. 2012

5.6 Test data for Conducted Emission

- . Test Date : February 6, 2012
- . Resolution Bandwidth : 9 kHz
- . Frequency Range : 0.15 MHz ~ 30 MHz
- . Line : L1: Live, N: Neutral



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



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.178000	43.6	1000.0	9.000	On	N	9.7	21.0	64.6	
0.256000	43.5	1000.0	9.000	On	N	9.6	18.1	61.6	
0.444000	35.2	1000.0	9.000	On	N	9.7	21.7	57.0	
0.788000	26.0	1000.0	9.000	On	L1	9.7	30.0	56.0	
1.336000	22.5	1000.0	9.000	On	N	9.7	33.5	56.0	
2.224000	15.4	1000.0	9.000	On	L1	9.7	40.6	56.0	
14.888000	24.1	1000.0	9.000	On	N	10.1	35.9	60.0	
27.496000	13.7	1000.0	9.000	On	L1	10.3	46.3	60.0	

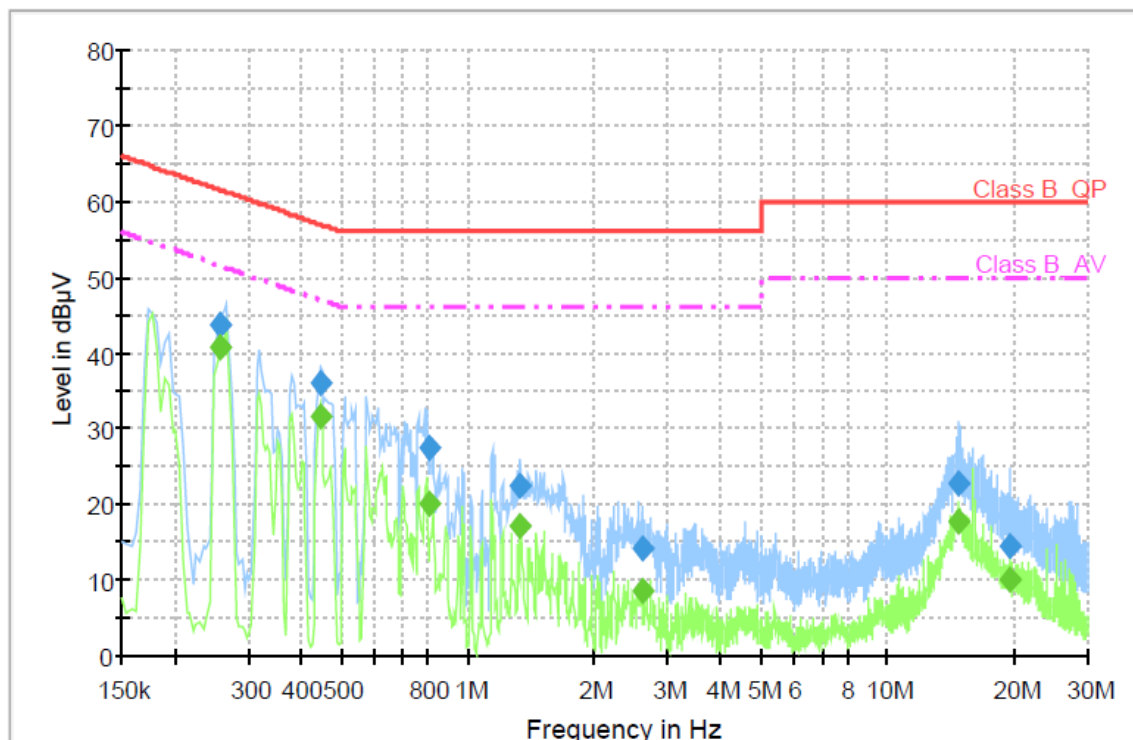
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.178000	44.7	1000.0	9.000	On	N	9.7	9.9	54.6	
0.256000	40.5	1000.0	9.000	On	N	9.6	11.0	51.6	
0.444000	31.6	1000.0	9.000	On	N	9.7	15.4	47.0	
0.788000	17.6	1000.0	9.000	On	L1	9.7	28.4	46.0	
1.336000	16.9	1000.0	9.000	On	N	9.7	29.1	46.0	
2.224000	9.9	1000.0	9.000	On	L1	9.7	36.1	46.0	
14.888000	19.5	1000.0	9.000	On	N	10.1	30.5	50.0	
27.496000	6.8	1000.0	9.000	On	L1	10.3	43.2	50.0	

< Fig 4. Conducted emission result >



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



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.256000	43.8	1000.0	9.000	On	N	9.6	17.7	61.6	
0.256000	43.7	1000.0	9.000	On	N	9.6	17.8	61.6	
0.448000	36.0	1000.0	9.000	On	N	9.7	20.9	56.9	
0.808000	27.5	1000.0	9.000	On	N	9.7	28.6	56.0	
1.336000	22.6	1000.0	9.000	On	L1	9.7	33.4	56.0	
2.604000	14.2	1000.0	9.000	On	N	9.7	41.8	56.0	
14.740000	22.9	1000.0	9.000	On	L1	10.0	37.1	60.0	
19.636000	14.6	1000.0	9.000	On	N	10.2	45.4	60.0	

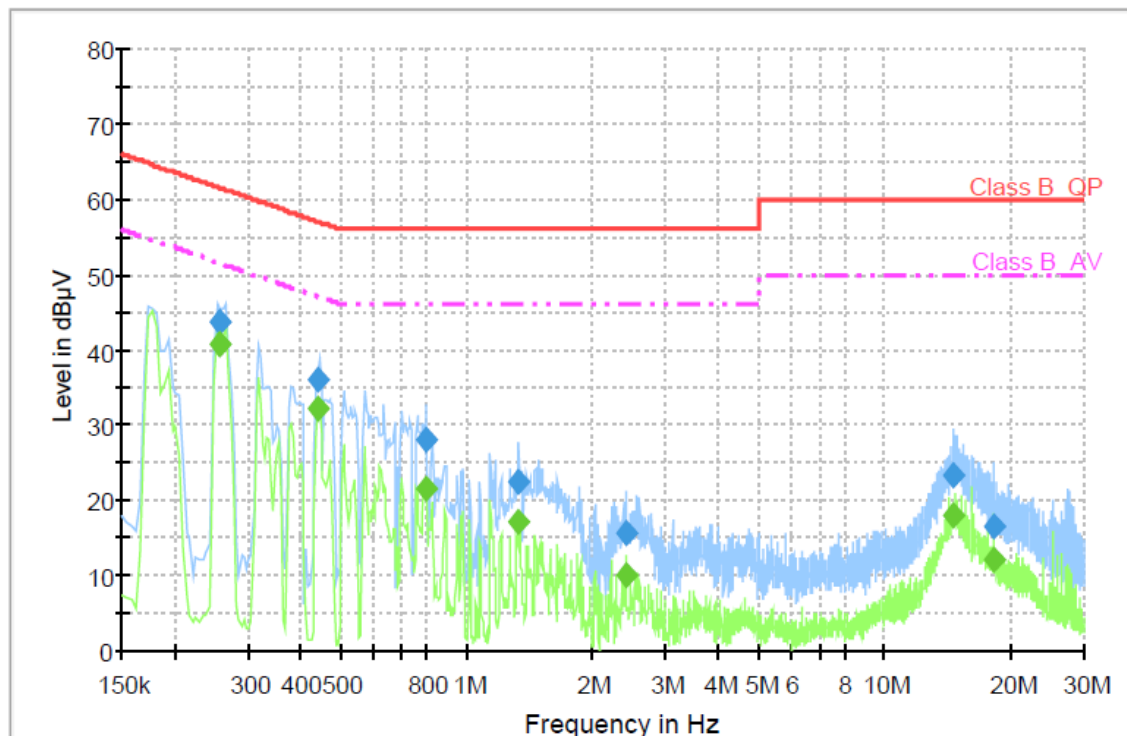
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.256000	40.7	1000.0	9.000	On	N	9.6	10.9	51.6	
0.256000	40.7	1000.0	9.000	On	N	9.6	10.9	51.6	
0.448000	31.5	1000.0	9.000	On	N	9.7	15.4	46.9	
0.808000	20.0	1000.0	9.000	On	N	9.7	26.0	46.0	
1.336000	17.1	1000.0	9.000	On	L1	9.7	28.9	46.0	
2.604000	8.5	1000.0	9.000	On	N	9.7	37.5	46.0	
14.740000	17.8	1000.0	9.000	On	L1	10.0	32.2	50.0	
19.636000	10.2	1000.0	9.000	On	N	10.2	39.8	50.0	

