

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 14, 2012

Order Number: GETEC-C1-12-071

Test Report Number: GETEC-E3-12-033

Test Site: GUMI COLLEGE EMC CENTER

FCC Registration Number: (100749, 443957)

FCC ID. : BEJM2352D

Applicant : LG Electronics Inc.

Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: LED LCD TV/Monitor
Type of Authority	: Certification
Model Name	: M2352D
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 C63.4-2009 / 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,



Hyun Kim / Engineer
GUMI COLLEGE EMC CENTER



Jae-Hoon Jeong, Senior Engineer
GUMI COLLEGE EMC CENTER



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

1. General Information

Applicant: LG Electronics Inc.

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

Manufacturer: LG Electronics Inc.

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

Contact Person: Mr. Do-Hyung Kim, Chief research engineer

Tel Number: +82-31-610-9623

- **FCC ID.** BEJM2352D
- **EUT Type** LED LCD TV/Monitor
- **Model Name** M2352D
- **Trade Name** LG
- **Serial Number** Prototype
- **Rule Part(s)** FCC Part 15 Subpart B
- **Type of Authority** Certification
- **Test Procedure(s)** ANSI C63.4 (2009) / Canadian standard ICES-003
- **Dates of Test** March 2 ~ 9, 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-E3-12-034
- **Dates of Issue** March 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.**

LED LCD TV/Monitor (Model Name: M2352D)

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)



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Gyungbok, 730-711, Republic of Korea
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Fig 1. The map above shows the Gumi College in vicinity area.



3. Product Information

3.1 Description of EUT

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

LED LCD TV/Monitor (Model Name: M2352D) FCC ID.: BEJM2352D

Panel	Screen Type	584.2 mm Wide (23 inch) Visible diagonal size : 584.2 mm
	Pixel Pitch	0.27 mm (H) x 0.27 mm (V)
Video Signal	Max. Resolution	1920 x 1080 @ 60 Hz
	Recommended Resolution	1920 x 1080 @ 60 Hz
	Horizontal Frequency	30 kHz to 83 kHz
	Vertical Frequency	56 Hz to 75 Hz
	Synchronization Type	Separate Sync, Digital
Input Connector		TV, D-Sub Analog, SCART, PC Audio In, Component, CVBS, HDMI*2
Power	Rated Voltage	19 V --- 2.0 A
	Power Consumption	On Mode : 32 W (typ.) Off Mode ≤ 0.4 W
AC/DC Adapter		Manufacturer: LITE-ON, Model PA-1650-64 Manufacturer: LG Innotek, Model PSAB-L101A
Tilt	Tilt Range	-5 to 20°
Dimensions (Width x Depth x Height) Weight	With Stand	
	544.1 mm x 182.8 mm x 406.2 mm 3.9 kg	
	Without Stand	
	544.1 mm x 62.9 mm x 334.6 mm 3.4 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	ASUSTEK COMPUTER INC.	P8H61	S/N: 0BG084-02014-MIBFE0-A05 FCC ID.: DoC
Video card	Digital Greentech Co., Ltd.	VX4850	S/N: LG1112056668 FCC ID.: DoC
PS2 keyboard	COMPAQ	166516-AD6	S/N: B13BBOR391006D FCC ID.: AQ6-23K15
USB mouse	Microsoft Corporation	1484	S/N: 0352700289761 FCC ID: DoC
DVD player	ILIKE ELECTRONICS CO., LTD.	CVX-3800 Full-HD	S/N: CVX380020110110493 FCC ID.: Verification
USB memory stick	SAMSUNG	SUM-PSB4	S/N: TBBB202478F FCC ID.: DoC
Digital TV pattern generator	Teleview	TPG430B	S/N: 93.01.20.05.09.00.00.02 FCC ID.: Verification
8-VSB modulator	Ktech	VSF-ENC-150E	S/N: 2005-726 FCC ID.: Verification

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.	AKB73655824	S/N: None. FCC ID.: N/A
Adapter #1 ¹⁾	LITE-ON TECHNOLOGY CORPORATION	PA-1650-64	S/N: OC2KN612314050050 FCC ID.: None.
Adapter #2 ¹⁾	LG Innotek Co., Ltd.	PSAB-L101A	S/N: LC1NI627104017047 FCC ID.: None.

1) Input ratings: AC (100 – 240) V~, (50 – 60) Hz, 1.4 A / Output ratings: DC 19 V, 2.53 A



3.2.3 Used Cable(s)

Cable Name	Condition	Description
Power cable	Connected to the adapter	1.80 m unshielded
Adapter cable	Connected to the EUT	1.50 m shielded with a ferrite core
RGB(Analog) in cable	Connected to the EUT and PC	1.50 m shielded
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	1.50 m shielded
Component in cable	Connected to the EUT and DVD player	3.00 m shielded
Headset cable	Connected to the EUT and headset	1.20 m shielded
Antenna cable	Connected to the EUT and digital TV pattern generator	10.00 m shielded with two ferrite cores

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 (with adapter #1(model name: PA-1650-64 or with adapter #2(model name: PSAB-L101A)

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),

1 024 × 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
- 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

Measurements (below 1 GHz) were made at Open area test site that complies to CISPR 16/ANSI C63.4. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 10 m. The EUT was rotated 360° about its azimuth with the receive antenna located at 1, 2, 3 and 4 meter heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1.0 m to 4.0 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

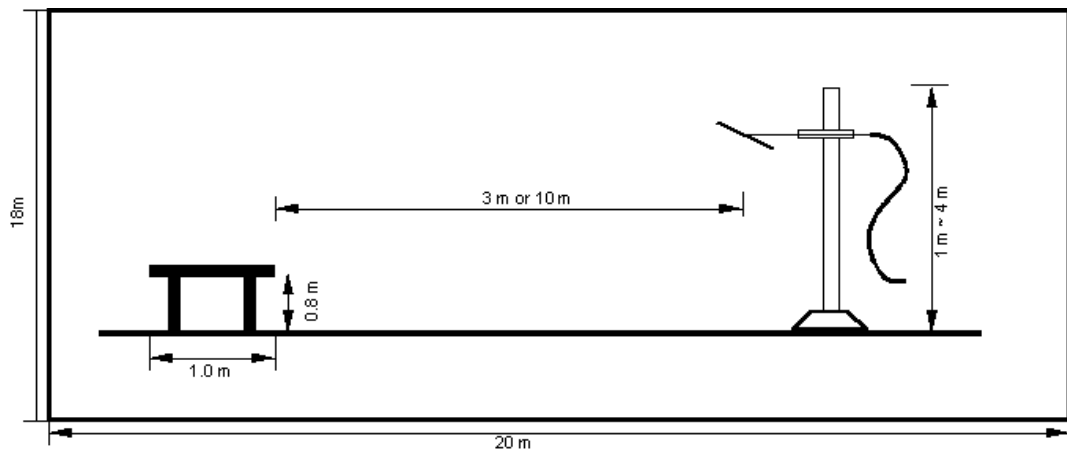


Fig 3. Dimensions of test site

The measurements (above 1 GHz) were made 3 m distance test site that complies to CISPR 16-1-4 (2007). In order to meet SVSWR Limit (Within 6 dB), the bottom side of test site was installed with absorbers. 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. The measurements were conducted with Average and Peak value.

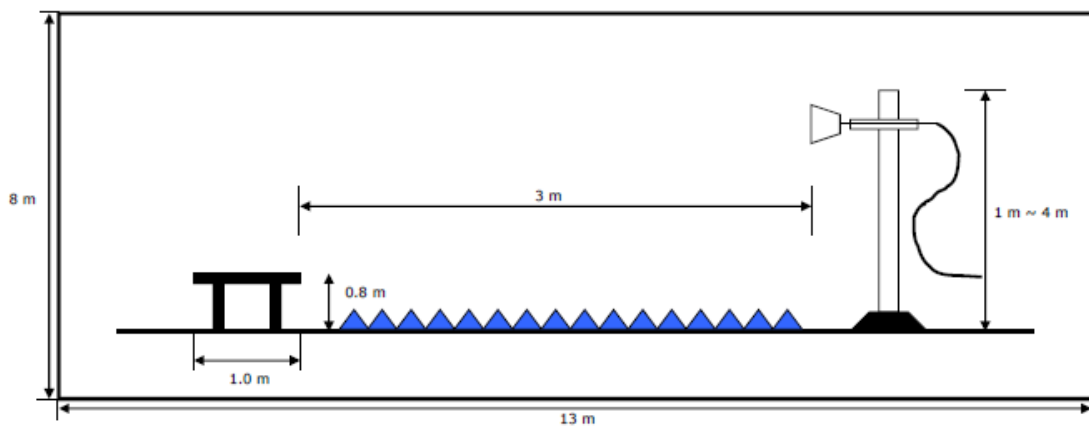


Fig 4. Dimensions of test site



5. Conducted Emission

5.1 Operating Environment

Temperature : 23.0 °C
Relative Humidity : 40.0 % 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

