

FCC EVALUATION REPORT FOR CERTIFICATION

FCC Class B (Class II Permissive Change)

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: September 22, 2011

Order Number: GETEC-C1-11-224

Test Report Number: GETEC-E3-11-115

Test Site: Gumi College EMC Center

FCC Registration Number: (100749, 443957)

FCC ID. : BEJHSTND-3101-G

Applicant : LG Electronics Inc.

Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: Digital Signage Display
Type of Authority	: Certification
Model Name	: HSTND-3101-G, LD4201
Trade Name	: HP, LG
Class II Change(s)	: Changed evaluation test frequency range

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



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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.** BEJHSTND-3101-G

● **EUT Type** Digital Signage Display

● **Model Name** HSTND-3101-G, LD4201

[The differences for all models are as follow:](#)

Model Name	Description
HSTND-3101-G	HP brand model name
LD4201	LG brand model name

● **Trade Name** HP, LG

● **Serial Number** Prototype

● **Rule Part(s)** FCC Part 15 Subpart B

● **Type of Authority** Certification

● **Test Procedure(s)** ANSI C63.4 (2003) / Canadian standard ICES-003

● **Dates of Test** November 8, 2010 ~ September 19, 2011

● **Place of Test** **Gumi College EMC Center** (FCC Registration Number: 100749, 443957)
407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.

● **Test Report Number** GETEC-E3-11-115

● **Dates of Issue** September 22, 2011

● **Class II Change(s)** Changed evaluation test frequency range

EUT Type: Digital Signage Display

FCC ID.: BEJHSTND-3101-G



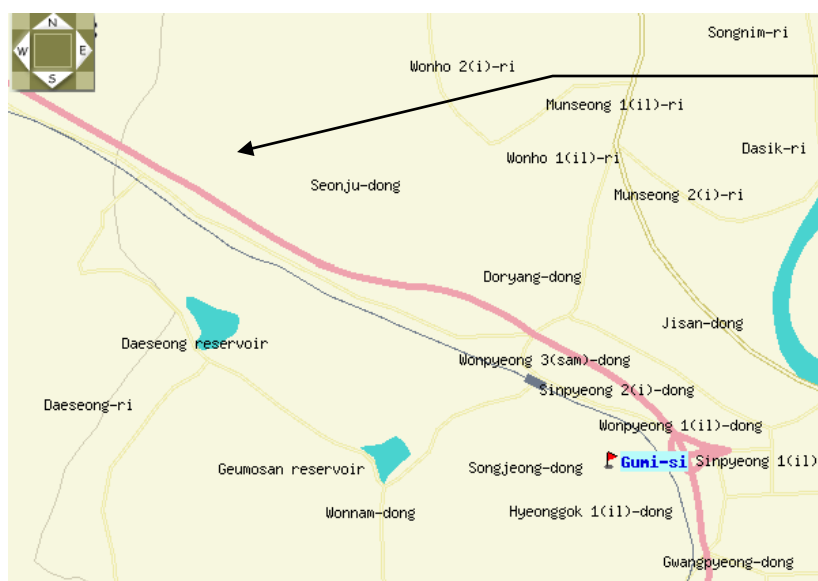
2. Introduction

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. Digital Signage Display (Model Name: HSTND-3101-G, LD4201)**

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)



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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. Digital Signage Display (Model Name: HSTND-3101-G, LD4201)** FCC ID.: BEJHSTND-3411-G

		HP LD4201	HP LD4210	HP LD4710
Display	Size	106.73 cm (42 in)	106.73 cm (42 in)	119.28 cm (47 in)
	Type	TFT LCD panel	TFT LCD panel	TFT LCD panel
Viewable image size		106.73 cm (42 in) diagonal	106.73 cm (42 in) diagonal	119.28 cm (47 in) diagonal
Pixel pitch		0.4845 x 0.4845 mm (0.0191 x 0.0191 in) X RGB	0.4845 x 0.4845 mm (0.0191 x 0.0191 in) X RGB	0.5415 x 0.5415 mm (0.0213 x 0.0213 in) X RGB
Weight—maximum	Without stand and speaker	18.6 kg (41.01 lbs)	18.6 kg (41.01 lbs)	22.7 kg (50.05 lbs)
	With speaker	19.3 kg (42.55 lbs)	19.3 kg (42.55 lbs)	23.4 kg (51.59 lbs)
	With stand	21.9 kg (48.28 lbs)	21.9 kg (48.28 lbs)	26.0 kg (57.32 lbs)
	With stand and speaker	22.6 kg (49.82 lbs)	22.6 kg (49.82 lbs)	26.7 kg (58.86 lbs)
Dimensions (W x H x D)	Without stand and speaker	96.71 x 55.98 x 12.37 cm (38.07 x 22.04 x 4.87 in)	96.71 x 55.98 x 12.37 cm (38.07 x 22.04 x 4.87 in)	107.95 x 62.46 x 12.29 cm (42.50 x 24.59 x 4.84 in)
	With speaker	96.71 x 55.98 x 12.37 cm (38.07 x 22.04 x 4.87 in)	96.71 x 55.98 x 12.37 cm (38.07 x 22.04 x 4.87 in)	107.95 x 62.46 x 12.29 cm (42.50 x 24.59 x 4.84 in)
	With stand	96.71 x 63.50 x 25.86 cm (38.07 x 25 x 10.18 in)	96.71 x 63.50 x 25.86 cm (38.07 x 25 x 10.18 in)	107.95 x 69.77 x 29.83 cm (42.50 x 27.47 x 11.7 in)
	With stand and speaker	96.71 x 63.50 x 25.86 cm (38.07 x 25 x 10.18 in)	96.71 x 63.50 x 25.86 cm (38.07 x 25 x 10.18 in)	107.95 x 69.77 x 29.83 cm (42.50 x 27.47 x 11.7 in)
Power	Rated voltage	AC 100-240 V~50/60 Hz 2.2 A	AC 100-240 V~50/60 Hz 2.2 A	AC 100-240 V~50/60 Hz 2.2 A

- . Serial Number : Prototype
- . I/O Port : RS-232C IN/OUT, HDMI/DVI, RGB IN/OUT, AUDIO (RGB/DVI), DP IN/OUT, SPEAKER OUT
- . Clock & Tune Frequency : RGB (Analog) mode: 400 MHz, HDMI (Digital) mode: 1.2 GHz, DP (Digital) mode: 2.7 GHz



3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID.
PC	Hewlett Packard	HP Z400	S/N: None. FCC ID.: DoC
Video card	ATI	ATI Radeon HD 5770	S/N: None. FCC ID.: DoC
PS2 keyboard	Hewlett Packard	SK-2880	S/N: 434820-002 FCC ID.: DoC
USB mouse	Hewlett Packard	M-UAE96	S/N: 265986-011 FCC ID.: DoC
USB memory stick	LG Electronics Inc.	UM5 2GB	S/N: 003RLRN37758 FCC ID.: DoC
Monitor	LG Electronics Inc.	M2762WSK	S/N: None. 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.
Speaker	LG Electronics Inc.	HSP0000K	S/N: None. FCC ID.: N/A
Stand	LG Electronics Inc.	HST0000K	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	1.80 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(Digital) in cable	Connected to the EUT and PC	2.00 m shielded
HDMI/DVI(Digital) in cable	Connected to the EUT and PC	2.90 m shielded
Audio in cable	Connected to the EUT and PC	1.80 m shielded
RS232-C cable	Connected to the EUT(in port) and EUT(out port)	1.20 m shielded with two ferrite cores
DP(Digital) in cable	Connected to the EUT and PC	1.80 m shielded
DP(Digital) out cable	Connected to the EUT and monitor	1.80 m shielded
Speaker cable	Connected to the EUT and speaker	0.95 m unshielded with four 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

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

Conducted emission: 1 920 × 1 080 / 60 Hz (RGB: Analog, 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 mode of 1 kHz audio file with winamp player