< Fig 5. Conducted emission result >



◆ Operating condition: 640 × 480 / 60 Hz (RGB: Analog)



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.256000	43.8	1000.0	9.000	On	N	9.6	17.7	61.6	
0.256000	43.8	1000.0	9.000	On	N	9.6	17.8	61.6	
0.444000	36.0	1000.0	9.000	On	N	9.7	21.0	57.0	
0.804000	28.1	1000.0	9.000	On	L1	9.7	27.9	56.0	
1.336000	22.5	1000.0	9.000	On	N	9.7	33.5	56.0	
2.412000	15.7	1000.0	9.000	On	L1	9.7	40.3	56.0	
14.576000	23.3	1000.0	9.000	On	L1	10.0	36.7	60.0	
18.268000	16.7	1000.0	9.000	On	L1	10.1	43.3	60.0	

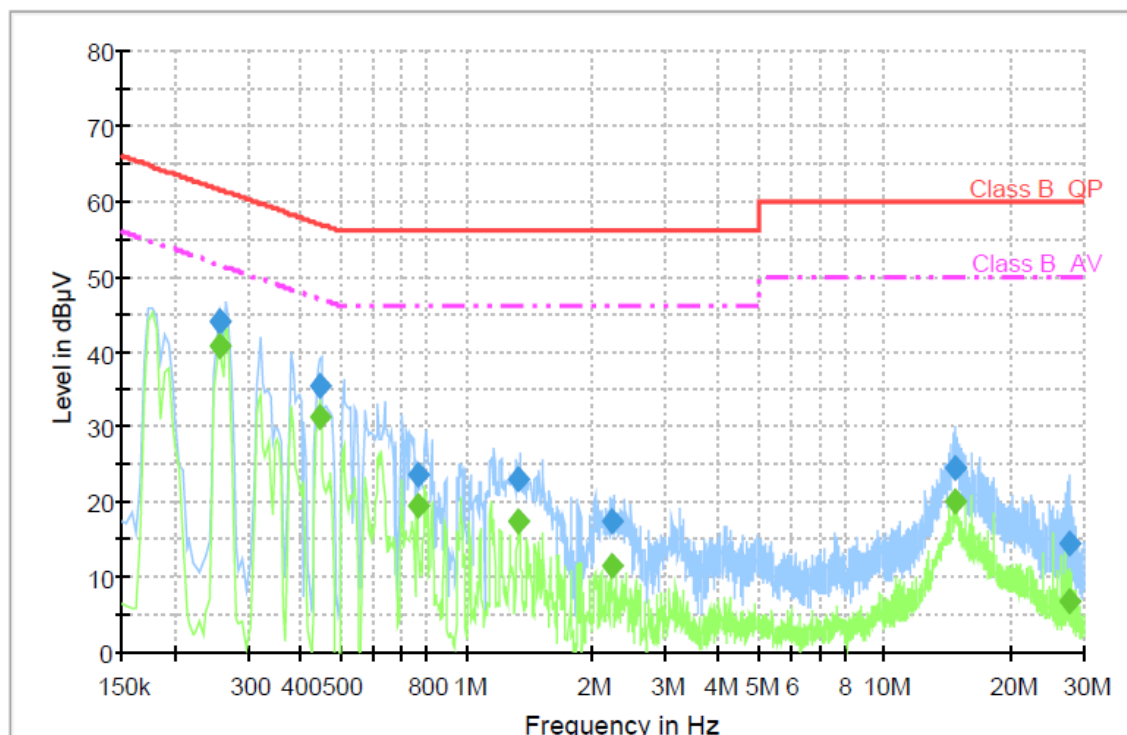
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.256000	40.7	1000.0	9.000	On	N	9.6	10.9	51.6	
0.256000	40.7	1000.0	9.000	On	N	9.6	10.9	51.6	
0.444000	32.2	1000.0	9.000	On	N	9.7	14.7	47.0	
0.804000	21.5	1000.0	9.000	On	L1	9.7	24.5	46.0	
1.336000	17.1	1000.0	9.000	On	N	9.7	28.9	46.0	
2.412000	10.1	1000.0	9.000	On	L1	9.7	35.9	46.0	
14.576000	18.0	1000.0	9.000	On	L1	10.0	32.0	50.0	
18.268000	12.1	1000.0	9.000	On	L1	10.1	37.9	50.0	

< Fig 6. Conducted emission result >



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



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.256000	44.0	1000.0	9.000	On	N	9.6	17.6	61.6	
0.256000	44.0	1000.0	9.000	On	N	9.6	17.6	61.6	
0.448000	35.6	1000.0	9.000	On	N	9.7	21.3	56.9	
0.764000	23.6	1000.0	9.000	On	N	9.7	32.4	56.0	
1.336000	23.0	1000.0	9.000	On	L1	9.7	33.0	56.0	
2.224000	17.4	1000.0	9.000	On	L1	9.7	38.6	56.0	
14.824000	24.5	1000.0	9.000	On	N	10.1	35.5	60.0	
27.788000	14.4	1000.0	9.000	On	N	10.4	45.6	60.0	