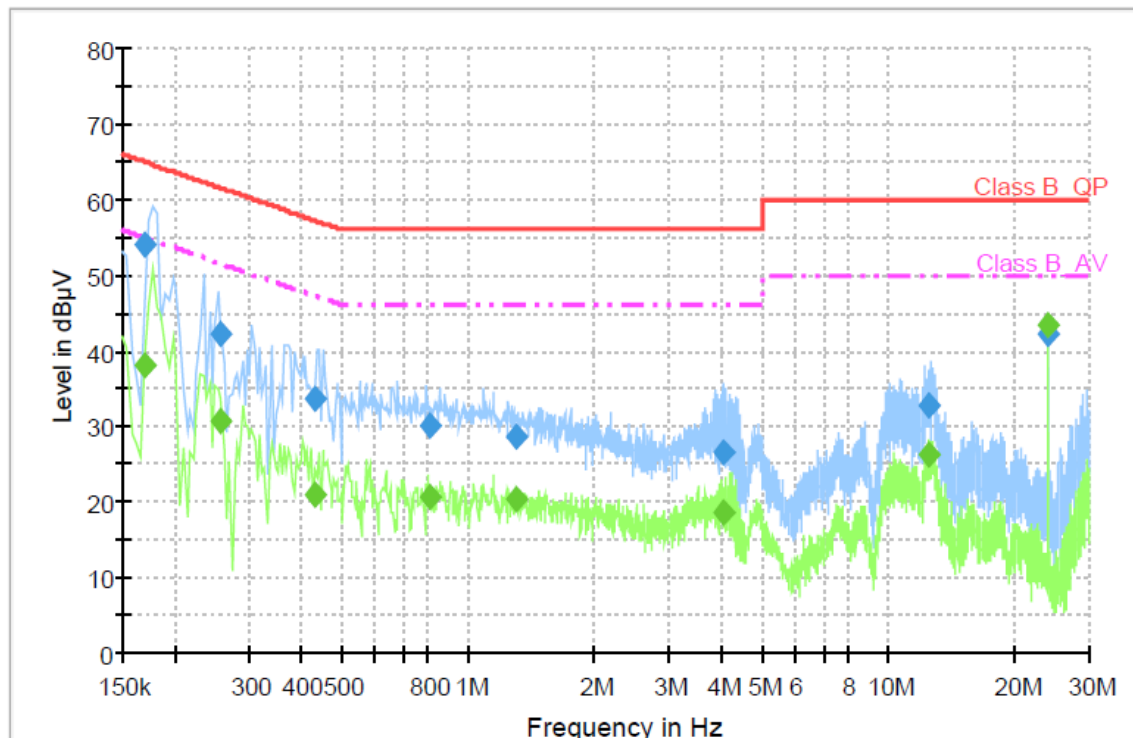
Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESCS30	Rohde & Schwarz	EMI Test Receiver	839809/003	12. 05. 2012
■ - ESH3-Z5	Rohde & Schwarz	LISN	838979/020	12. 07. 2012
■ - ESH2-Z5	Rohde & Schwarz	LISN	829991/009	12. 07. 2012
□ - ENY81-CA6	Rohde & Schwarz	ISN	101573	10. 19. 2012

5.6 Test data for Conducted Emission

- . Test Date : March 2, 2012
- . Resolution Bandwidth : 9 kHz
- . Frequency Range : 0.15 MHz ~ 30 MHz
- . Line : L1: Live, N: Neutral



◆ Operating condition: Monitor with adapter #1, 1 920 × 1 080 / 60 Hz(RGB: Analog)



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.170000	54.0	1000.0	9.000	GND	L1	10.1	10.9	65.0	
0.256000	42.2	1000.0	9.000	GND	N	10.1	19.4	61.6	
0.432000	33.6	1000.0	9.000	GND	L1	10.1	23.7	57.2	
0.808000	30.3	1000.0	9.000	GND	L1	10.1	25.7	56.0	
1.300000	28.7	1000.0	9.000	GND	N	10.2	27.3	56.0	
4.068000	26.6	1000.0	9.000	GND	N	10.3	29.4	56.0	
12.540000	32.8	1000.0	9.000	GND	N	10.3	27.2	60.0	
24.040000	42.1	1000.0	9.000	GND	L1	10.4	17.9	60.0	

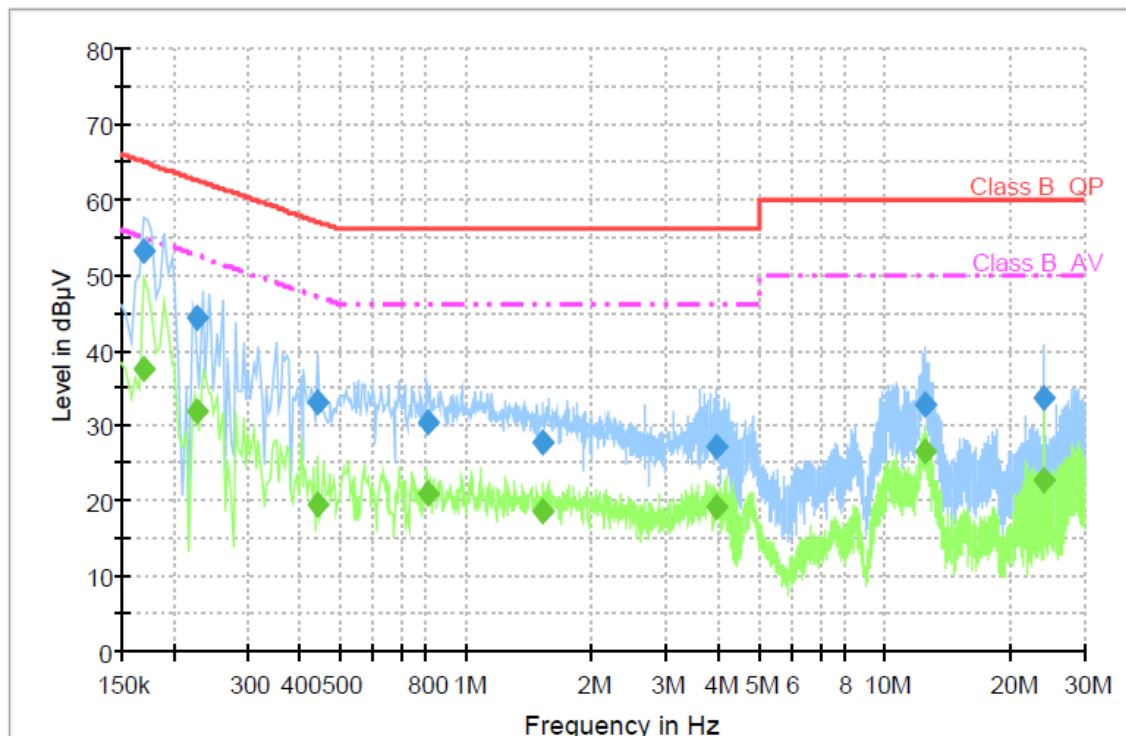
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.170000	38.2	1000.0	9.000	GND	L1	10.1	16.8	55.0	
0.256000	30.8	1000.0	9.000	GND	N	10.1	20.7	51.6	
0.432000	20.8	1000.0	9.000	GND	L1	10.1	26.4	47.2	
0.808000	20.8	1000.0	9.000	GND	L1	10.1	25.2	46.0	
1.300000	20.3	1000.0	9.000	GND	N	10.2	25.7	46.0	
4.068000	18.6	1000.0	9.000	GND	N	10.3	27.4	46.0	
12.540000	26.2	1000.0	9.000	GND	N	10.3	23.8	50.0	
24.040000	43.5	1000.0	9.000	GND	L1	10.4	6.5	50.0	

< Fig 4. Conducted emission result >



◆ Operating condition: Monitor with adapter #1, 1 024 × 768 / 60 Hz(RGB: Analog)



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.170000	53.0	1000.0	9.000	GND	N	10.1	12.0	65.0	
0.228000	44.3	1000.0	9.000	GND	L1	10.1	18.2	62.5	
0.440000	33.1	1000.0	9.000	GND	N	10.1	23.9	57.1	
0.808000	30.4	1000.0	9.000	GND	L1	10.1	25.6	56.0	
1.520000	27.8	1000.0	9.000	GND	L1	10.2	28.2	56.0	
3.972000	27.3	1000.0	9.000	GND	L1	10.2	28.7	56.0	
12.452000	32.6	1000.0	9.000	GND	L1	10.3	27.4	60.0	
23.996000	33.5	1000.0	9.000	GND	L1	10.4	26.5	60.0	

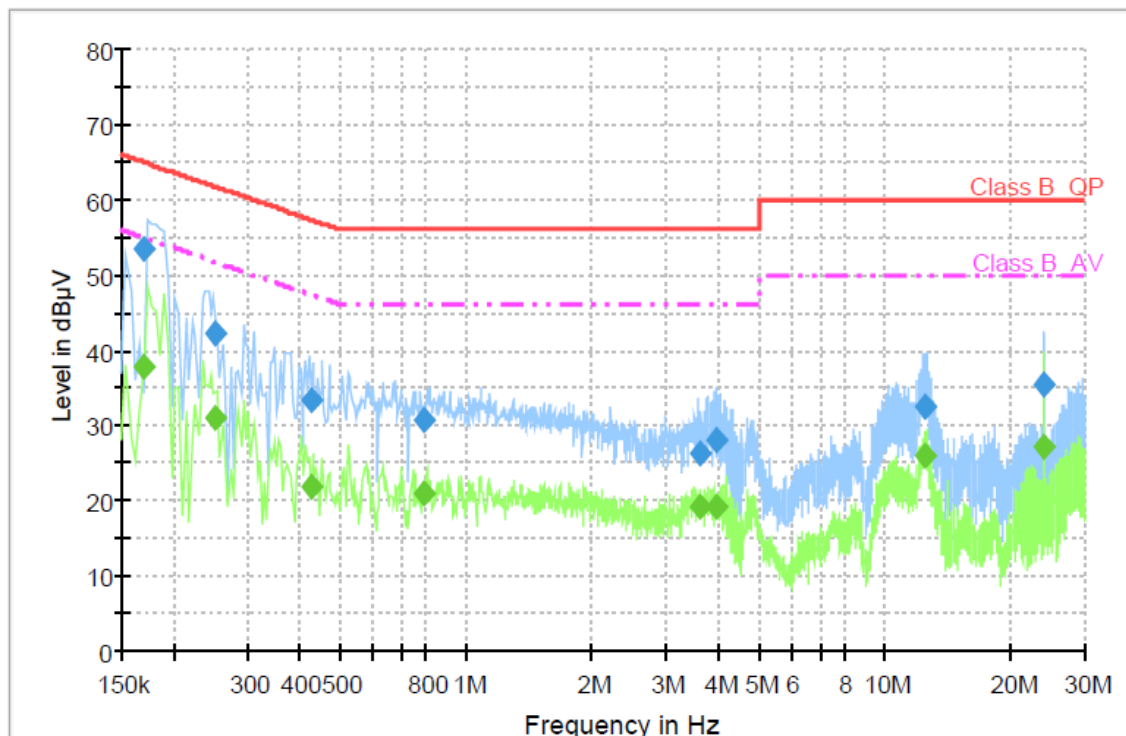
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.170000	37.5	1000.0	9.000	GND	N	10.1	17.4	55.0	
0.228000	31.8	1000.0	9.000	GND	L1	10.1	20.7	52.5	
0.440000	19.4	1000.0	9.000	GND	N	10.1	27.6	47.1	
0.808000	21.1	1000.0	9.000	GND	L1	10.1	24.9	46.0	
1.520000	18.5	1000.0	9.000	GND	L1	10.2	27.5	46.0	
3.972000	19.1	1000.0	9.000	GND	L1	10.2	26.9	46.0	
12.452000	26.5	1000.0	9.000	GND	L1	10.3	23.5	50.0	
23.996000	22.8	1000.0	9.000	GND	L1	10.4	27.2	50.0	