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

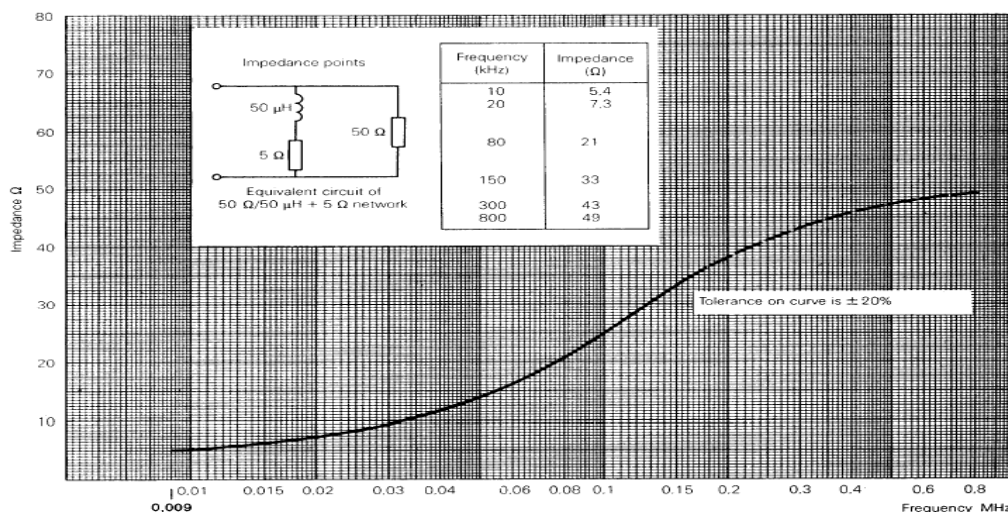


Fig 2. Impedance of LISN



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

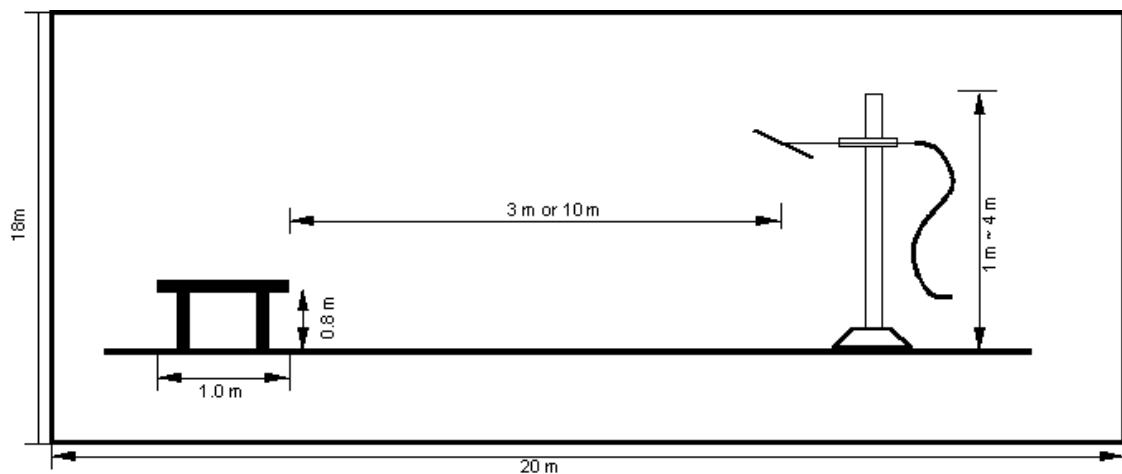


Fig 3. Dimensions of test site



5. Conducted Emission

5.1 Operating Environment

Temperature : 23.0 °C
Relative Humidity : 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 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 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. 10. 2010
■ - ESH3-Z5	Rohde & Schwarz	LISN	838979/020	12. 10. 2010
■ - ESH2-Z5	Rohde & Schwarz	LISN	829991/009	12. 10. 2010
□ - ISN T8	TESEQ. GmbH	ISN	24568	11. 09. 2011

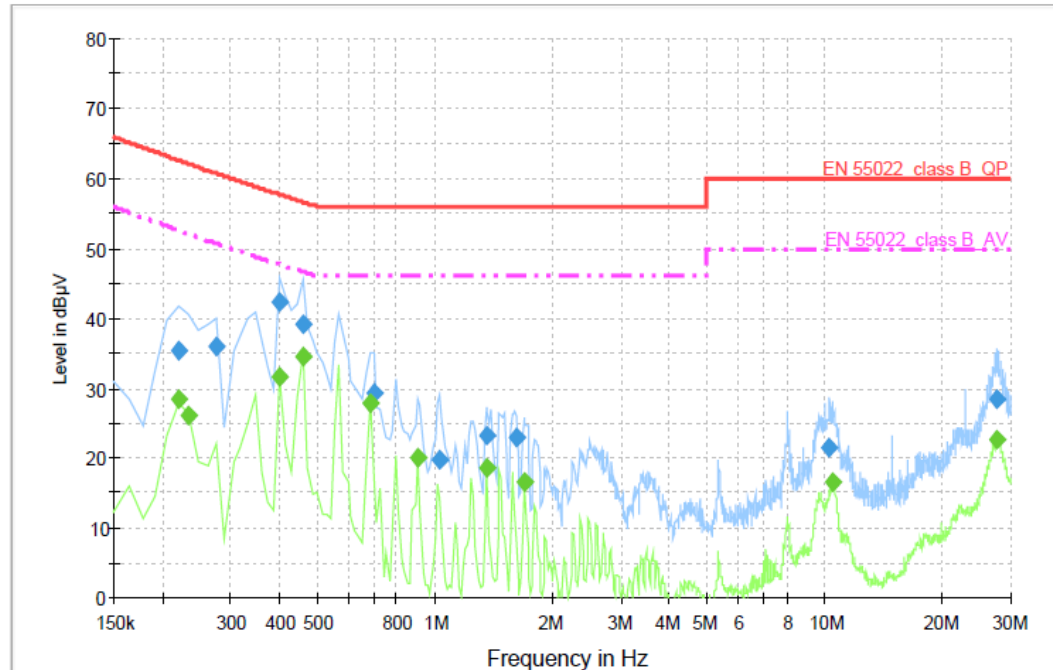
5.6 Test data for Conducted Emission

-. Test Date : November 9, 2010
-. 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)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	35.5	1000.000	9.000	GND	L1	10.0	27.1	62.6	
0.276000	36.1	1000.000	9.000	GND	L1	10.0	24.6	60.7	
0.402000	42.2	1000.000	9.000	GND	L1	10.0	15.5	57.7	
0.458000	39.1	1000.000	9.000	GND	L1	10.0	17.6	56.7	
0.696000	29.2	1000.000	9.000	GND	L1	10.0	26.8	56.0	
1.032000	19.8	1000.000	9.000	GND	L1	10.0	36.2	56.0	
1.354000	23.2	1000.000	9.000	GND	L1	10.1	32.8	56.0	
1.620000	22.8	1000.000	9.000	GND	L1	10.1	33.2	56.0	
10.300000	21.4	1000.000	9.000	GND	L1	10.4	38.6	60.0	
27.772000	28.4	1000.000	9.000	GND	L1	11.4	31.6	60.0	

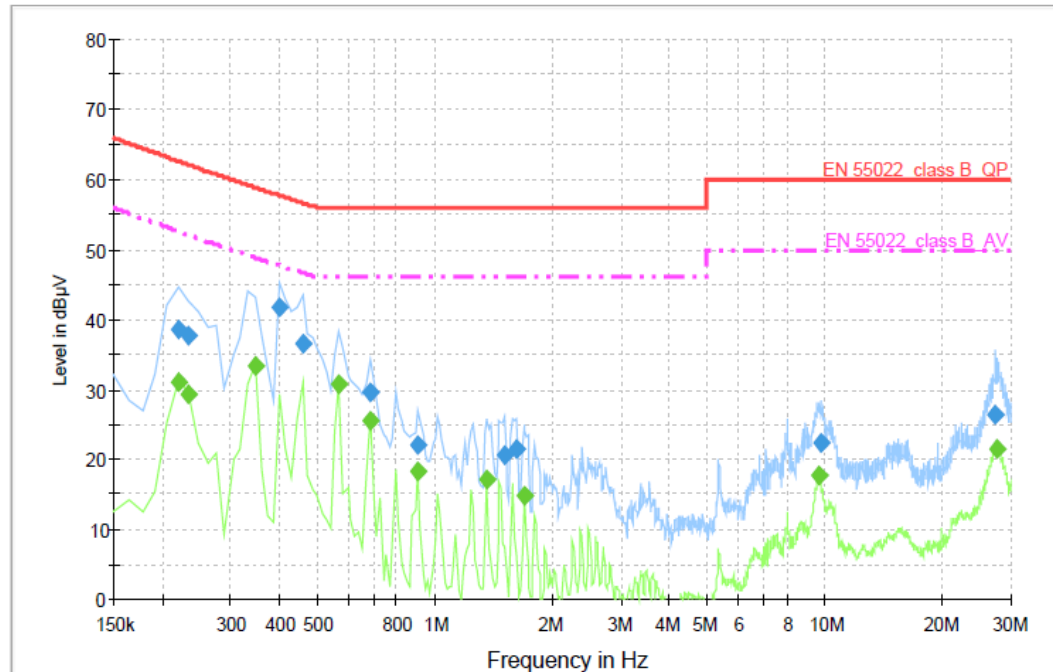
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	28.4	1000.000	9.000	GND	L1	10.0	24.2	52.6	
0.234000	26.1	1000.000	9.000	GND	L1	10.0	26.0	52.1	
0.402000	31.6	1000.000	9.000	GND	L1	10.0	16.1	47.7	
0.458000	34.4	1000.000	9.000	GND	L1	10.0	12.3	46.7	
0.682000	27.8	1000.000	9.000	GND	L1	10.0	18.2	46.0	
0.906000	20.1	1000.000	9.000	GND	L1	10.0	25.9	46.0	
1.354000	18.6	1000.000	9.000	GND	L1	10.1	27.4	46.0	
1.690000	16.6	1000.000	9.000	GND	L1	10.1	29.4	46.0	
10.482000	16.4	1000.000	9.000	GND	L1	10.4	33.6	50.0	
27.506000	22.6	1000.000	9.000	GND	L1	11.4	27.4	50.0	