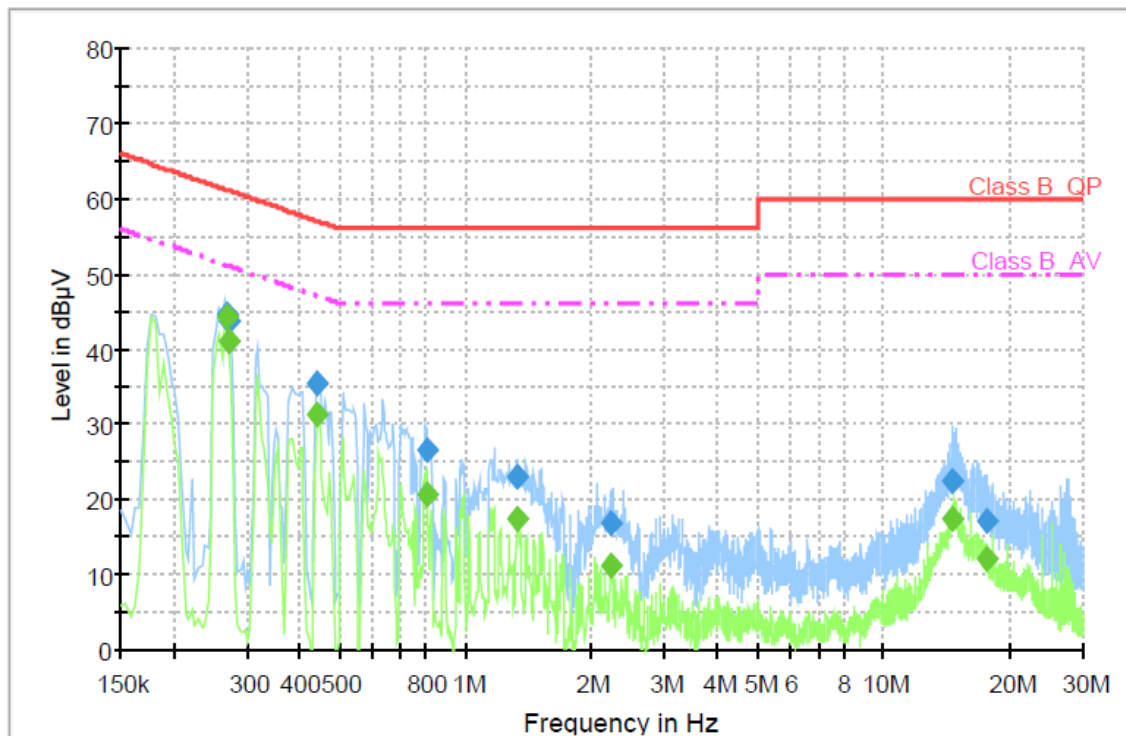
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.256000	40.8	1000.0	9.000	On	N	9.6	10.8	51.6	
0.256000	40.8	1000.0	9.000	On	N	9.6	10.8	51.6	
0.448000	31.1	1000.0	9.000	On	N	9.7	15.8	46.9	
0.764000	19.6	1000.0	9.000	On	N	9.7	26.4	46.0	
1.336000	17.5	1000.0	9.000	On	L1	9.7	28.5	46.0	
2.224000	11.5	1000.0	9.000	On	L1	9.7	34.5	46.0	
14.824000	20.2	1000.0	9.000	On	N	10.1	29.8	50.0	
27.788000	6.9	1000.0	9.000	On	N	10.4	43.1	50.0	

< Fig 7. Conducted emission result >



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



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.268000	44.5	1000.0	9.000	On	N	9.6	16.7	61.2	
0.272000	43.8	1000.0	9.000	On	N	9.6	17.2	61.1	
0.444000	35.5	1000.0	9.000	On	N	9.7	21.5	57.0	
0.808000	26.7	1000.0	9.000	On	L1	9.7	29.3	56.0	
1.336000	23.0	1000.0	9.000	On	N	9.7	33.0	56.0	
2.224000	17.0	1000.0	9.000	On	N	9.7	39.0	56.0	
14.604000	22.3	1000.0	9.000	On	L1	10.0	37.7	60.0	
17.716000	17.0	1000.0	9.000	On	N	10.1	43.0	60.0	

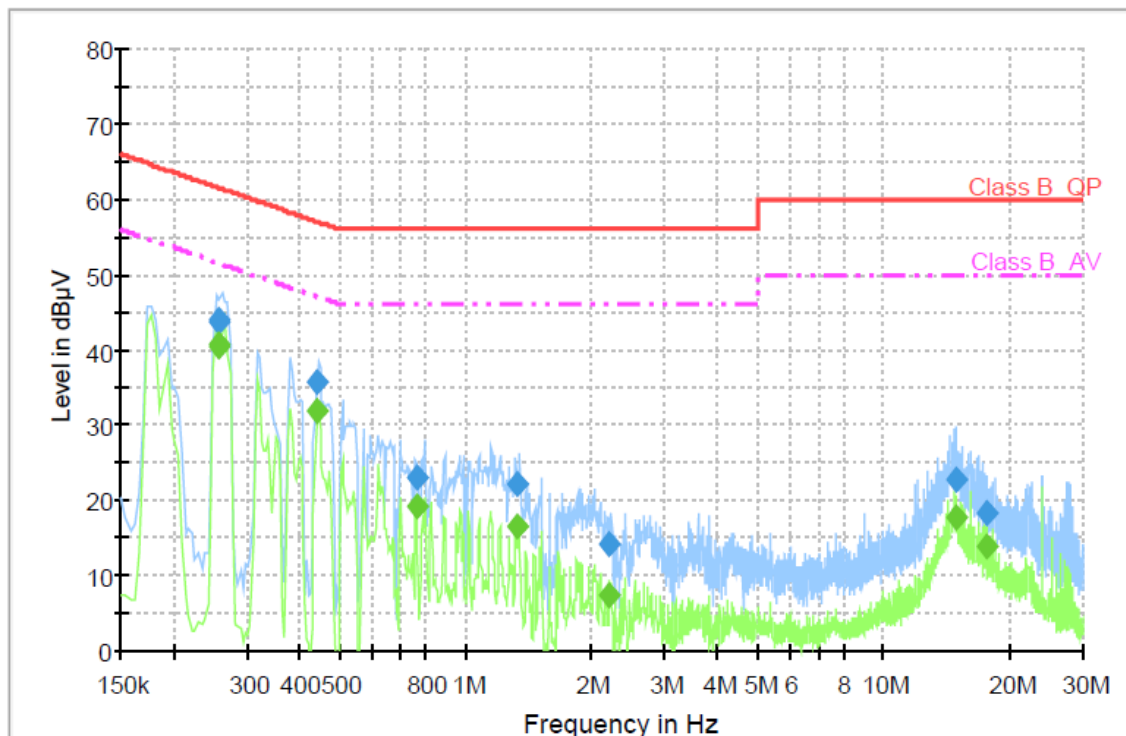
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.268000	44.3	1000.0	9.000	On	N	9.6	6.9	51.2	
0.272000	41.1	1000.0	9.000	On	N	9.6	10.0	51.1	
0.444000	31.4	1000.0	9.000	On	N	9.7	15.6	47.0	
0.808000	20.8	1000.0	9.000	On	L1	9.7	25.2	46.0	
1.336000	17.5	1000.0	9.000	On	N	9.7	28.5	46.0	
2.224000	11.1	1000.0	9.000	On	N	9.7	34.9	46.0	
14.604000	17.3	1000.0	9.000	On	L1	10.0	32.7	50.0	
17.716000	12.0	1000.0	9.000	On	N	10.1	38.0	50.0	