< Fig 5. Conducted emission result >



◆ Operating condition: Monitor with adapter #1, 640 × 480 / 60 Hz(RGB: Analog)



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.170000	53.5	1000.0	9.000	GND	L1	10.1	11.5	65.0	
0.252000	42.2	1000.0	9.000	GND	L1	10.1	19.5	61.7	
0.428000	33.4	1000.0	9.000	GND	N	10.1	23.9	57.3	
0.796000	30.7	1000.0	9.000	GND	N	10.1	25.3	56.0	
3.624000	26.3	1000.0	9.000	GND	L1	10.2	29.7	56.0	
3.972000	28.0	1000.0	9.000	GND	L1	10.2	28.0	56.0	
12.532000	32.4	1000.0	9.000	GND	N	10.3	27.6	60.0	
24.004000	35.3	1000.0	9.000	GND	L1	10.4	24.7	60.0	

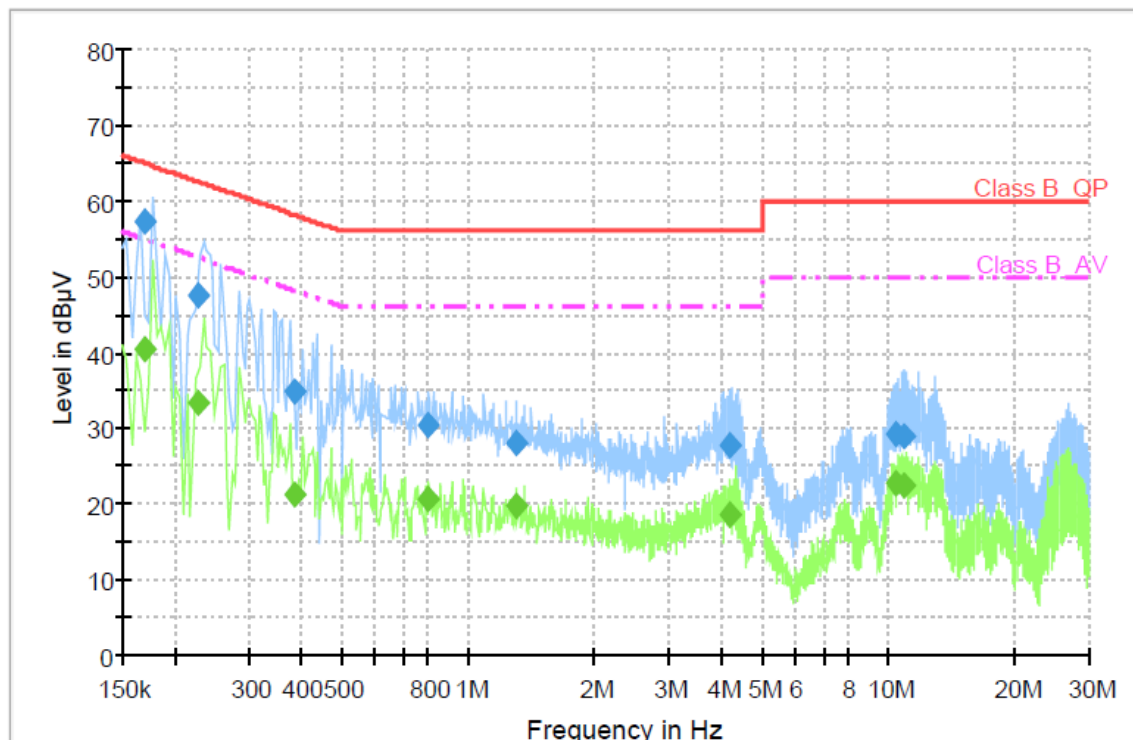
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.170000	37.8	1000.0	9.000	GND	L1	10.1	17.1	55.0	
0.252000	30.9	1000.0	9.000	GND	L1	10.1	20.7	51.7	
0.428000	22.0	1000.0	9.000	GND	N	10.1	25.3	47.3	
0.796000	21.0	1000.0	9.000	GND	N	10.1	25.0	46.0	
3.624000	19.2	1000.0	9.000	GND	L1	10.2	26.8	46.0	
3.972000	19.3	1000.0	9.000	GND	L1	10.2	26.7	46.0	
12.532000	26.1	1000.0	9.000	GND	N	10.3	23.9	50.0	
24.004000	27.2	1000.0	9.000	GND	L1	10.4	22.8	50.0	

< Fig 6. Conducted emission result >



◆ Operating condition: Monitor with adapter #1, 1 920 × 1 080 / 60 Hz(HDMI/DVI: Digital)



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.170000	57.2	1000.0	9.000	GND	L1	10.1	7.8	65.0	
0.228000	47.4	1000.0	9.000	GND	N	10.1	15.1	62.5	
0.388000	34.9	1000.0	9.000	GND	N	10.1	23.2	58.1	
0.804000	30.4	1000.0	9.000	GND	L1	10.1	25.6	56.0	
1.300000	28.1	1000.0	9.000	GND	N	10.2	27.9	56.0	
4.180000	27.9	1000.0	9.000	GND	L1	10.3	28.1	56.0	
10.384000	29.2	1000.0	9.000	GND	N	10.3	30.8	60.0	
10.856000	28.9	1000.0	9.000	GND	N	10.3	31.1	60.0	

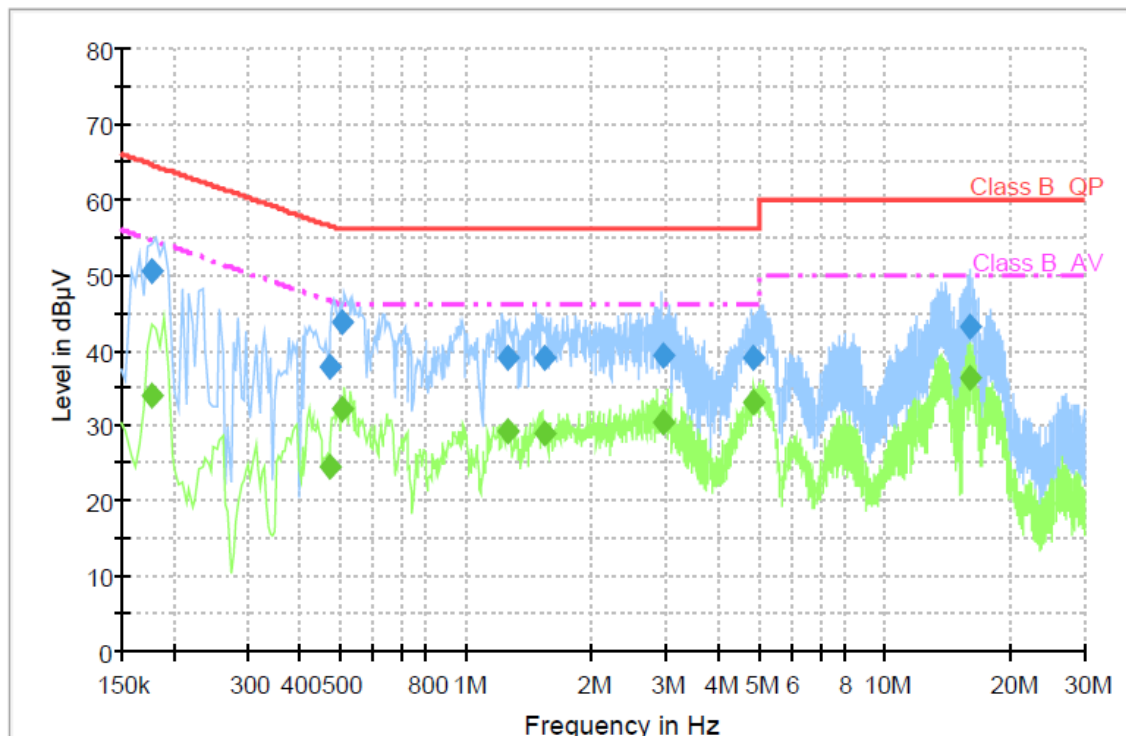
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.170000	40.3	1000.0	9.000	GND	L1	10.1	14.6	55.0	
0.228000	33.3	1000.0	9.000	GND	N	10.1	19.3	52.5	
0.388000	21.1	1000.0	9.000	GND	N	10.1	27.0	48.1	
0.804000	20.7	1000.0	9.000	GND	L1	10.1	25.3	46.0	
1.300000	19.7	1000.0	9.000	GND	N	10.2	26.3	46.0	
4.180000	18.6	1000.0	9.000	GND	L1	10.3	27.4	46.0	
10.384000	22.7	1000.0	9.000	GND	N	10.3	27.3	50.0	
10.856000	22.4	1000.0	9.000	GND	N	10.3	27.6	50.0	