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



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	38.7	1000.000	9.000	GND	N	10.0	23.9	62.6	
0.234000	37.6	1000.000	9.000	GND	N	10.0	24.5	62.1	
0.402000	41.8	1000.000	9.000	GND	N	10.0	15.9	57.7	
0.458000	36.6	1000.000	9.000	GND	N	10.0	20.1	56.7	
0.682000	29.4	1000.000	9.000	GND	N	10.0	26.6	56.0	
0.906000	22.1	1000.000	9.000	GND	N	10.0	33.9	56.0	
1.508000	20.4	1000.000	9.000	GND	N	10.1	35.6	56.0	
1.620000	21.3	1000.000	9.000	GND	N	10.1	34.7	56.0	
9.810000	22.3	1000.000	9.000	GND	N	10.4	37.7	60.0	
27.282000	26.4	1000.000	9.000	GND	N	10.8	33.6	60.0	

Final Measurement Detector 2

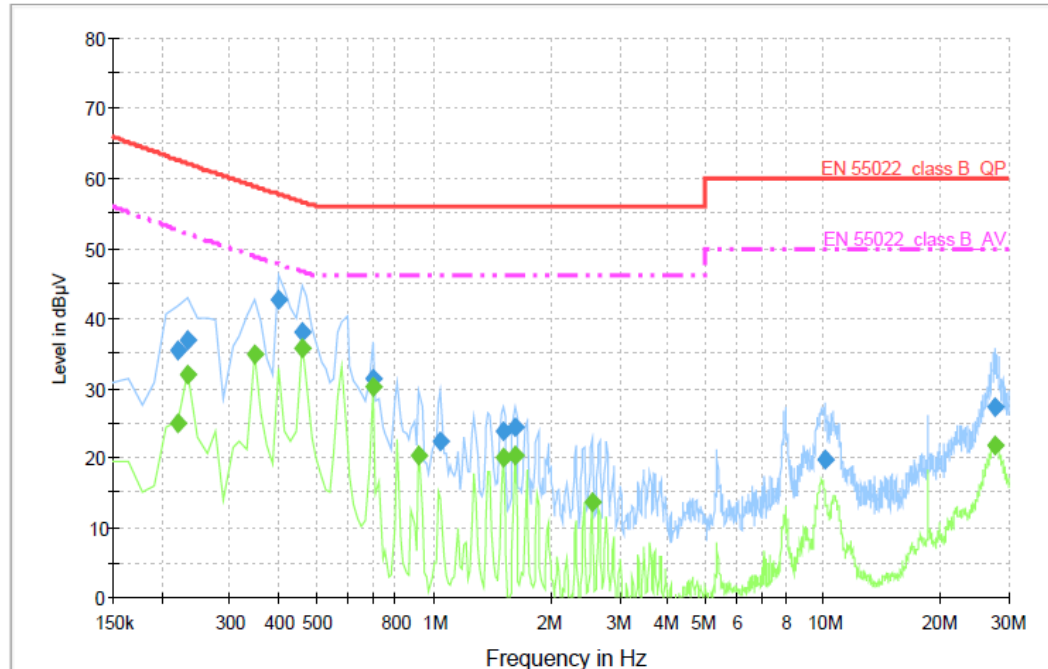
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	31.1	1000.000	9.000	GND	N	10.0	21.6	52.6	
0.234000	29.3	1000.000	9.000	GND	N	10.0	22.8	52.1	
0.346000	33.4	1000.000	9.000	GND	N	10.0	15.5	48.9	
0.570000	30.8	1000.000	9.000	GND	N	10.0	15.2	46.0	
0.682000	25.4	1000.000	9.000	GND	N	10.0	20.6	46.0	
0.906000	18.3	1000.000	9.000	GND	N	10.0	27.7	46.0	
1.354000	17.1	1000.000	9.000	GND	N	10.1	28.9	46.0	
1.690000	14.9	1000.000	9.000	GND	N	10.1	31.1	46.0	
9.684000	17.5	1000.000	9.000	GND	N	10.4	32.5	50.0	
27.520000	21.4	1000.000	9.000	GND	N	10.8	28.6	50.0	

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



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

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	35.3	1000.000	9.000	GND	L1	10.0	27.3	62.6	
0.234000	36.7	1000.000	9.000	GND	L1	10.0	25.4	62.1	
0.402000	42.6	1000.000	9.000	GND	L1	10.0	15.1	57.7	
0.458000	37.9	1000.000	9.000	GND	L1	10.0	18.8	56.7	
0.696000	31.4	1000.000	9.000	GND	L1	10.0	24.6	56.0	
1.046000	22.3	1000.000	9.000	GND	L1	10.0	33.7	56.0	
1.508000	23.9	1000.000	9.000	GND	L1	10.1	32.1	56.0	
1.620000	24.3	1000.000	9.000	GND	L1	10.1	31.7	56.0	
10.146000	19.7	1000.000	9.000	GND	L1	10.4	40.3	60.0	
27.688000	27.4	1000.000	9.000	GND	L1	11.4	32.6	60.0	

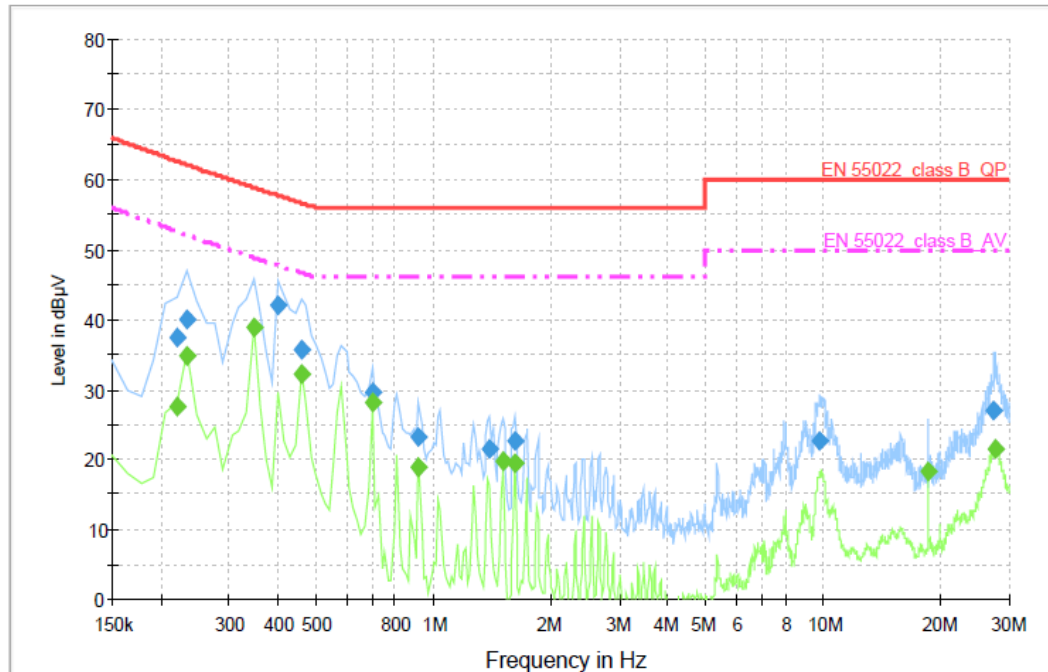
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	24.9	1000.000	9.000	GND	L1	10.0	27.7	52.6	
0.234000	32.0	1000.000	9.000	GND	L1	10.0	20.1	52.1	
0.346000	34.7	1000.000	9.000	GND	L1	10.0	14.2	48.9	
0.458000	35.7	1000.000	9.000	GND	L1	10.0	11.0	46.7	
0.696000	30.1	1000.000	9.000	GND	L1	10.0	15.9	46.0	
0.920000	20.2	1000.000	9.000	GND	L1	10.0	25.8	46.0	
1.508000	20.0	1000.000	9.000	GND	L1	10.1	26.0	46.0	
1.620000	20.3	1000.000	9.000	GND	L1	10.1	25.7	46.0	
2.544000	13.5	1000.000	9.000	GND	L1	10.1	32.5	46.0	
27.786000	21.6	1000.000	9.000	GND	L1	11.4	28.4	50.0	