< Fig 8. Conducted emission result >



◆ Operating condition: 1 920 × 1 080 / 60 Hz (DP: Digital)



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.256000	43.9	1000.0	9.000	On	N	9.6	17.6	61.6	
0.256000	43.8	1000.0	9.000	On	N	9.6	17.7	61.6	
0.444000	35.6	1000.0	9.000	On	N	9.7	21.4	57.0	
0.764000	22.9	1000.0	9.000	On	N	9.7	33.1	56.0	
1.336000	22.0	1000.0	9.000	On	L1	9.7	34.0	56.0	
2.204000	14.1	1000.0	9.000	On	L1	9.7	41.9	56.0	
14.868000	22.8	1000.0	9.000	On	L1	10.0	37.2	60.0	
17.692000	18.3	1000.0	9.000	On	N	10.1	41.7	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.256000	40.6	1000.0	9.000	On	N	9.6	10.9	51.6	
0.256000	40.6	1000.0	9.000	On	N	9.6	11.0	51.6	
0.444000	31.8	1000.0	9.000	On	N	9.7	15.2	47.0	
0.764000	19.3	1000.0	9.000	On	N	9.7	26.7	46.0	
1.336000	16.4	1000.0	9.000	On	L1	9.7	29.6	46.0	
2.204000	7.3	1000.0	9.000	On	L1	9.7	38.7	46.0	
14.868000	17.6	1000.0	9.000	On	L1	10.0	32.4	50.0	
17.692000	14.0	1000.0	9.000	On	N	10.1	36.0	50.0	

< Fig 9. Conducted emission result >



6. Radiated Emission

6.1 Operating Environment

Temperature : - 3.0 °C
Relative Humidity : 35.0 % 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 level of approximately 95 % ($k = 2$)
Radiated emission (30 MHz ~ 300 MHz, 10 m, Horizontal)	± 3.96 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Vertical)	± 4.01 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Horizontal)	± 3.88 dB	Confidence level of approximately 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
■ - ESCS30	Rohde & Schwarz	EMI Test Receiver	839809/003	12. 05. 2012
■ - 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. 05. 2012
■ - BBHA9120D	Schwarzbeck	Horn Antenna	597	01. 23. 2013
■ - 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. 2012

6.6 Test data for Radiated Emission

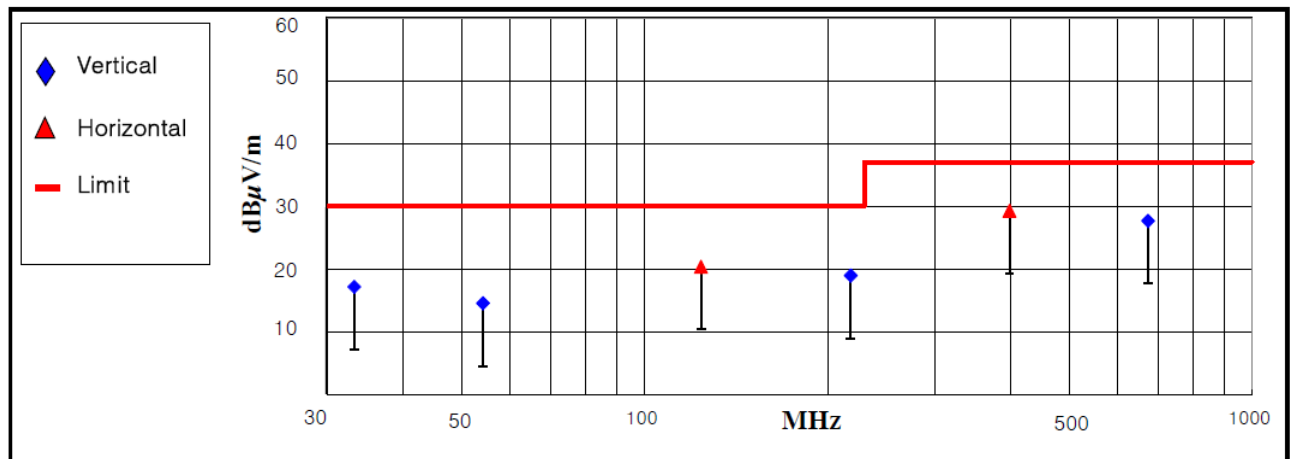
- Test Date : February 2 ~ 6, 2012
- Measurement Distance : 10 m / 3 m
- Note : The highest frequency of the internal source of the EUT is between 500 MHz and 1 000 MHz (667 MHz). The measurement was made up to 5 000 MHz
- Measurement

Frequency range	30 MHz ~ 1 GHz	Above 1 GHz
Detector mode	Quasi peak	Peak / Average
Resolution bandwidth	120 kHz	1 MHz



◆ Operating Condition: 1 920 × 1 080 / 60 Hz (RGB: Analog)

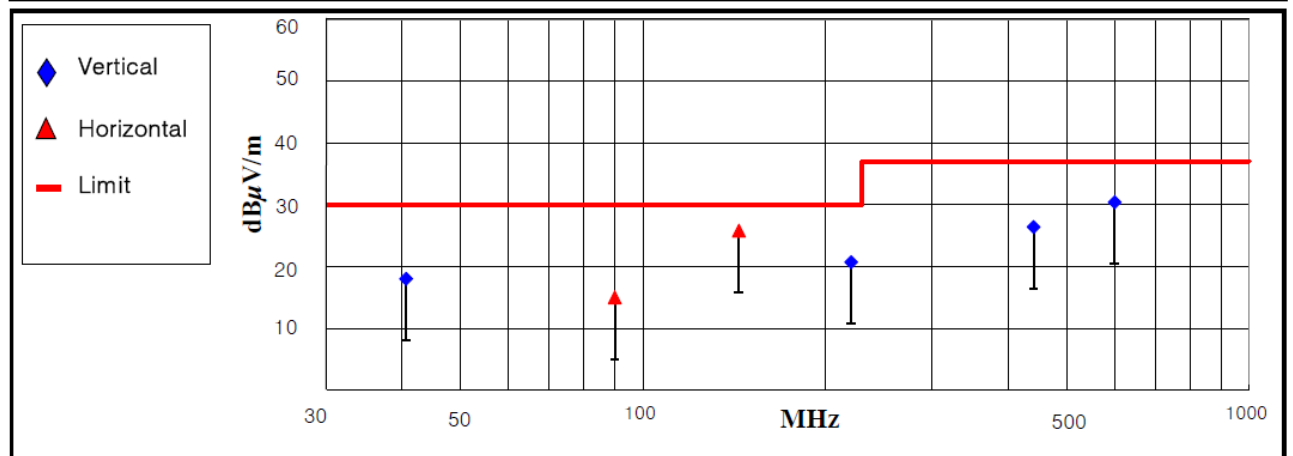
Frequency (MHz)	Measurement Level				Limit (dBμ V/m)	Margin (dB)	Positioning System		
	Reading Value(dBμ V)	Antenna Factor(dB/m)	Cable Loss(dB)	Test Result (dBμ V/m)			Pol. (H/V)	Height (cm)	Angle (°)
33.25	3.61	12.40	1.19	17.20	30.00	12.80	V	100	245
54.16	4.11	8.80	1.69	14.60	30.00	15.40	V	100	10
123.76	6.16	11.34	2.90	20.40	30.00	9.60	H	240	285
218.32	1.01	14.08	3.91	19.00	30.00	11.00	V	213	169
398.43	7.51	16.16	5.63	29.30	37.00	7.70	H	110	268
673.89	0.34	19.89	7.47	27.70	37.00	9.30	V	103	166