< Fig 7. Conducted emission result >



◆ Operating condition: Monitor with adapter #2, 1 920 × 1 080 / 60 Hz(RGB: Analog)



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.178000	50.4	1000.0	9.000	GND	L1	10.1	14.2	64.6	
0.472000	37.9	1000.0	9.000	GND	N	10.1	18.6	56.5	
0.508000	43.7	1000.0	9.000	GND	L1	10.1	12.3	56.0	
1.256000	38.9	1000.0	9.000	GND	N	10.2	17.1	56.0	
1.536000	38.9	1000.0	9.000	GND	N	10.2	17.1	56.0	
2.964000	39.3	1000.0	9.000	GND	N	10.2	16.7	56.0	
4.840000	39.0	1000.0	9.000	GND	L1	10.3	17.0	56.0	
15.928000	43.0	1000.0	9.000	GND	L1	10.3	17.0	60.0	

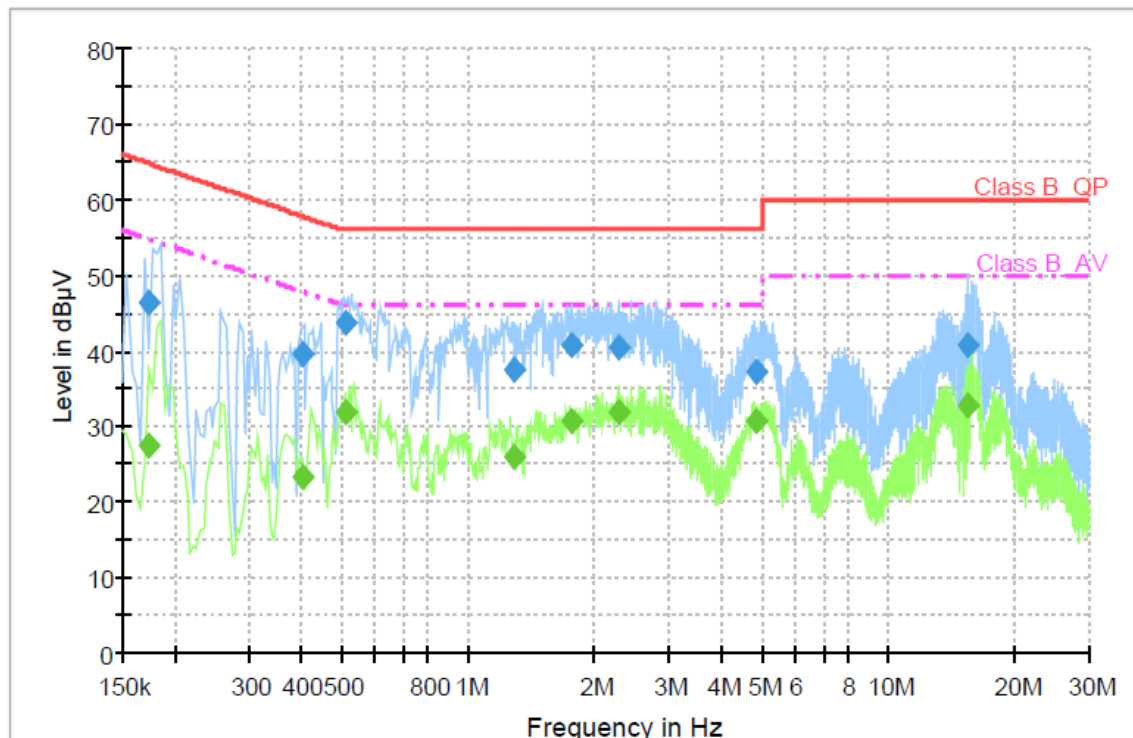
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.178000	34.1	1000.0	9.000	GND	L1	10.1	20.5	54.6	
0.472000	24.4	1000.0	9.000	GND	N	10.1	22.1	46.5	
0.508000	32.2	1000.0	9.000	GND	L1	10.1	13.8	46.0	
1.256000	29.3	1000.0	9.000	GND	N	10.2	16.7	46.0	
1.536000	28.8	1000.0	9.000	GND	N	10.2	17.2	46.0	
2.964000	30.5	1000.0	9.000	GND	N	10.2	15.5	46.0	
4.840000	33.0	1000.0	9.000	GND	L1	10.3	13.0	46.0	
15.928000	36.3	1000.0	9.000	GND	L1	10.3	13.7	50.0	

< Fig 8. Conducted emission result >



◆ Operating condition: Monitor with adapter #2, 1 024 × 768 / 60 Hz(RGB: Analog)



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.174000	46.5	1000.0	9.000	GND	L1	10.1	18.3	64.8	
0.404000	39.5	1000.0	9.000	GND	L1	10.1	18.3	57.8	
0.512000	43.7	1000.0	9.000	GND	L1	10.1	12.3	56.0	
1.288000	37.4	1000.0	9.000	GND	N	10.2	18.6	56.0	
1.756000	40.8	1000.0	9.000	GND	L1	10.2	15.2	56.0	
2.276000	40.5	1000.0	9.000	GND	N	10.2	15.5	56.0	
4.836000	37.1	1000.0	9.000	GND	N	10.3	18.9	56.0	
15.464000	40.8	1000.0	9.000	GND	L1	10.3	19.2	60.0	

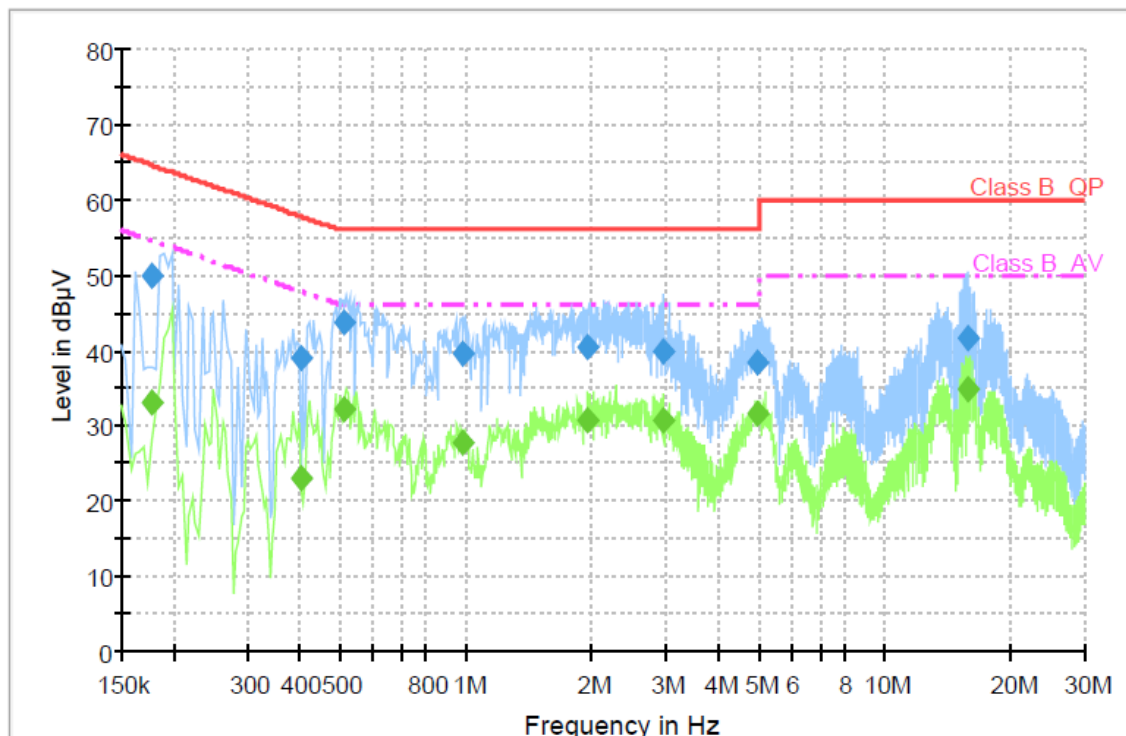
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.174000	27.5	1000.0	9.000	GND	L1	10.1	27.3	54.8	
0.404000	23.4	1000.0	9.000	GND	L1	10.1	24.4	47.8	
0.512000	31.9	1000.0	9.000	GND	L1	10.1	14.1	46.0	
1.288000	26.1	1000.0	9.000	GND	N	10.2	19.9	46.0	
1.756000	30.8	1000.0	9.000	GND	L1	10.2	15.2	46.0	
2.276000	32.0	1000.0	9.000	GND	N	10.2	14.0	46.0	
4.836000	30.8	1000.0	9.000	GND	N	10.3	15.2	46.0	
15.464000	32.7	1000.0	9.000	GND	L1	10.3	17.3	50.0	

< Fig 9. Conducted emission result >



◆ Operating condition: Monitor with adapter #2, 640 × 480 / 60 Hz(RGB: Analog)



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.178000	49.9	1000.0	9.000	GND	L1	10.1	14.7	64.6	
0.404000	39.0	1000.0	9.000	GND	L1	10.1	18.7	57.8	
0.512000	43.8	1000.0	9.000	GND	L1	10.1	12.2	56.0	
0.984000	39.5	1000.0	9.000	GND	N	10.2	16.5	56.0	
1.960000	40.3	1000.0	9.000	GND	L1	10.2	15.7	56.0	
2.964000	40.0	1000.0	9.000	GND	N	10.2	16.0	56.0	
4.952000	38.4	1000.0	9.000	GND	L1	10.3	17.6	56.0	
15.824000	41.7	1000.0	9.000	GND	L1	10.3	18.3	60.0	