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



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	37.5	1000.000	9.000	GND	N	10.0	25.1	62.6	
0.234000	39.9	1000.000	9.000	GND	N	10.0	22.2	62.1	
0.402000	42.0	1000.000	9.000	GND	N	10.0	15.7	57.7	
0.458000	35.6	1000.000	9.000	GND	N	10.0	21.1	56.7	
0.696000	29.6	1000.000	9.000	GND	N	10.0	26.4	56.0	
0.920000	23.0	1000.000	9.000	GND	N	10.0	33.0	56.0	
1.396000	21.4	1000.000	9.000	GND	N	10.1	34.6	56.0	
1.620000	22.7	1000.000	9.000	GND	N	10.1	33.3	56.0	
9.754000	22.6	1000.000	9.000	GND	N	10.4	37.4	60.0	
27.422000	26.8	1000.000	9.000	GND	N	10.8	33.2	60.0	

Final Measurement Detector 2

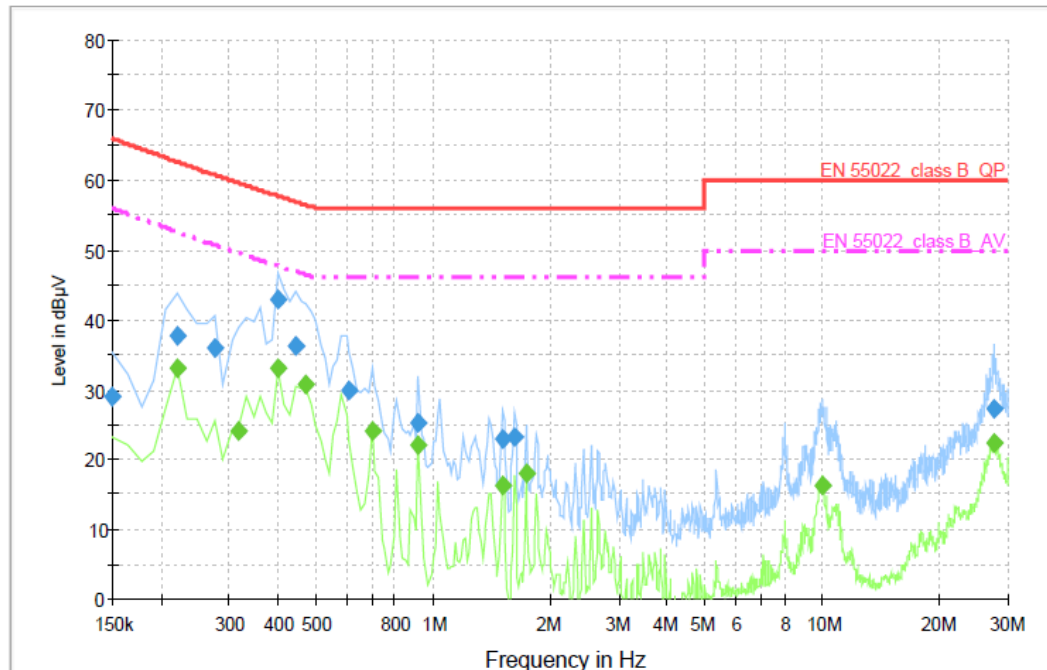
Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	27.5	1000.000	9.000	GND	N	10.0	25.1	52.6	
0.234000	34.9	1000.000	9.000	GND	N	10.0	17.2	52.1	
0.346000	38.8	1000.000	9.000	GND	N	10.0	10.1	48.9	
0.458000	32.1	1000.000	9.000	GND	N	10.0	14.6	46.7	
0.696000	28.1	1000.000	9.000	GND	N	10.0	17.9	46.0	
0.920000	19.0	1000.000	9.000	GND	N	10.0	27.0	46.0	
1.508000	19.6	1000.000	9.000	GND	N	10.1	26.4	46.0	
1.620000	19.4	1000.000	9.000	GND	N	10.1	26.6	46.0	
18.616000	18.3	1000.000	9.000	GND	N	10.7	31.7	50.0	
27.562000	21.5	1000.000	9.000	GND	N	10.8	28.5	50.0	

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



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

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	29.0	1000.000	9.000	GND	L1	10.0	37.0	66.0	
0.220000	37.6	1000.000	9.000	GND	L1	10.0	25.0	62.6	
0.276000	36.1	1000.000	9.000	GND	L1	10.0	24.6	60.7	
0.402000	42.9	1000.000	9.000	GND	L1	10.0	14.8	57.7	
0.444000	36.1	1000.000	9.000	GND	L1	10.0	20.8	56.9	
0.612000	29.9	1000.000	9.000	GND	L1	10.0	26.1	56.0	
0.920000	25.1	1000.000	9.000	GND	L1	10.0	30.9	56.0	
1.508000	22.9	1000.000	9.000	GND	L1	10.1	33.1	56.0	
1.620000	23.1	1000.000	9.000	GND	L1	10.1	32.9	56.0	
27.744000	27.2	1000.000	9.000	GND	L1	11.4	32.8	60.0	

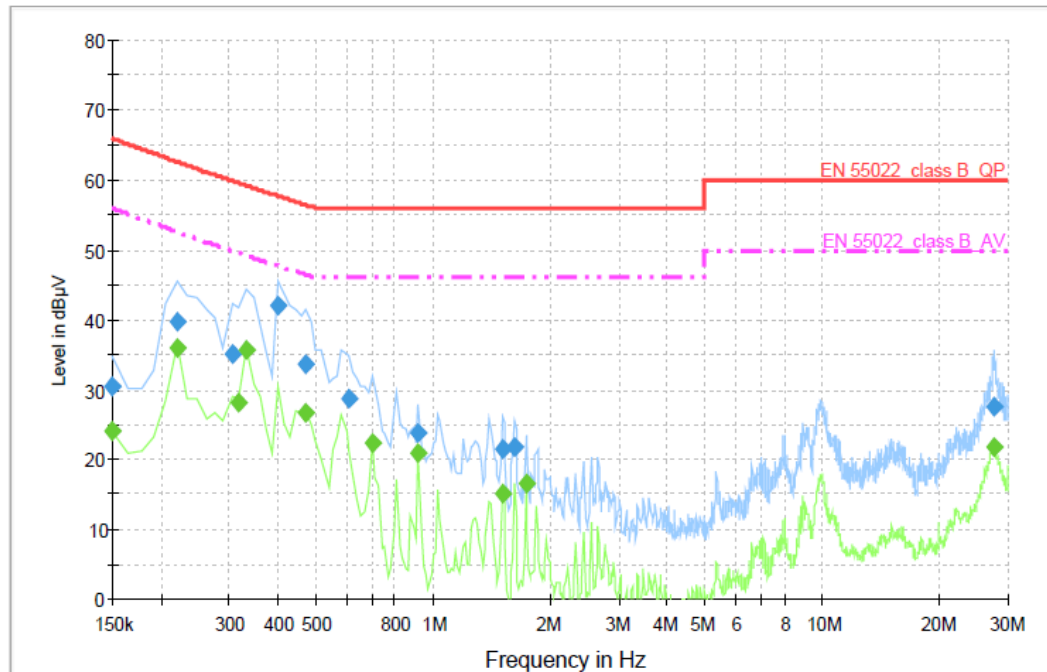
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	33.2	1000.000	9.000	GND	L1	10.0	19.4	52.6	
0.318000	24.0	1000.000	9.000	GND	L1	10.0	25.5	49.5	
0.402000	33.2	1000.000	9.000	GND	L1	10.0	14.5	47.7	
0.472000	30.6	1000.000	9.000	GND	L1	10.0	15.8	46.4	
0.696000	24.1	1000.000	9.000	GND	L1	10.0	21.9	46.0	
0.920000	22.1	1000.000	9.000	GND	L1	10.0	23.9	46.0	
1.508000	16.4	1000.000	9.000	GND	L1	10.1	29.6	46.0	
1.732000	18.1	1000.000	9.000	GND	L1	10.1	27.9	46.0	
10.006000	16.3	1000.000	9.000	GND	L1	10.4	33.7	50.0	
27.646000	22.3	1000.000	9.000	GND	L1	11.4	27.7	50.0	