< Fig 10. Radiated emission result (30 MHz ~ 1 000 MHz) >

◆ Operating Condition: 1 920 × 1 080 / 60 Hz (DVI: Digital)

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 (°)
40.67	5.57	11.31	1.12	18.00	30.00	12.00	V	100	115
89.84	3.99	8.64	2.37	15.00	30.00	15.00	H	197	52
144.00	10.81	11.89	3.10	25.80	30.00	4.20	H	241	0
220.54	2.74	14.03	3.93	20.70	30.00	9.30	V	163	331
440.95	3.73	16.75	5.92	26.40	37.00	10.60	V	152	334
600.02	4.43	19.01	6.96	30.40	37.00	6.60	V	107	176

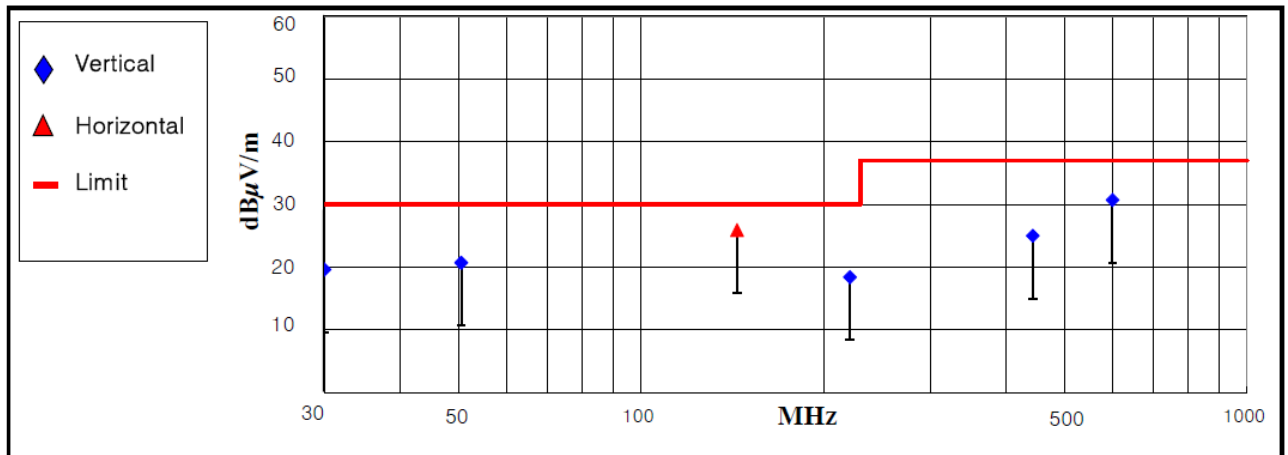


< Fig 11. Radiated emission result (30 MHz ~ 1 000 MHz) >



◆ Operating Condition: 1 920 × 1 080 / 60 Hz (HDMI: Digital)

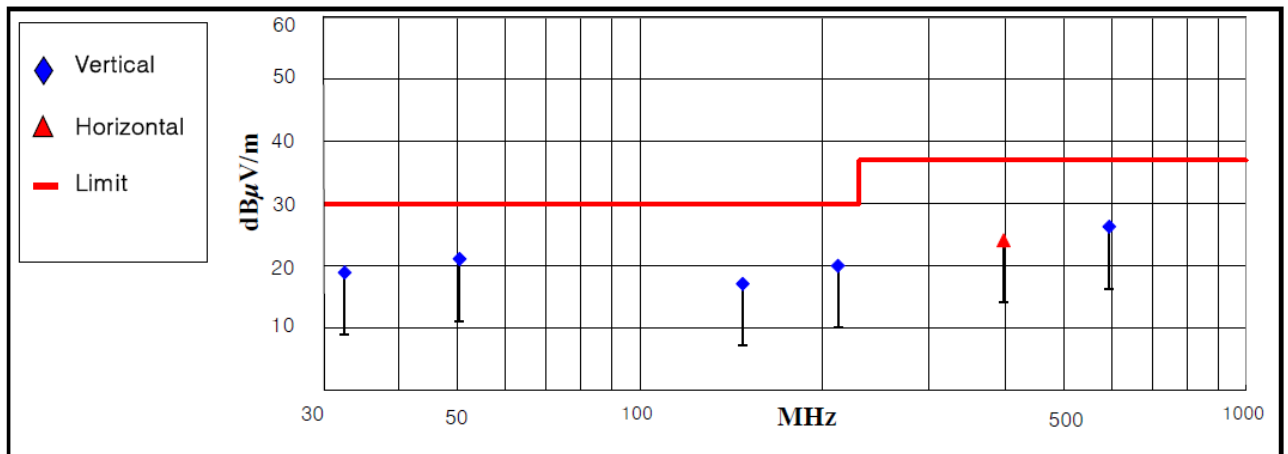
Frequency (MHz)	Measurement Level				Limit (dBμ V/m)	Margin (dB)	Positioning System		
	Reading	Antenna	Cable	Test Result			Pol.	Height	Angle
	Value(dBμ V)	Factor(dB/m)	Loss(dB)	(dBμ V/m)			(H/V)	(cm)	(°)
30.00	4.58	13.78	1.24	19.60	30.00	10.40	V	100	215
50.46	9.81	9.28	1.61	20.70	30.00	9.30	V	100	221
143.99	10.91	11.89	3.10	25.90	30.00	4.10	H	244	0
221.12	0.45	14.01	3.94	18.40	30.00	11.60	V	220	194
443.03	2.29	16.78	5.93	25.00	37.00	12.00	V	160	324
600.00	4.73	19.01	6.96	30.70	37.00	6.30	V	124	158



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

◆ Operating Condition: 1 920 × 1 080 / 60 Hz (HDMI: Digital)