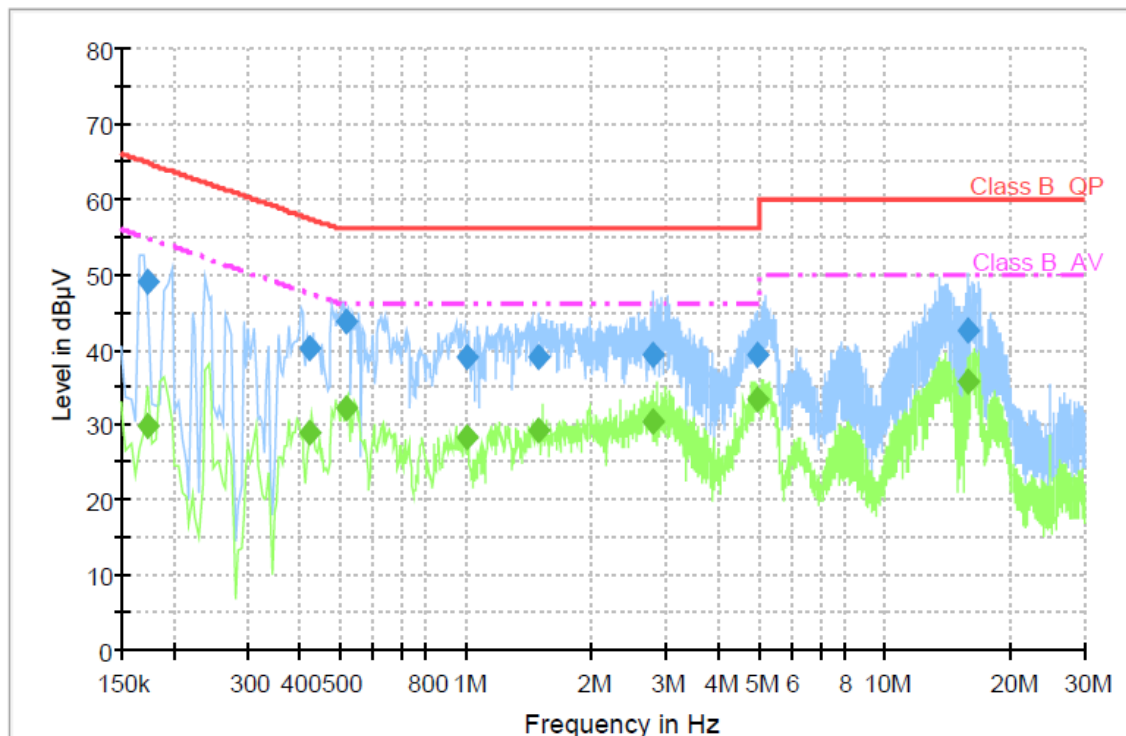
Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.178000	33.2	1000.0	9.000	GND	L1	10.1	21.4	54.6	
0.404000	22.9	1000.0	9.000	GND	L1	10.1	24.8	47.8	
0.512000	32.0	1000.0	9.000	GND	L1	10.1	14.0	46.0	
0.984000	27.7	1000.0	9.000	GND	N	10.2	18.3	46.0	
1.960000	30.8	1000.0	9.000	GND	L1	10.2	15.2	46.0	
2.964000	30.6	1000.0	9.000	GND	N	10.2	15.4	46.0	
4.952000	31.7	1000.0	9.000	GND	L1	10.3	14.3	46.0	
15.824000	34.8	1000.0	9.000	GND	L1	10.3	15.2	50.0	

< Fig 10. Conducted emission result >



◆ Operating condition: Monitor with adapter #2, 1 920 × 1 080 / 60 Hz(HDMI/DVI: Digital)



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.174000	49.0	1000.0	9.000	GND	L1	10.1	15.7	64.8	
0.424000	40.2	1000.0	9.000	GND	L1	10.1	17.2	57.4	
0.516000	43.7	1000.0	9.000	GND	L1	10.1	12.3	56.0	
1.000000	39.1	1000.0	9.000	GND	N	10.2	17.0	56.0	
1.496000	39.0	1000.0	9.000	GND	N	10.2	17.0	56.0	
2.788000	39.1	1000.0	9.000	GND	N	10.2	16.9	56.0	
4.944000	39.3	1000.0	9.000	GND	L1	10.3	16.7	56.0	
15.820000	42.4	1000.0	9.000	GND	L1	10.3	17.6	60.0	

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.174000	29.8	1000.0	9.000	GND	L1	10.1	25.0	54.8	
0.424000	29.0	1000.0	9.000	GND	L1	10.1	18.4	47.4	
0.516000	32.1	1000.0	9.000	GND	L1	10.1	13.9	46.0	
1.000000	28.5	1000.0	9.000	GND	N	10.2	17.5	46.0	
1.496000	29.1	1000.0	9.000	GND	N	10.2	16.9	46.0	
2.788000	30.3	1000.0	9.000	GND	N	10.2	15.7	46.0	
4.944000	33.4	1000.0	9.000	GND	L1	10.3	12.6	46.0	
15.820000	35.8	1000.0	9.000	GND	L1	10.3	14.2	50.0	

< Fig 11. Conducted emission result >



6. Radiated Emission

6.1 Operating Environment

Temperature : 23.0 °C
Relative Humidity : 44.0 % 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(Anechoic Chamber)	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 3 m, Vertical)	± 4.38 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)	± 3.50 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)	± 3.75 dB	Confidence level of approximately 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal)	± 3.59 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
■ - ESIB26	Rohde & Schwarz	EMI Test Receiver	830482/010	12. 05. 2012
■ - VULB9160	Schwarzbeck	Broadband Test Antenna	3099	08. 07. 2013
■ - 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

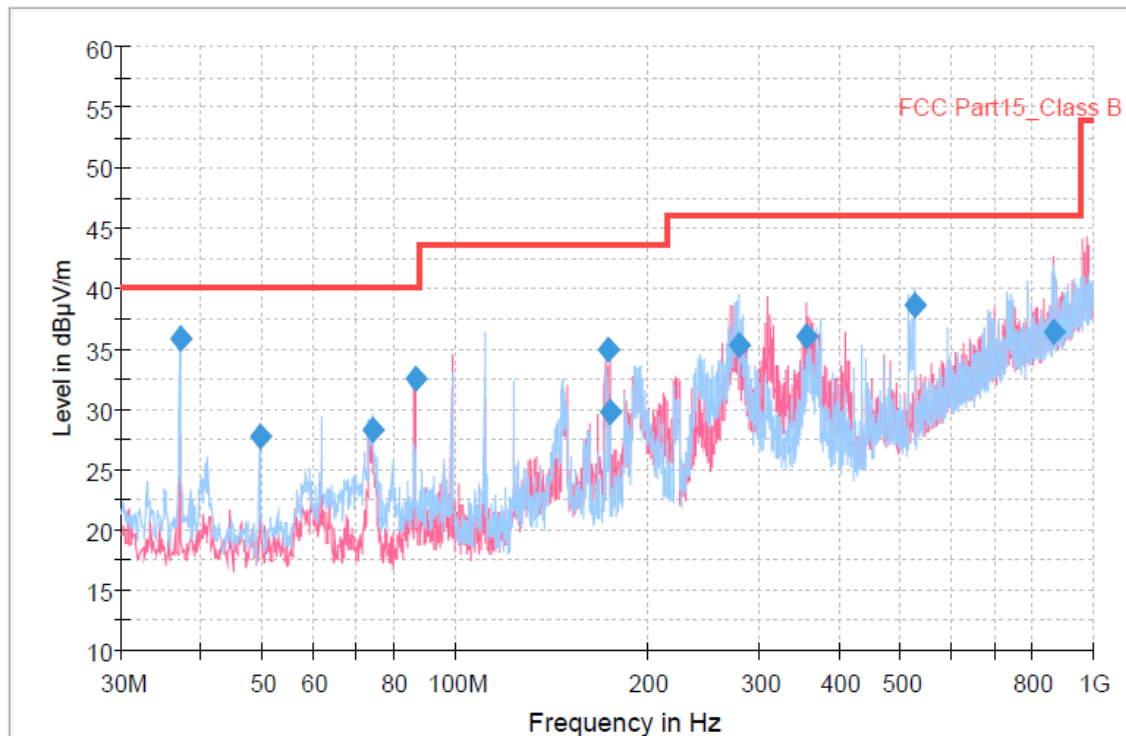
- Test Date : March 2 ~ 9, 2012
- Measurement Distance : 3 m
- Note : The highest frequency of the internal source of the EUT is between 500 MHz and 1 000 MHz (667 MHz). The measurement was made up to 5 000 MHz

- Measurement

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



- ◆ Operating condition: Monitor with adapter #1, 1 920 × 1 080 / 60 Hz(RGB: Analog)