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



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	30.3	1000.000	9.000	GND	N	10.0	35.7	66.0	
0.220000	39.8	1000.000	9.000	GND	N	10.0	22.8	62.6	
0.304000	35.0	1000.000	9.000	GND	N	10.0	24.9	59.9	
0.402000	42.2	1000.000	9.000	GND	N	10.0	15.5	57.7	
0.472000	33.6	1000.000	9.000	GND	N	10.0	22.8	56.4	
0.612000	28.7	1000.000	9.000	GND	N	10.0	27.4	56.0	
0.920000	23.9	1000.000	9.000	GND	N	10.0	32.1	56.0	
1.508000	21.6	1000.000	9.000	GND	N	10.1	34.4	56.0	
1.620000	21.9	1000.000	9.000	GND	N	10.1	34.1	56.0	
27.520000	27.5	1000.000	9.000	GND	N	10.8	32.5	60.0	

Final Measurement Detector 2

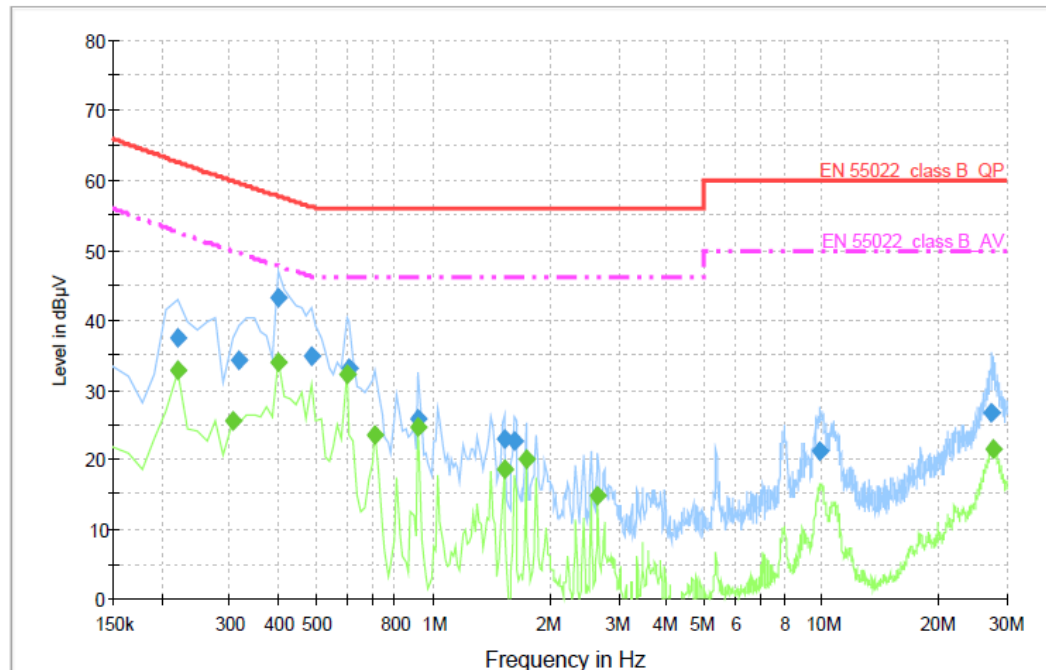
Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	24.1	1000.000	9.000	GND	N	10.0	31.9	56.0	
0.220000	36.0	1000.000	9.000	GND	N	10.0	16.6	52.6	
0.318000	28.2	1000.000	9.000	GND	N	10.0	21.3	49.5	
0.332000	35.7	1000.000	9.000	GND	N	10.0	13.5	49.2	
0.472000	26.7	1000.000	9.000	GND	N	10.0	19.7	46.4	
0.696000	22.3	1000.000	9.000	GND	N	10.0	23.7	46.0	
0.920000	20.9	1000.000	9.000	GND	N	10.0	25.1	46.0	
1.508000	15.0	1000.000	9.000	GND	N	10.1	31.0	46.0	
1.732000	16.6	1000.000	9.000	GND	N	10.1	29.4	46.0	
27.520000	21.7	1000.000	9.000	GND	N	10.8	28.3	50.0	

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



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

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	37.5	1000.000	9.000	GND	L1	10.0	25.1	62.6	
0.318000	34.2	1000.000	9.000	GND	L1	10.0	25.4	59.6	
0.402000	43.2	1000.000	9.000	GND	L1	10.0	14.5	57.7	
0.486000	34.7	1000.000	9.000	GND	L1	10.0	21.5	56.2	
0.612000	33.2	1000.000	9.000	GND	L1	10.0	22.8	56.0	
0.920000	25.8	1000.000	9.000	GND	L1	10.0	30.2	56.0	
1.522000	23.0	1000.000	9.000	GND	L1	10.1	33.0	56.0	
1.620000	22.7	1000.000	9.000	GND	L1	10.1	33.3	56.0	
9.936000	21.0	1000.000	9.000	GND	L1	10.4	39.0	60.0	
27.380000	26.7	1000.000	9.000	GND	L1	11.4	33.3	60.0	

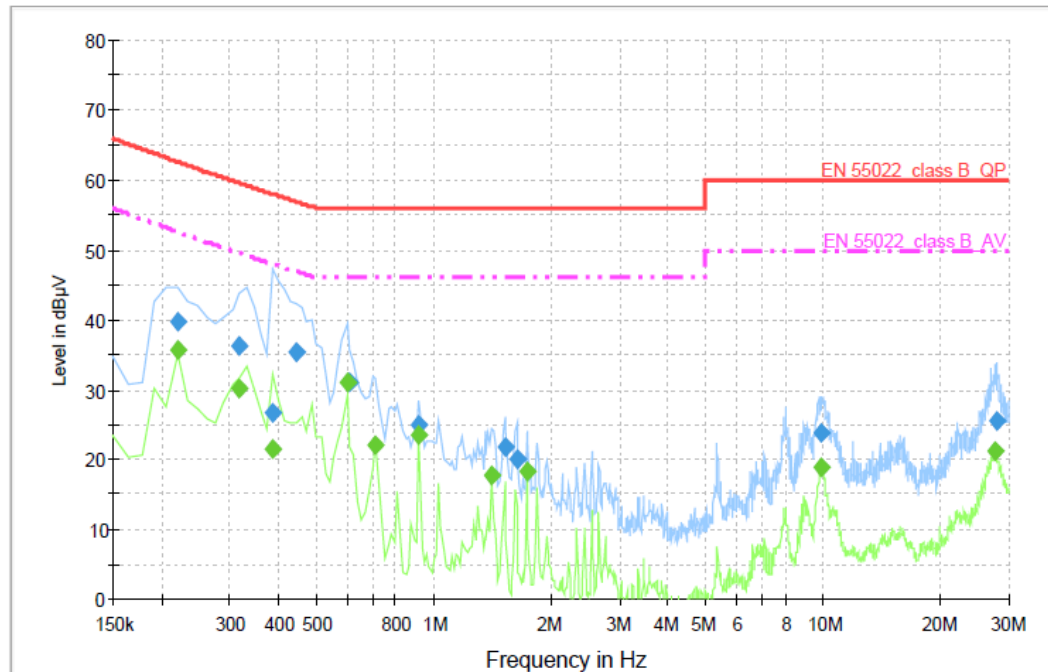
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	32.7	1000.000	9.000	GND	L1	10.0	19.9	52.6	
0.304000	25.6	1000.000	9.000	GND	L1	10.0	24.3	49.9	
0.402000	34.0	1000.000	9.000	GND	L1	10.0	13.7	47.7	
0.598000	32.1	1000.000	9.000	GND	L1	10.0	13.9	46.0	
0.710000	23.6	1000.000	9.000	GND	L1	10.0	22.4	46.0	
0.920000	24.6	1000.000	9.000	GND	L1	10.0	21.4	46.0	
1.522000	18.5	1000.000	9.000	GND	L1	10.1	27.5	46.0	
1.732000	19.9	1000.000	9.000	GND	L1	10.1	26.1	46.0	
2.656000	14.7	1000.000	9.000	GND	L1	10.1	31.3	46.0	
27.562000	21.5	1000.000	9.000	GND	L1	11.4	28.5	50.0	

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



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.220000	39.8	1000.000	9.000	GND	N	10.0	22.8	62.6	
0.318000	36.2	1000.000	9.000	GND	N	10.0	23.4	59.6	
0.388000	26.6	1000.000	9.000	GND	N	10.0	31.4	58.0	
0.444000	35.4	1000.000	9.000	GND	N	10.0	21.5	56.9	
0.612000	31.0	1000.000	9.000	GND	N	10.0	25.0	56.0	
0.920000	24.9	1000.000	9.000	GND	N	10.0	31.1	56.0	
1.522000	21.6	1000.000	9.000	GND	N	10.1	34.4	56.0	
1.634000	19.9	1000.000	9.000	GND	N	10.1	36.1	56.0	
9.866000	23.8	1000.000	9.000	GND	N	10.4	36.2	60.0	
27.968000	25.4	1000.000	9.000	GND	N	10.8	34.6	60.0	