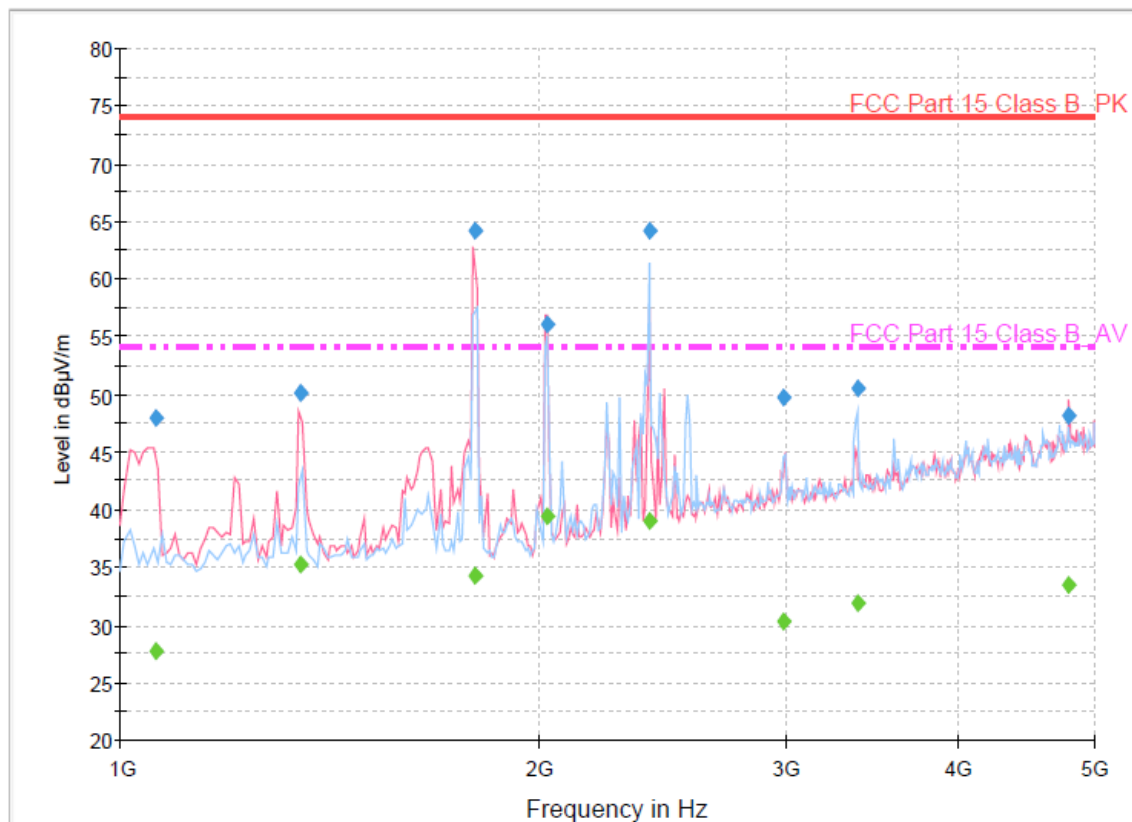
Frequency (MHz)	Measurement Level				Limit (dBμ V/m)	Margin (dB)	Positioning System		
	Reading	Antenna	Cable	Test Result			Pol.	Height	Angle
	Value(dBμ V)	Factor(dB/m)	Loss(dB)	(dBμ V/m)			(H/V)	(cm)	(°)
32.59	5.02	12.68	1.20	18.90	30.00	11.10	V	100	286
50.42	10.20	9.29	1.61	21.10	30.00	8.90	V	100	179
147.75	2.03	11.93	3.14	17.10	30.00	12.90	V	121	38
212.14	1.94	14.22	3.84	20.00	30.00	10.00	V	156	200
398.03	2.32	16.15	5.63	24.10	37.00	12.90	H	142	274
594.49	0.44	18.93	6.93	26.30	37.00	10.70	V	236	157



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



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (RGB: Analog)
Green marker: Average detector, Blue marker: 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)
1059.912225	47.9	1000.0	1000.000	100.0	V	179.0	-14.0	26.1	74.0
1349.689379	50.1	1000.0	1000.000	100.0	V	28.0	-12.9	23.9	74.0
1796.987174	64.1	1000.0	1000.000	100.0	V	-1.0	-11.6	9.9	74.0
2025.036072	56.1	1000.0	1000.000	100.0	V	132.0	-11.1	17.9	74.0
2396.589579	64.3	1000.0	1000.000	137.0	H	236.0	-9.1	9.7	74.0
2992.591984	49.7	1000.0	1000.000	100.0	H	216.0	-6.4	24.3	74.0
3384.961523	50.5	1000.0	1000.000	137.0	H	53.0	-5.0	23.5	74.0
4787.399198	48.1	1000.0	1000.000	100.0	V	6.0	-0.8	25.9	74.0