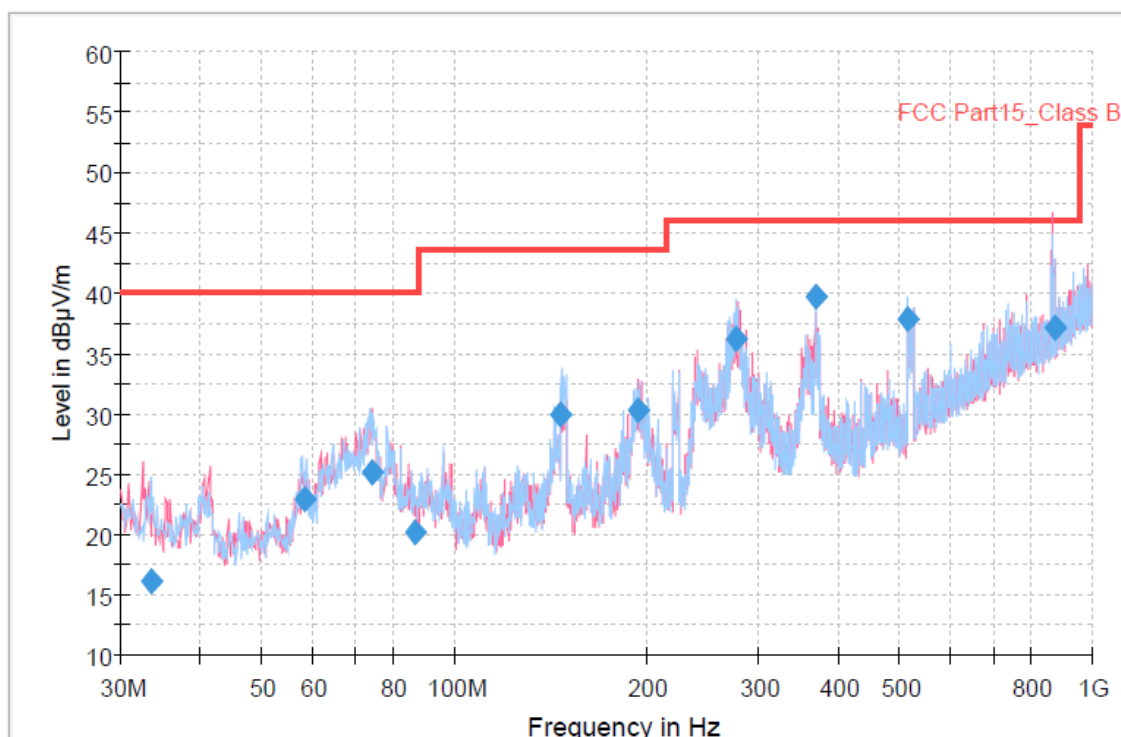
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
37.132500	35.9	1000.0	120.000	100.0	H	100.0	12.8	4.1	40.0
49.500000	27.6	1000.0	120.000	100.0	H	265.0	13.5	12.4	40.0
74.235000	28.3	1000.0	120.000	100.0	H	73.0	10.6	11.7	40.0
86.603750	32.5	1000.0	120.000	200.0	V	193.0	9.6	7.5	40.0
173.243750	34.9	1000.0	120.000	150.0	V	177.0	14.2	8.6	43.5
175.033750	29.7	1000.0	120.000	150.0	V	-25.0	14.1	13.8	43.5
278.662500	35.3	1000.0	120.000	100.0	H	193.0	15.2	10.7	46.0
356.330000	36.0	1000.0	120.000	100.0	V	44.0	17.6	10.0	46.0
525.367500	38.6	1000.0	120.000	200.0	H	179.0	21.7	7.4	46.0
871.937500	36.4	1000.0	120.000	120.0	V	341.0	28.6	9.6	46.0

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



- ◆ Operating condition: Monitor with adapter #1, 1 920 × 1 080 / 60 Hz(HDMI/DVI: Digital)



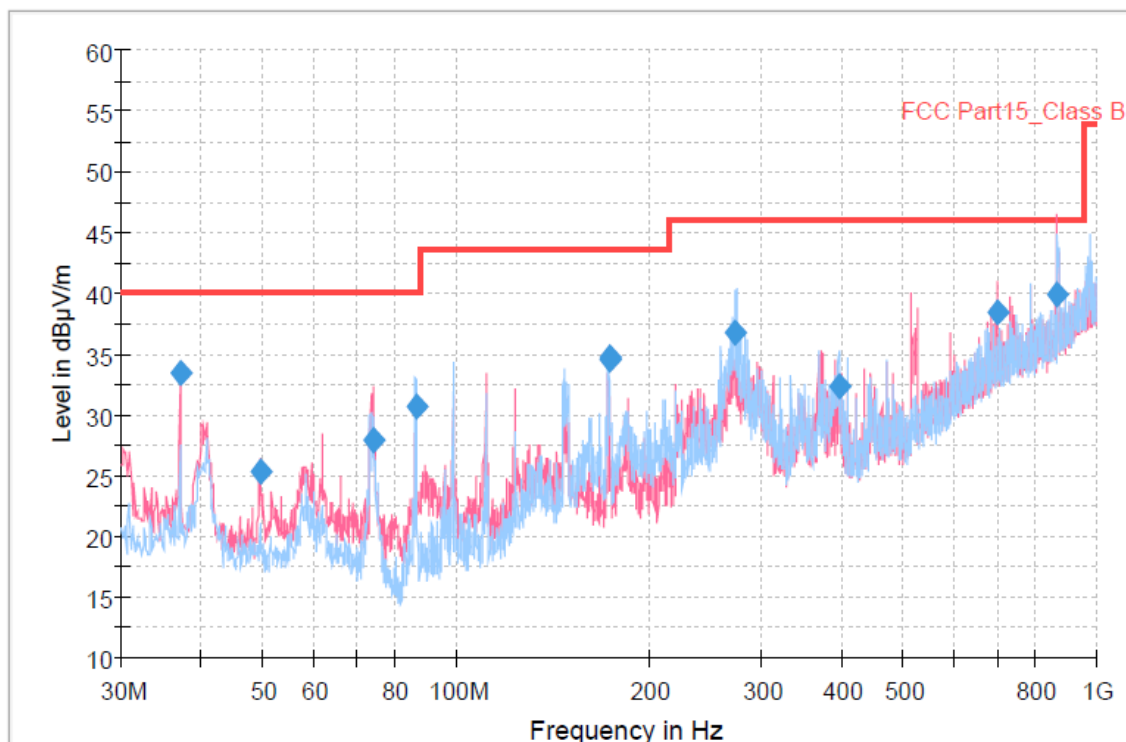
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
33.525000	16.1	1000.0	120.000	110.0	V	8.0	12.8	23.9	40.0
58.386250	23.0	1000.0	120.000	100.0	H	195.0	13.3	17.0	40.0
74.350000	25.1	1000.0	120.000	150.0	H	104.0	10.5	14.9	40.0
87.002500	20.1	1000.0	120.000	150.0	H	273.0	9.6	19.9	40.0
147.188750	29.9	1000.0	120.000	100.0	H	133.0	14.6	13.6	43.5
194.198750	30.2	1000.0	120.000	110.0	V	117.0	12.2	13.3	43.5
277.287500	36.3	1000.0	120.000	100.0	H	175.0	15.1	9.7	46.0
367.985000	39.7	1000.0	120.000	130.0	H	154.0	17.9	6.3	46.0
515.062500	37.9	1000.0	120.000	200.0	H	171.0	21.5	8.1	46.0
872.541250	37.1	1000.0	120.000	122.0	V	-3.0	28.6	8.9	46.0

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



- ◆ Operating condition: Monitor with adapter #2, 1 920 × 1 080 / 60 Hz(RGB: Analog)



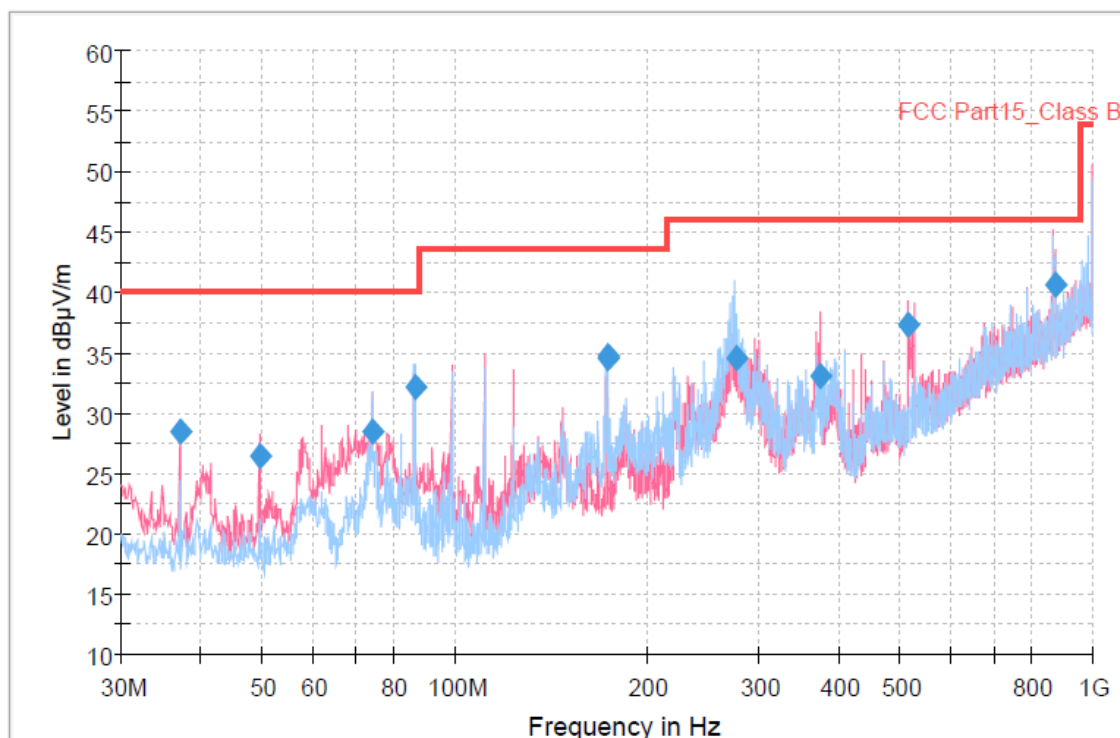
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
37.132500	33.4	1000.0	120.000	100.0	V	100.0	12.8	6.6	40.0
49.500000	25.2	1000.0	120.000	100.0	V	112.0	13.5	14.8	40.0
74.276250	27.9	1000.0	120.000	140.0	V	149.0	10.6	12.1	40.0
86.602500	30.7	1000.0	120.000	198.0	H	212.0	9.6	9.3	40.0
173.256250	34.6	1000.0	120.000	148.0	H	304.0	14.2	8.9	43.5
173.257500	34.6	1000.0	120.000	148.0	H	295.0	14.2	8.9	43.5
273.373750	36.7	1000.0	120.000	110.0	H	197.0	14.9	9.3	46.0
395.953750	32.4	1000.0	120.000	100.0	H	178.0	18.6	13.6	46.0
700.572500	38.4	1000.0	120.000	148.0	V	176.0	25.8	7.6	46.0
870.898750	40.0	1000.0	120.000	100.0	V	75.0	28.6	6.0	46.0