Final Measurement Detector 2

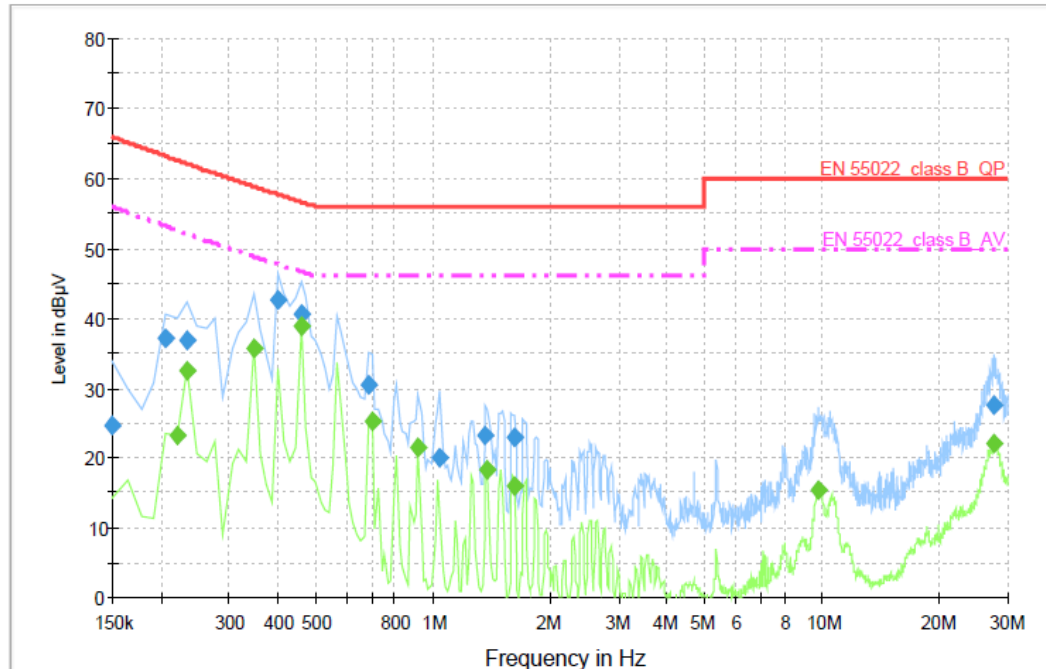
Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.220000	35.7	1000.000	9.000	GND	N	10.0	16.9	52.6	
0.318000	30.2	1000.000	9.000	GND	N	10.0	19.3	49.5	
0.388000	21.5	1000.000	9.000	GND	N	10.0	26.4	47.9	
0.598000	30.9	1000.000	9.000	GND	N	10.0	15.1	46.0	
0.710000	21.9	1000.000	9.000	GND	N	10.0	24.1	46.0	
0.920000	23.5	1000.000	9.000	GND	N	10.0	22.5	46.0	
1.410000	17.7	1000.000	9.000	GND	N	10.1	28.3	46.0	
1.732000	18.2	1000.000	9.000	GND	N	10.1	27.8	46.0	
9.866000	19.0	1000.000	9.000	GND	N	10.4	31.0	50.0	
27.506000	21.1	1000.000	9.000	GND	N	10.8	28.9	50.0	

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



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

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	24.5	1000.000	9.000	GND	L1	10.0	41.5	66.0	
0.206000	37.0	1000.000	9.000	GND	L1	10.0	26.2	63.2	
0.234000	36.7	1000.000	9.000	GND	L1	10.0	25.4	62.1	
0.402000	42.7	1000.000	9.000	GND	L1	10.0	15.0	57.7	
0.458000	40.5	1000.000	9.000	GND	L1	10.0	16.2	56.7	
0.682000	30.3	1000.000	9.000	GND	L1	10.0	25.7	56.0	
1.046000	20.0	1000.000	9.000	GND	L1	10.0	36.0	56.0	
1.368000	23.1	1000.000	9.000	GND	L1	10.1	32.9	56.0	
1.620000	22.8	1000.000	9.000	GND	L1	10.1	33.2	56.0	
27.632000	27.5	1000.000	9.000	GND	L1	11.4	32.5	60.0	

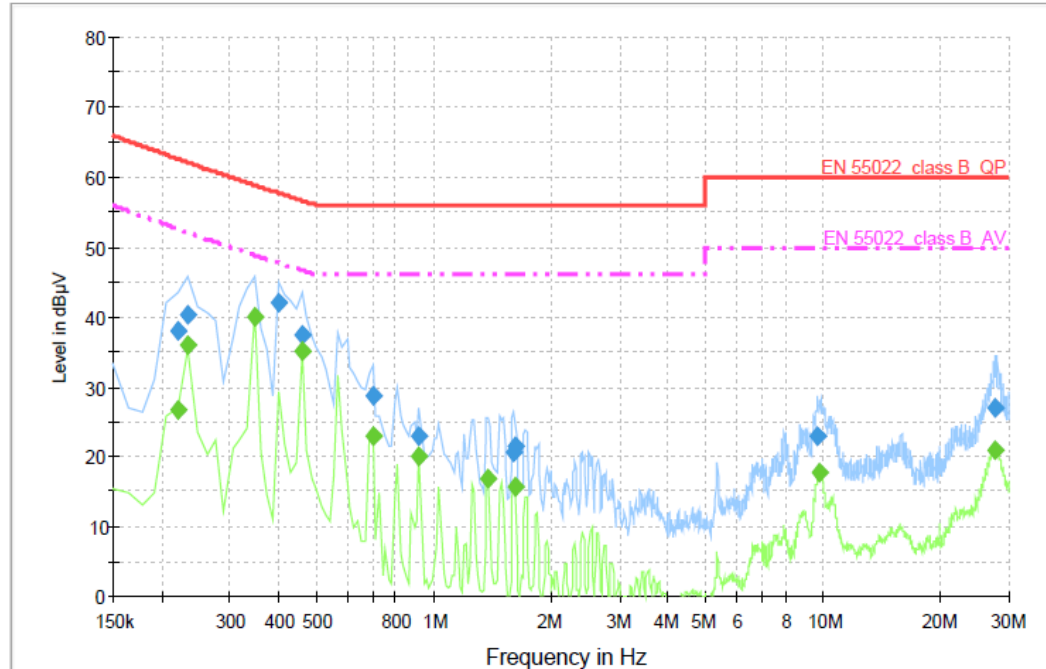
Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.220000	23.2	1000.000	9.000	GND	L1	10.0	29.4	52.6	
0.234000	32.5	1000.000	9.000	GND	L1	10.0	19.6	52.1	
0.346000	35.7	1000.000	9.000	GND	L1	10.0	13.2	48.9	
0.458000	38.8	1000.000	9.000	GND	L1	10.0	7.9	46.7	
0.696000	25.2	1000.000	9.000	GND	L1	10.0	20.8	46.0	
0.920000	21.3	1000.000	9.000	GND	L1	10.0	24.7	46.0	
1.382000	18.3	1000.000	9.000	GND	L1	10.1	27.7	46.0	
1.620000	16.0	1000.000	9.000	GND	L1	10.1	30.0	46.0	
9.824000	15.3	1000.000	9.000	GND	L1	10.4	34.7	50.0	
27.716000	21.9	1000.000	9.000	GND	L1	11.4	28.1	50.0	

< Fig 12. Conducted emission result (Live line) >



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.220000	38.1	1000.000	9.000	GND	N	10.0	24.5	62.6	
0.234000	40.2	1000.000	9.000	GND	N	10.0	21.9	62.1	
0.402000	42.2	1000.000	9.000	GND	N	10.0	15.5	57.7	
0.458000	37.4	1000.000	9.000	GND	N	10.0	19.3	56.7	
0.696000	28.7	1000.000	9.000	GND	N	10.0	27.3	56.0	
0.920000	22.8	1000.000	9.000	GND	N	10.0	33.2	56.0	
1.606000	20.5	1000.000	9.000	GND	N	10.1	35.5	56.0	
1.620000	21.5	1000.000	9.000	GND	N	10.1	34.5	56.0	
9.684000	23.0	1000.000	9.000	GND	N	10.4	37.0	60.0	
27.660000	26.8	1000.000	9.000	GND	N	10.8	33.2	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.220000	26.7	1000.000	9.000	GND	N	10.0	25.9	52.6	
0.234000	36.0	1000.000	9.000	GND	N	10.0	16.1	52.1	
0.346000	40.1	1000.000	9.000	GND	N	10.0	8.8	48.9	
0.458000	35.0	1000.000	9.000	GND	N	10.0	11.7	46.7	
0.696000	22.8	1000.000	9.000	GND	N	10.0	23.2	46.0	
0.920000	19.9	1000.000	9.000	GND	N	10.0	26.1	46.0	
1.382000	16.7	1000.000	9.000	GND	N	10.1	29.3	46.0	
1.620000	15.7	1000.000	9.000	GND	N	10.1	30.3	46.0	
9.838000	17.7	1000.000	9.000	GND	N	10.4	32.3	50.0	
27.758000	21.0	1000.000	9.000	GND	N	10.8	29.0	50.0	