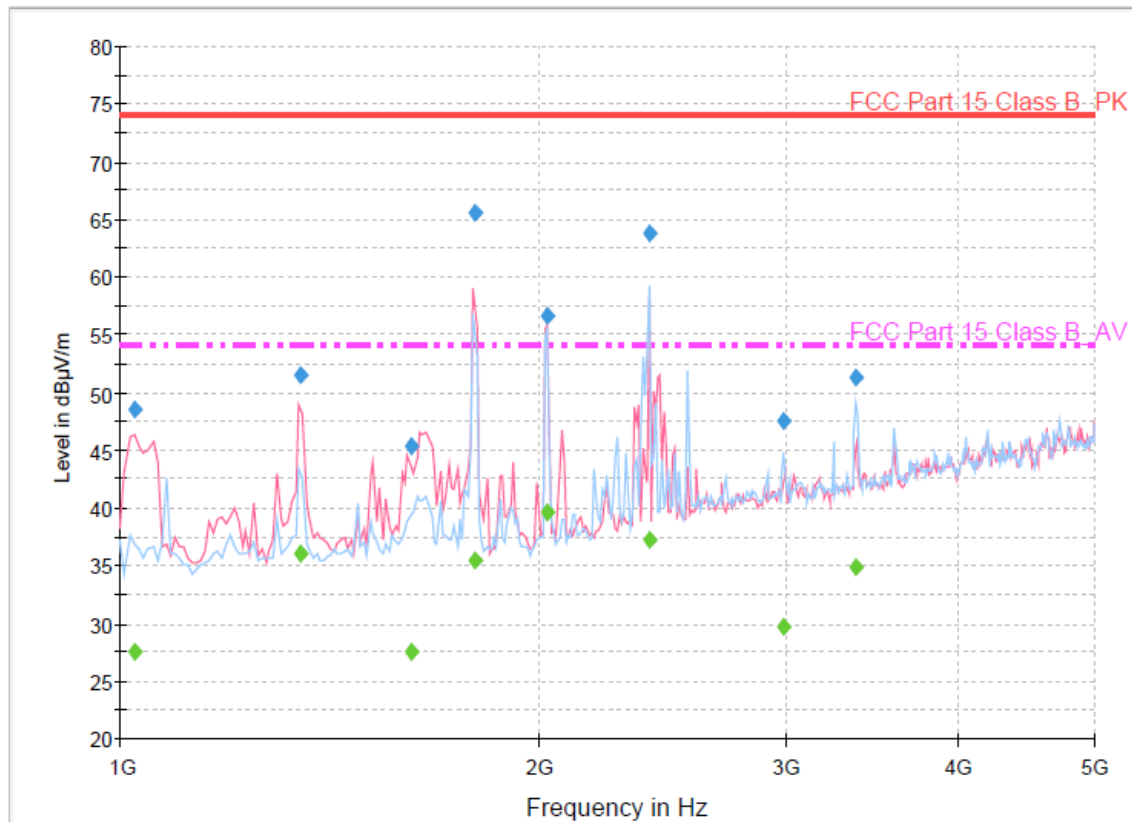
Final Result 2

Frequency (MHz)	CAverage (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1059.912225	27.7	1000.0	1000.000	100.0	V	179.0	-14.0	26.3	54.0
1349.689379	35.3	1000.0	1000.000	100.0	V	28.0	-12.9	18.7	54.0
1796.987174	34.2	1000.0	1000.000	100.0	V	-1.0	-11.6	19.8	54.0
2025.036072	39.4	1000.0	1000.000	100.0	V	132.0	-11.1	14.6	54.0
2396.589579	39.1	1000.0	1000.000	137.0	H	236.0	-9.1	13.9	54.0
2992.591984	30.2	1000.0	1000.000	100.0	H	216.0	-6.4	23.8	54.0
3384.961523	31.9	1000.0	1000.000	137.0	H	53.0	-5.0	22.1	54.0
4787.399198	33.5	1000.0	1000.000	100.0	V	6.0	-0.8	20.5	54.0

< Fig 14. Radiated emission result (1 000 MHz ~ 5 000 MHz) >



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (DVI: Digital)
Green marker: Average detector, Blue marker: 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)
1023.200000	48.5	1000.0	1000.000	100.0	V	174.0	-14.2	25.5	74.0
1350.089379	51.5	1000.0	1000.000	100.0	V	23.0	-12.9	22.5	74.0
1617.418437	45.3	1000.0	1000.000	100.0	V	-1.0	-12.2	28.7	74.0
1796.587174	65.6	1000.0	1000.000	100.0	V	0.0	-11.6	8.4	74.0
2025.852104	56.6	1000.0	1000.000	100.0	V	137.0	-11.1	17.4	74.0
2395.789579	63.8	1000.0	1000.000	100.0	H	236.0	-9.1	10.2	74.0
2992.591984	47.6	1000.0	1000.000	100.0	H	206.0	-6.4	26.4	74.0
3372.545491	51.3	1000.0	1000.000	127.0	H	55.0	-5.1	22.7	74.0

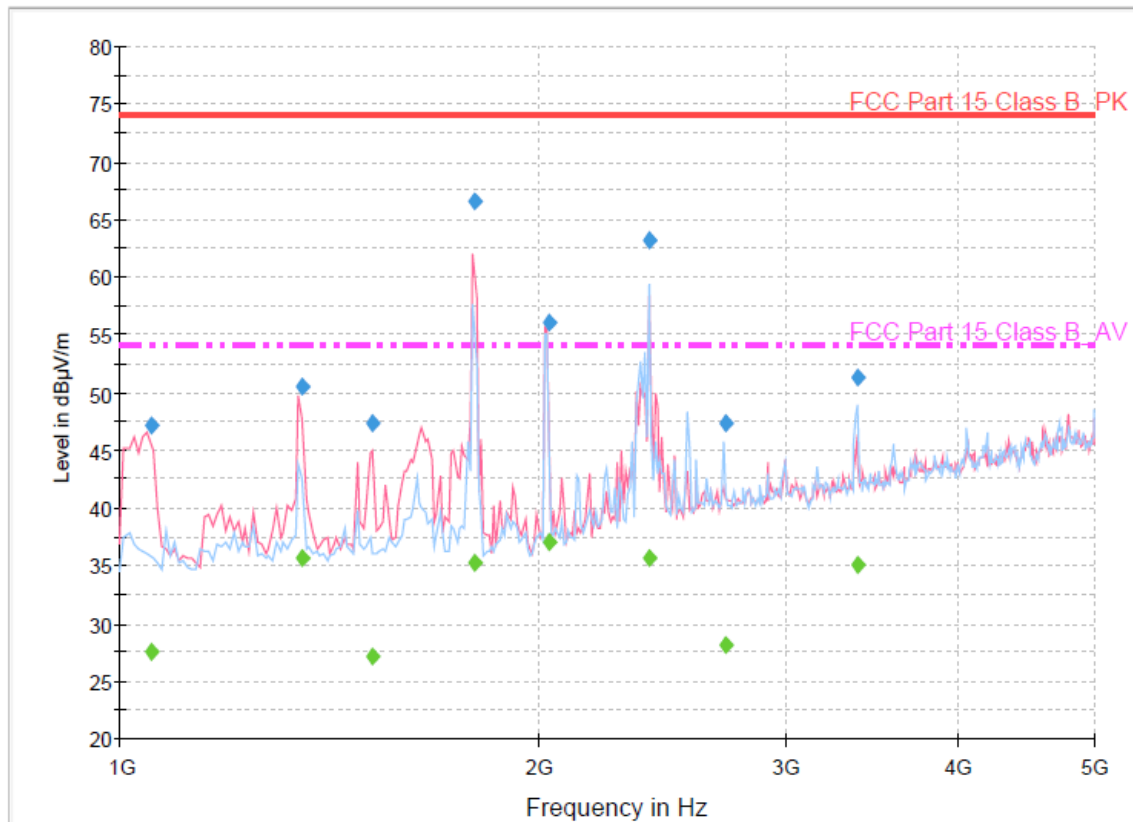
Final Result 2

Frequency (MHz)	CAverage (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1023.200000	27.6	1000.0	1000.000	100.0	V	174.0	-14.2	26.4	54.0
1350.089379	36.0	1000.0	1000.000	100.0	V	23.0	-12.9	18.0	54.0
1617.418437	27.5	1000.0	1000.000	100.0	V	-1.0	-12.2	26.5	54.0
1796.587174	35.4	1000.0	1000.000	100.0	V	0.0	-11.6	18.6	54.0
2025.852104	39.5	1000.0	1000.000	100.0	V	137.0	-11.1	14.5	54.0
2395.789579	37.2	1000.0	1000.000	100.0	H	236.0	-9.1	16.8	54.0
2992.591984	29.7	1000.0	1000.000	100.0	H	206.0	-6.4	24.3	54.0
3372.545491	34.9	1000.0	1000.000	127.0	H	55.0	-5.1	19.1	54.0