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



- ◆ Operating condition: Monitor with adapter #2, 1 920 × 1 080 / 60 Hz(HDMI/DVI: Digital)



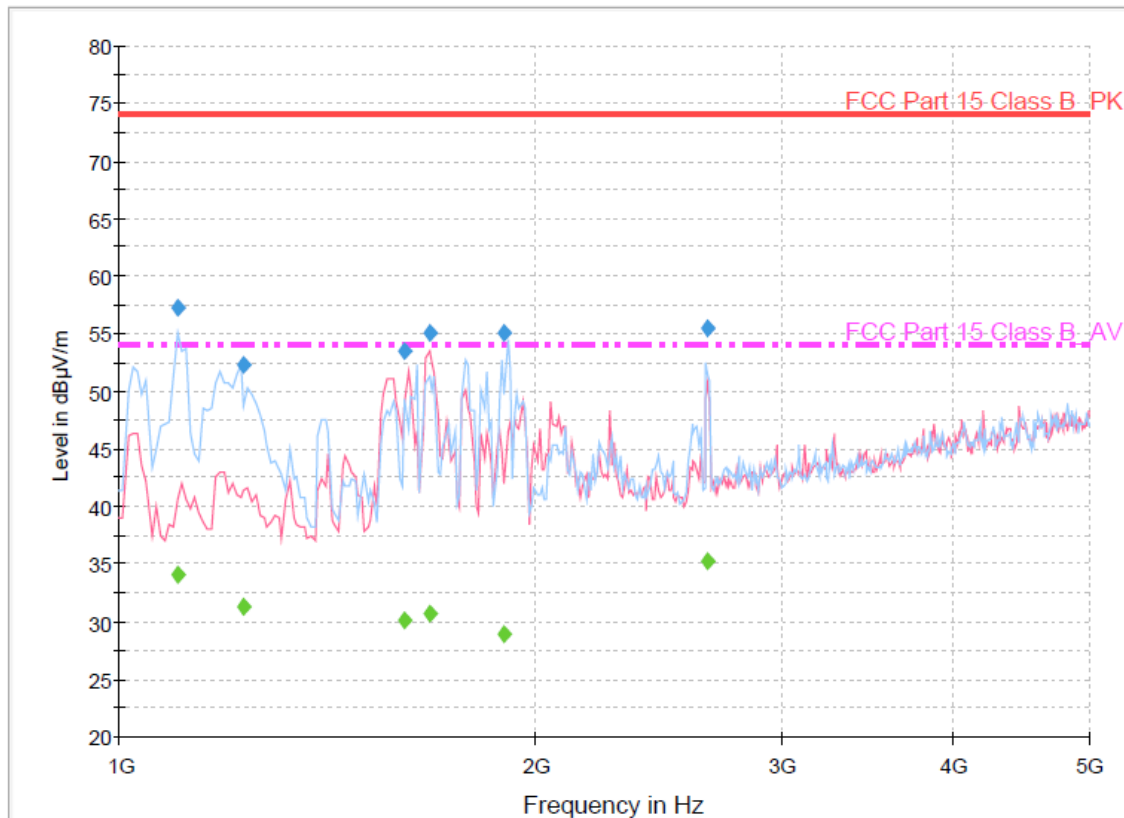
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
37.132500	28.4	1000.0	120.000	100.0	V	138.0	12.8	11.6	40.0
49.500000	26.5	1000.0	120.000	100.0	V	313.0	13.5	13.5	40.0
74.236250	28.5	1000.0	120.000	150.0	V	156.0	10.6	11.5	40.0
86.603750	32.2	1000.0	120.000	200.0	H	230.0	9.6	7.8	40.0
173.256250	34.7	1000.0	120.000	150.0	H	288.0	14.2	8.8	43.5
173.257500	34.6	1000.0	120.000	150.0	H	286.0	14.2	8.9	43.5
276.031250	34.5	1000.0	120.000	100.0	H	207.0	15.0	11.5	46.0
375.292500	33.0	1000.0	120.000	110.0	V	134.0	18.0	13.0	46.0
515.186250	37.3	1000.0	120.000	100.0	V	192.0	21.5	8.7	46.0
872.581250	40.6	1000.0	120.000	100.0	V	83.0	28.6	5.4	46.0

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



- ◆ Operating condition: Monitor with adapter #1, 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)
1103.608417	57.3	1000.0	1000.000	150.0	H	194.0	-13.7	16.7	74.0
1231.448898	52.2	1000.0	1000.000	100.0	H	166.0	-13.3	21.8	74.0
1609.834469	53.5	1000.0	1000.000	100.0	V	182.0	-12.2	20.5	74.0
1675.546693	55.0	1000.0	1000.000	100.0	V	201.0	-12.1	19.0	74.0
1898.411623	55.1	1000.0	1000.000	100.0	H	129.0	-11.6	18.9	74.0
2658.702605	55.4	1000.0	1000.000	115.0	H	220.0	-7.8	18.6	74.0

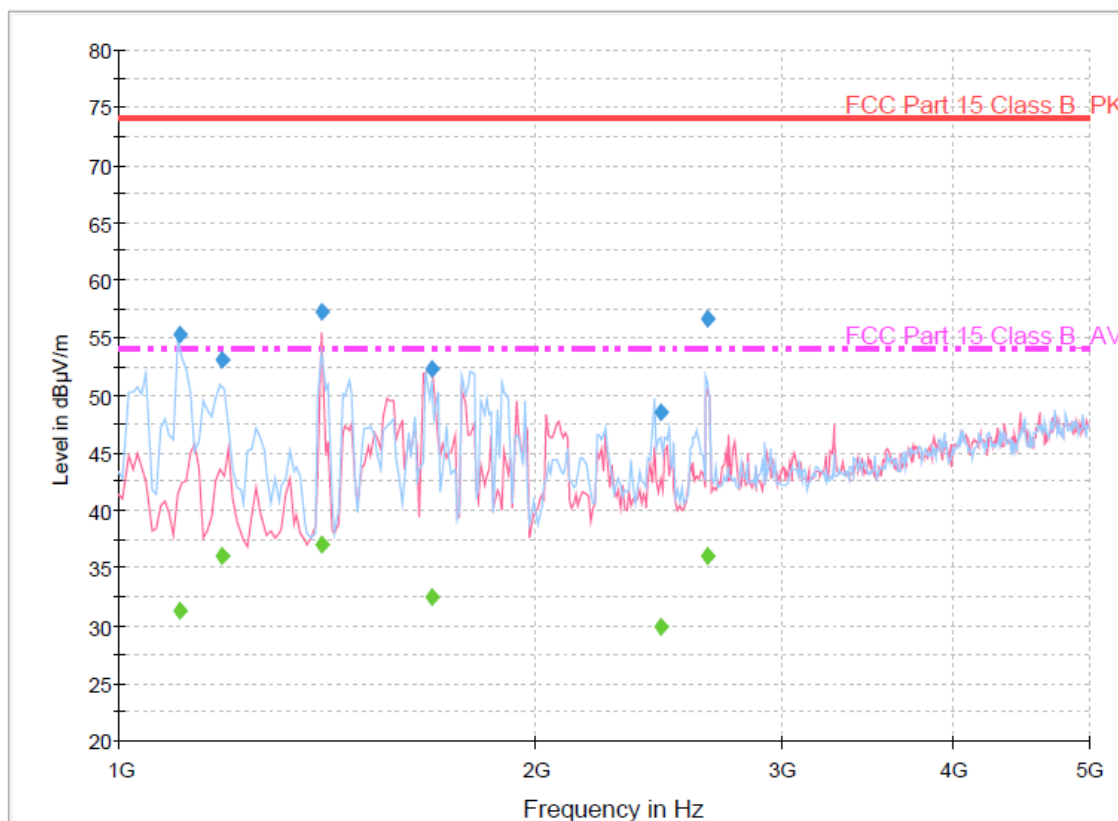
Final Result 2

Frequency (MHz)	CAverage (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1103.608417	34.1	1000.0	1000.000	150.0	H	194.0	-13.7	19.9	54.0
1231.448898	31.2	1000.0	1000.000	100.0	H	166.0	-13.3	22.8	54.0
1609.834469	30.0	1000.0	1000.000	100.0	V	182.0	-12.2	24.0	54.0
1675.546693	30.7	1000.0	1000.000	100.0	V	201.0	-12.1	23.3	54.0
1898.411623	28.8	1000.0	1000.000	100.0	H	129.0	-11.6	25.2	54.0
2658.702605	35.2	1000.0	1000.000	115.0	H	220.0	-7.8	18.8	54.0

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



- ◆ Operating condition: Monitor with adapter #1, 1 920 × 1 080 / 60 Hz(HDMI/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)
1105.608417	55.1	1000.0	1000.000	150.0	H	189.0	-13.7	18.9	74.0
1188.168738	53.2	1000.0	1000.000	100.0	H	194.0	-13.5	20.8	74.0
1401.401603	57.3	1000.0	1000.000	100.0	V	228.0	-12.8	16.7	74.0
1681.962726	52.3	1000.0	1000.000	100.0	V	214.0	-12.1	21.7	74.0
2457.869740	48.6	1000.0	1000.000	100.0	H	225.0	-8.8	25.4	74.0
2654.702605	56.6	1000.0	1000.000	150.0	H	216.0	-7.8	17.4	74.0