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



6. Radiated Emission

6.1 Operating Environment

Temperature : 24.0 °C
Relative Humidity : 45.0 % 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 levels of 95 % ($k = 2$)
Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)	± 3.50 dB	Confidence levels of 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)	± 3.75 dB	Confidence levels of 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal)	± 3.59 dB	Confidence levels of 95 % ($k = 2$)



6.4 Limit

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

6.5 Test Equipment used

Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESIB26	Rohde & Schwarz	EMI Test Receiver	830482/010	12. 11. 2011
■ - VULB9160	Schwarzbeck	Broadband Test Antenna	3193	03. 15. 2012
■ - 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

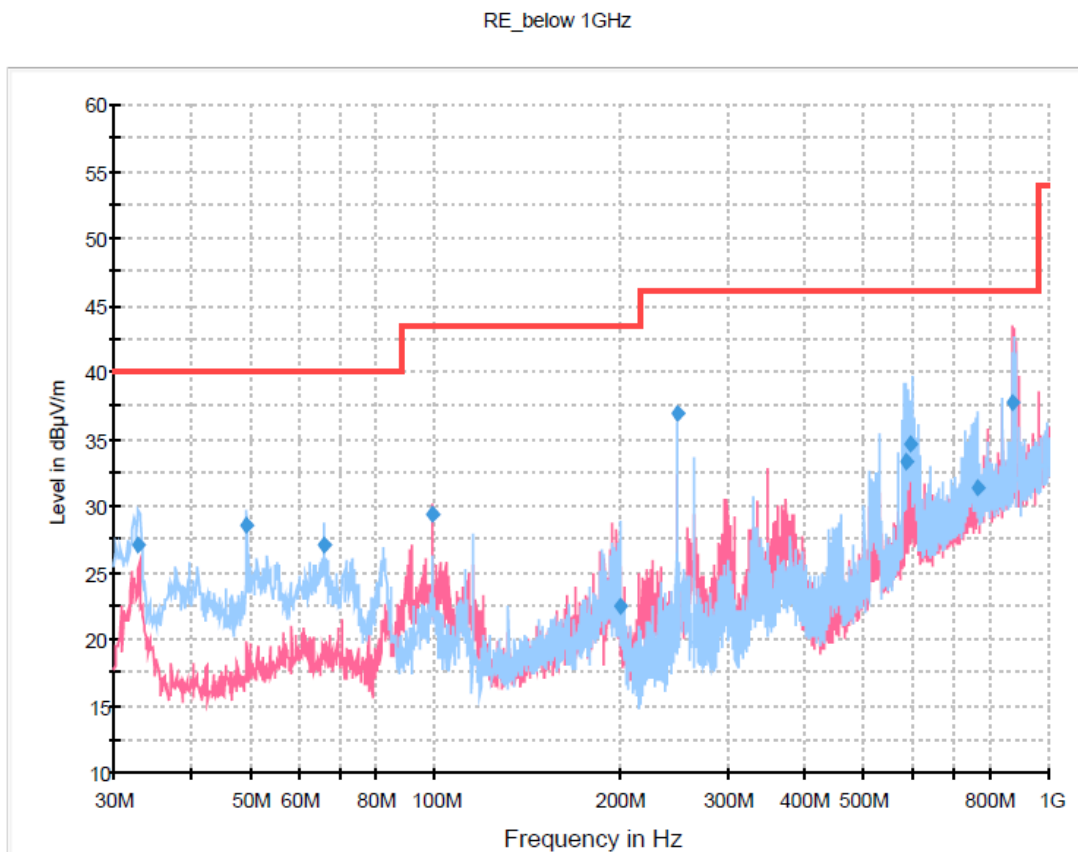
6.6 Test data for Radiated Emission

- Test Date : November 8, 2010 ~ September 19, 2011
- Resolution Bandwidth : 120 kHz / 1 MHz
- Detector Mode : Quasi-Peak detector mode / Peak detector mode, Average detector mode
- Measurement Distance : 3 m
- Note :

Test mode	Clock & tune frequency	Test frequency
RGB (Analog) mode	400 MHz	30 MHz to 2 GHz
HDMI (Digital) mode	1.2 GHz	30 MHz to 6 GHz
DP (Digital) mode	2.7 GHz	30 MHz to 18 GHz



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (RGB: Analog)
Red trace: Vertical polarization, Blue trace: Horizontal polarization



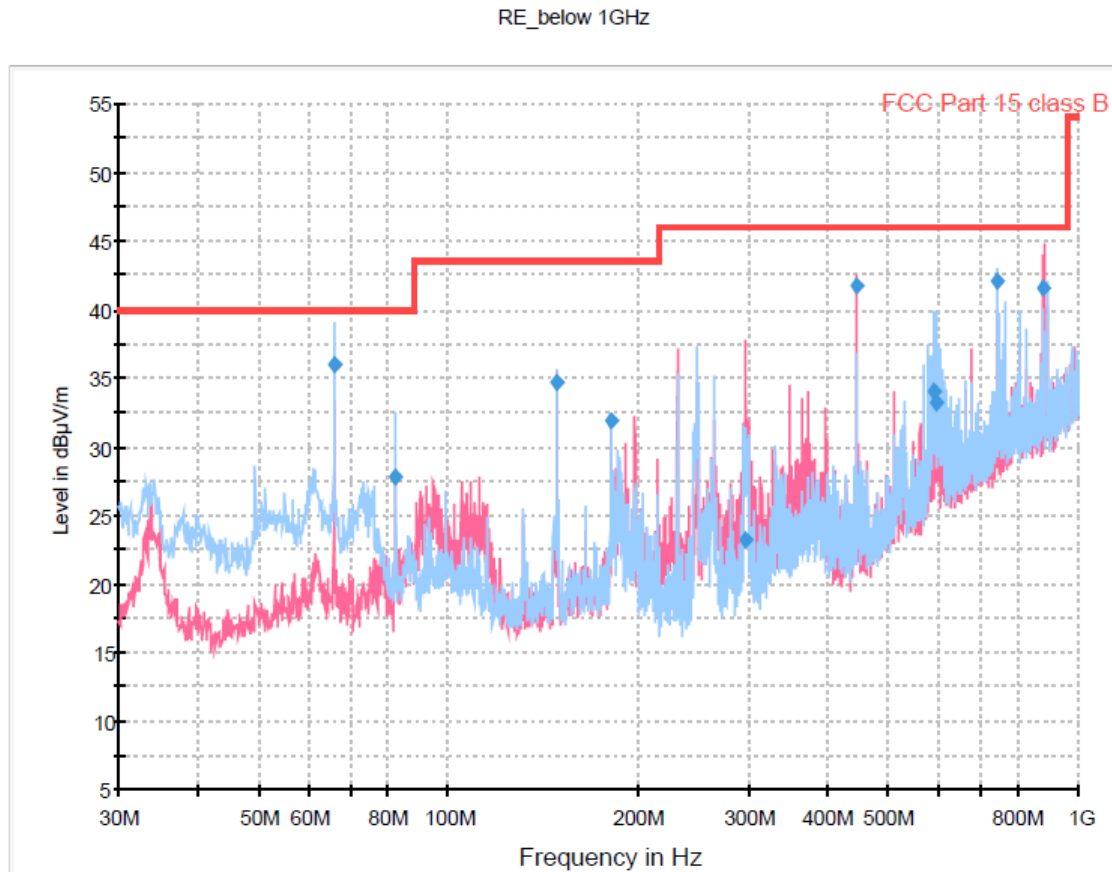
Final Result [1]

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
32.970000	27.0	1000.0	120.000	100.0	H	280.0	11.5	13.00	40.00
49.501250	28.5	1000.0	120.000	100.0	H	315.0	13.2	11.50	40.00
65.991250	27.1	1000.0	120.000	100.0	H	171.0	12.0	12.90	40.00
99.011250	29.3	1000.0	120.000	200.0	V	256.0	11.1	10.70	43.50
200.261250	22.5	1000.0	120.000	100.0	H	51.0	11.8	17.50	43.50
247.502500	36.9	1000.0	120.000	200.0	H	187.0	14.3	10.10	46.00
584.166250	33.4	1000.0	120.000	100.0	H	0.0	24.6	13.60	46.00
596.111250	34.6	1000.0	120.000	100.0	H	8.0	24.9	12.40	46.00
762.100000	31.3	1000.0	120.000	100.0	H	0.0	28.0	15.70	46.00
874.045000	37.7	1000.0	120.000	200.0	V	8.0	29.5	9.30	46.00