< Fig 15. Radiated emission result (1 000 MHz ~ 5 000 MHz) >



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (HDMI: Digital)
Green marker: Average detector, Blue marker: 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)
1055.496192	47.1	1000.0	1000.000	100.0	V	178.0	-14.0	26.9	74.0
1350.489379	50.5	1000.0	1000.000	100.0	V	20.0	-12.9	23.5	74.0
1519.242084	47.4	1000.0	1000.000	100.0	V	131.0	-12.5	26.6	74.0
1798.987174	66.6	1000.0	1000.000	100.0	V	0.0	-11.6	7.4	74.0
2030.636072	56.1	1000.0	1000.000	100.0	V	137.0	-11.1	17.9	74.0
2395.789579	63.2	1000.0	1000.000	231.0	H	118.0	-9.1	10.8	74.0
2718.430862	47.2	1000.0	1000.000	100.0	H	52.0	-7.6	26.8	74.0
3381.761523	51.3	1000.0	1000.000	138.0	H	68.0	-5.0	22.7	74.0

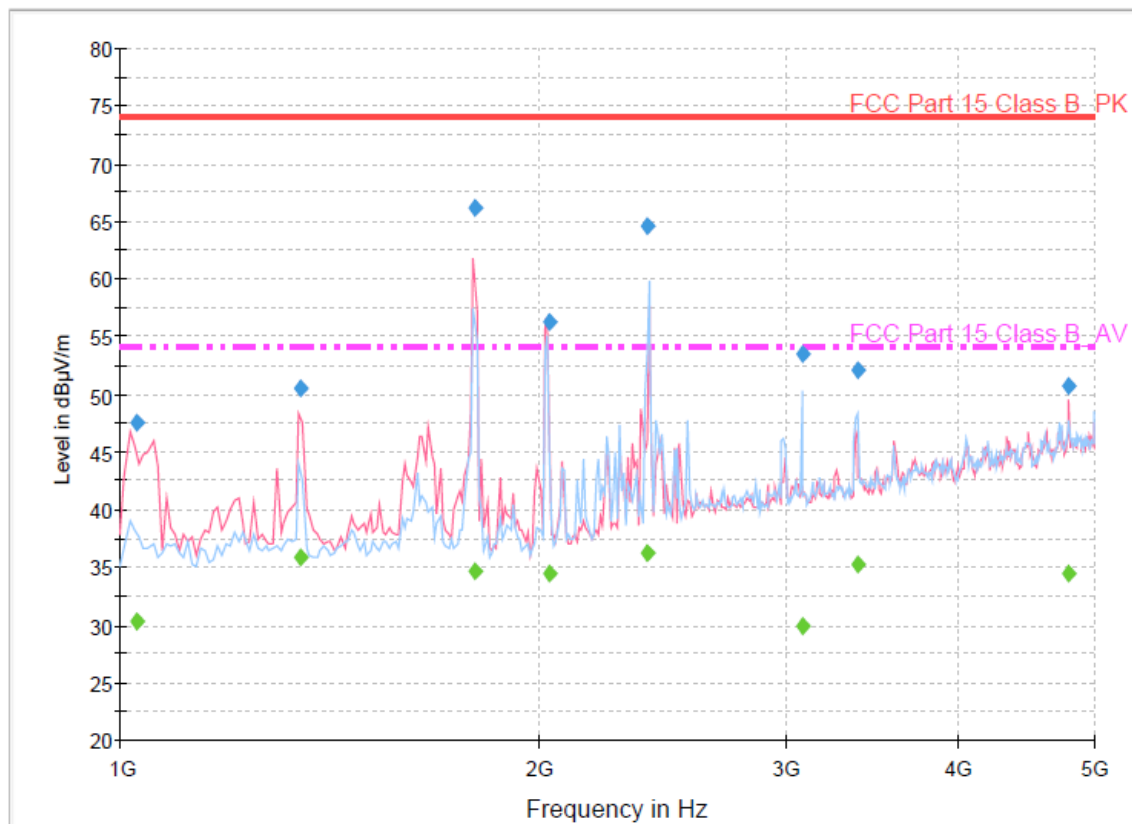
Final Result 2

Frequency (MHz)	CAverage (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1055.496192	27.5	1000.0	1000.000	100.0	V	178.0	-14.0	26.5	54.0
1350.489379	35.6	1000.0	1000.000	100.0	V	20.0	-12.9	18.4	54.0
1519.242084	27.1	1000.0	1000.000	100.0	V	131.0	-12.5	26.9	54.0
1798.987174	35.3	1000.0	1000.000	100.0	V	0.0	-11.6	18.8	54.0
2030.636072	37.1	1000.0	1000.000	100.0	V	137.0	-11.1	16.9	54.0
2395.789579	35.7	1000.0	1000.000	231.0	H	118.0	-9.1	18.3	54.0
2718.430862	28.1	1000.0	1000.000	100.0	H	52.0	-7.6	25.9	54.0
3381.761523	35.0	1000.0	1000.000	138.0	H	68.0	-5.0	19.0	54.0

< Fig 16. Radiated emission result (1 000 MHz ~ 5 000 MHz) >



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (DP: Digital)
Green marker: Average detector, Blue marker: 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)
1027.600000	47.5	1000.0	1000.000	100.0	V	175.0	-14.2	26.5	74.0
1348.889379	50.5	1000.0	1000.000	100.0	V	18.0	-12.9	23.5	74.0
1798.187174	66.2	1000.0	1000.000	100.0	V	-1.0	-11.6	7.8	74.0
2031.036072	56.2	1000.0	1000.000	100.0	V	137.0	-11.1	17.8	74.0
2393.789579	64.6	1000.0	1000.000	137.0	H	235.0	-9.1	9.4	74.0
3093.968337	53.4	1000.0	1000.000	127.0	H	142.0	-6.0	20.6	74.0
3382.561523	52.1	1000.0	1000.000	138.0	H	65.0	-5.0	21.9	74.0
4799.799198	50.6	1000.0	1000.000	100.0	V	85.0	-0.7	23.4	74.0

Final Result 2

Frequency (MHz)	CAverage (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1027.600000	30.4	1000.0	1000.000	100.0	V	175.0	-14.2	23.6	54.0
1348.889379	35.8	1000.0	1000.000	100.0	V	18.0	-12.9	18.2	54.0
1798.187174	34.6	1000.0	1000.000	100.0	V	-1.0	-11.6	19.4	54.0
2031.036072	34.4	1000.0	1000.000	100.0	V	137.0	-11.1	19.6	54.0
2393.789579	36.3	1000.0	1000.000	137.0	H	235.0	-9.1	17.7	54.0
3093.968337	29.8	1000.0	1000.000	127.0	H	142.0	-6.0	24.2	54.0
3382.561523	35.2	1000.0	1000.000	138.0	H	65.0	-5.0	18.8	54.0
4799.799198	34.5	1000.0	1000.000	100.0	V	85.0	-0.7	19.5	54.0

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



7. Sample Calculations

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

7.1 Example 1 :

■ 20.3 MHz

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

7.2 Example 2 :

■ 66.7 MHz

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



8. Recommendation & Conclusion

The data collected shows that the **LG Electronics Inc. MONITOR SIGNAGE (Model Name: 55WV70MS)** was complies with §15.107 and 15.109 of the FCC Rules.

- The end -