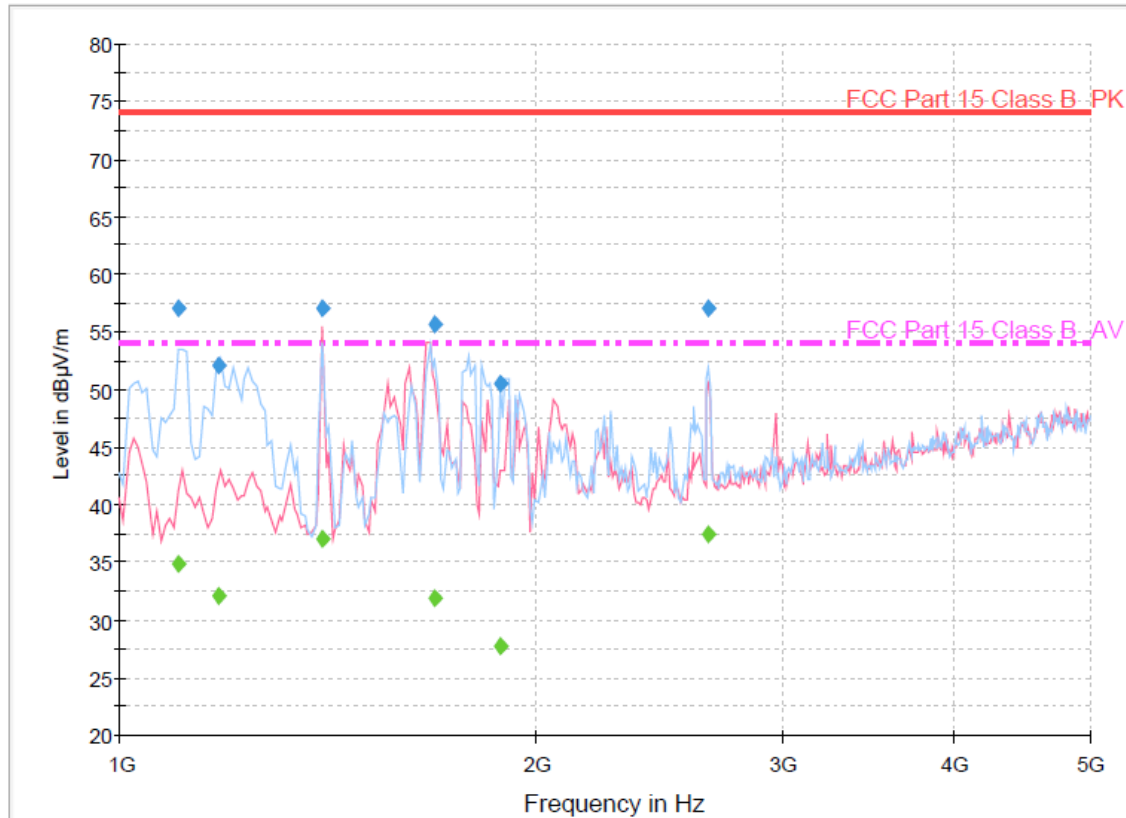
Final Result 2

Frequency (MHz)	CAverage (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1105.608417	31.3	1000.0	1000.000	150.0	H	189.0	-13.7	22.7	54.0
1188.168738	36.1	1000.0	1000.000	100.0	H	194.0	-13.5	17.9	54.0
1401.401603	37.1	1000.0	1000.000	100.0	V	228.0	-12.8	16.9	54.0
1681.962726	32.4	1000.0	1000.000	100.0	V	214.0	-12.1	21.6	54.0
2457.869740	29.9	1000.0	1000.000	100.0	H	225.0	-8.8	24.1	54.0
2654.702605	36.1	1000.0	1000.000	150.0	H	216.0	-7.8	17.9	54.0

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



- ◆ Operating condition: Monitor with adapter #2, 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)
1103.624449	57.0	1000.0	1000.000	150.0	H	184.0	-13.7	17.0	74.0
1181.368738	52.1	1000.0	1000.000	100.0	H	170.0	-13.6	21.9	74.0
1401.401603	57.1	1000.0	1000.000	100.0	V	228.0	-12.8	16.9	74.0
1685.546693	55.6	1000.0	1000.000	100.0	V	205.0	-12.1	18.4	74.0
1883.611623	50.6	1000.0	1000.000	100.0	H	166.0	-11.6	23.4	74.0
2655.118637	57.0	1000.0	1000.000	125.0	H	219.0	-7.8	17.0	74.0

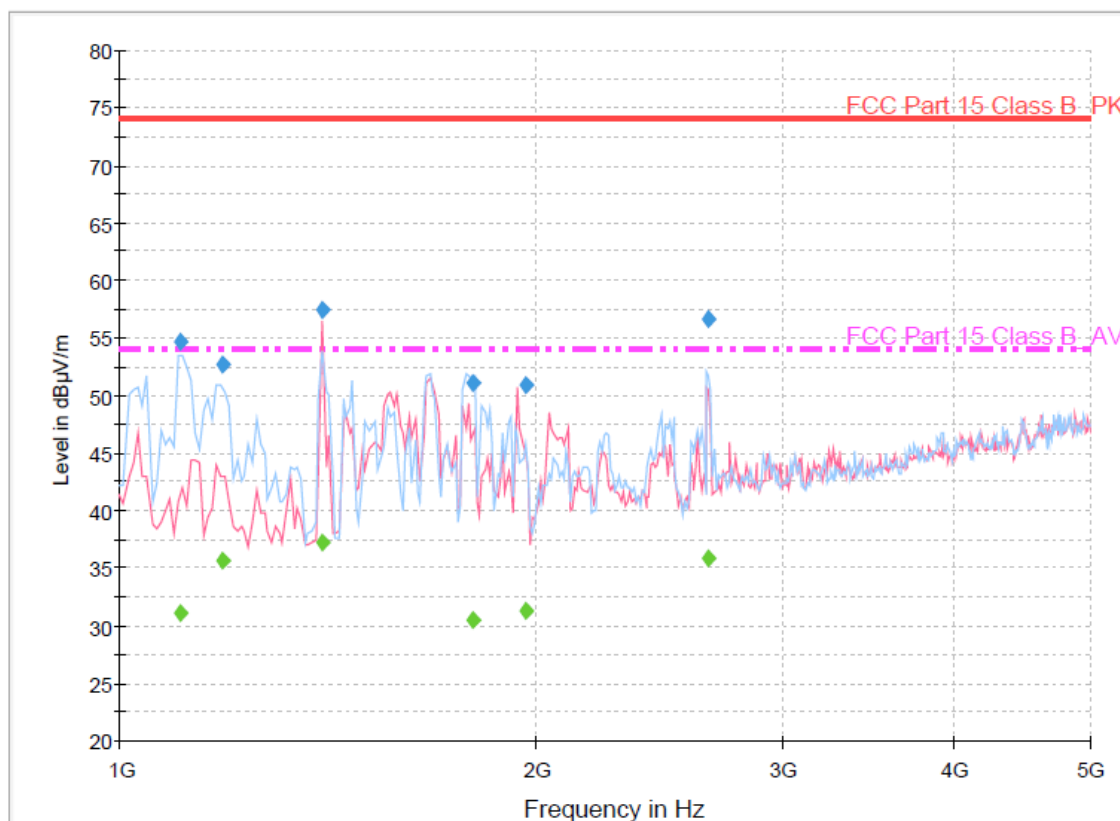
Final Result 2

Frequency (MHz)	CAverage (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1103.624449	34.9	1000.0	1000.000	150.0	H	184.0	-13.7	19.1	54.0
1181.368738	32.0	1000.0	1000.000	100.0	H	170.0	-13.6	22.0	54.0
1401.401603	37.0	1000.0	1000.000	100.0	V	228.0	-12.8	17.0	54.0
1685.546693	31.9	1000.0	1000.000	100.0	V	205.0	-12.1	22.1	54.0
1883.611623	27.7	1000.0	1000.000	100.0	H	166.0	-11.6	26.3	54.0
2655.118637	37.4	1000.0	1000.000	125.0	H	219.0	-7.8	16.6	54.0

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



- ◆ Operating condition: Monitor with adapter #2, 1 920 × 1 080 / 60 Hz(HDMI/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)
1105.624449	54.7	1000.0	1000.000	100.0	H	198.0	-13.7	19.3	74.0
1187.768738	52.6	1000.0	1000.000	100.0	H	186.0	-13.5	21.4	74.0
1401.401603	57.5	1000.0	1000.000	100.0	V	230.0	-12.8	16.5	74.0
1799.355110	51.0	1000.0	1000.000	100.0	H	231.0	-11.6	23.0	74.0
1962.475752	50.9	1000.0	1000.000	100.0	V	188.0	-11.4	23.1	74.0
2653.502605	56.7	1000.0	1000.000	144.0	H	221.0	-7.9	17.3	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)
1105.624449	31.0	1000.0	1000.000	100.0	H	198.0	-13.7	23.0	54.0
1187.768738	35.7	1000.0	1000.000	100.0	H	186.0	-13.5	18.3	54.0
1401.401603	37.2	1000.0	1000.000	100.0	V	230.0	-12.8	16.8	54.0
1799.355110	30.5	1000.0	1000.000	100.0	H	231.0	-11.6	23.5	54.0
1962.475752	31.2	1000.0	1000.000	100.0	V	188.0	-11.4	22.8	54.0
2653.502605	35.8	1000.0	1000.000	144.0	H	221.0	-7.9	18.2	54.0

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



7. Sample Calculations

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

7.1 Example 1 :

■ 20.3 MHz

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

7.2 Example 2 :

■ 66.7 MHz

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



8. Recommendation & Conclusion

The data collected shows that the **LG Electronics Inc. LED LCD TV/Monitor (Model Name: M2352D)** was complies with §15.107 and 15.109 of the FCC Rules.

- The end -