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



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (HDMI: Digital)
Red trace: Vertical polarization, Blue trace: Horizontal polarization



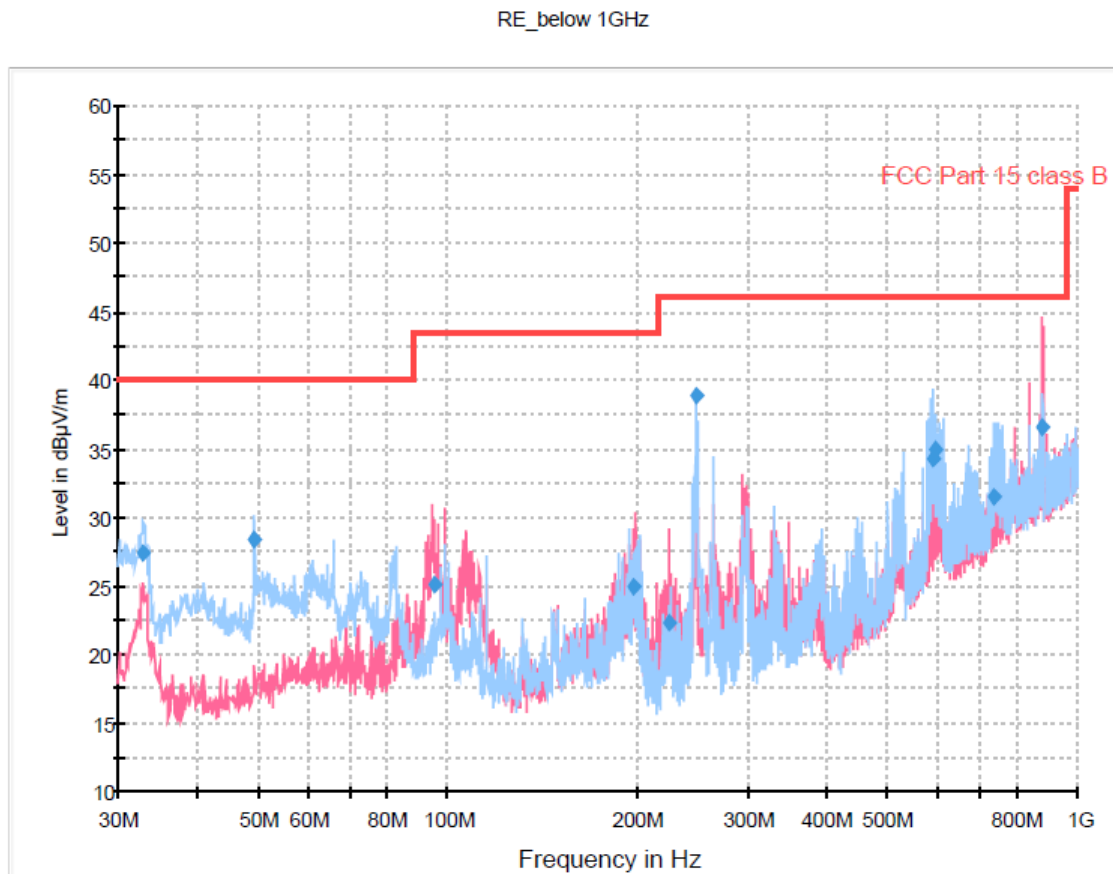
Final Result _1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
65.991250	36.0	1000.0	120.000	100.0	H	268.0	12.0	4.00	40.00
82.521250	27.7	1000.0	120.000	100.0	H	98.0	9.2	12.30	40.00
148.481250	34.6	1000.0	120.000	100.0	H	49.0	14.9	8.90	43.50
181.501250	31.9	1000.0	120.000	100.0	H	164.0	13.1	11.60	43.50
297.012500	23.2	1000.0	120.000	200.0	H	268.0	16.7	22.80	46.00
445.503750	41.8	1000.0	120.000	100.0	V	177.0	19.7	4.20	46.00
590.477500	34.0	1000.0	120.000	100.0	H	5.0	24.8	12.00	46.00
595.922500	33.2	1000.0	120.000	100.0	H	5.0	24.9	12.80	46.00
742.486250	42.0	1000.0	120.000	200.0	H	268.0	27.6	4.00	46.00
880.878750	41.6	1000.0	120.000	100.0	V	312.0	29.6	4.40	46.00

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



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (DP: Digital)
Red trace: Vertical polarization, Blue trace: Horizontal polarization



Final Result _1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
32.970000	27.4	1000.0	120.000	100.0	H	303.0	11.5	12.60	40.00
49.501250	28.3	1000.0	120.000	100.0	H	0.0	13.2	11.70	40.00
95.646250	25.1	1000.0	120.000	200.0	V	315.0	10.4	18.40	43.50
197.995000	24.9	1000.0	120.000	100.0	V	332.0	11.9	18.60	43.50
225.272500	22.3	1000.0	120.000	100.0	V	222.0	13.1	23.70	46.00
247.502500	38.8	1000.0	120.000	200.0	H	200.0	14.3	7.20	46.00
587.808750	34.3	1000.0	120.000	100.0	H	0.0	24.7	11.70	46.00
595.498750	34.9	1000.0	120.000	100.0	H	7.0	24.9	11.10	46.00
734.001250	31.5	1000.0	120.000	100.0	H	0.0	27.4	14.50	46.00
880.910000	36.6	1000.0	120.000	100.0	V	114.0	29.6	9.40	46.00

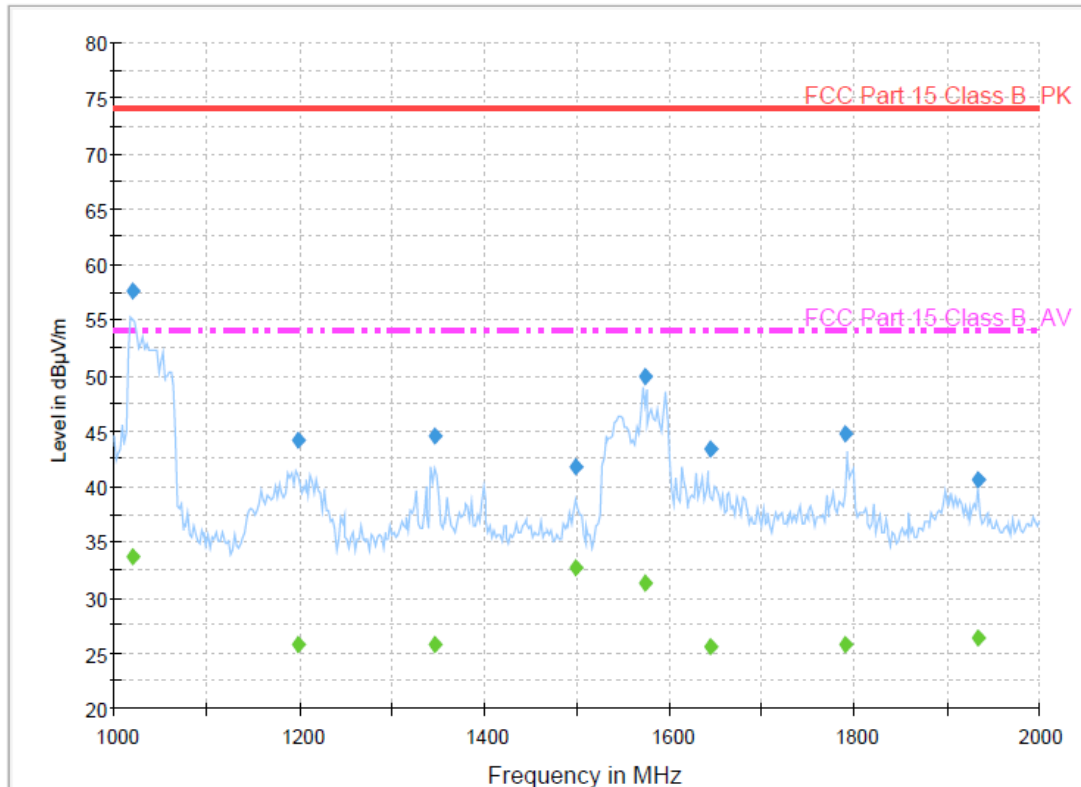
< Fig 16. Radiated emission result (30 MHz ~ 1 000 MHz) >



◆ Operating Condition: 1 920 × 1080 / 60 Hz (RGB: Analog)

Green trace: Average detector, Blue trace: Peak detector

Radiated emission_above 1GHz-6GHz



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)
1020.236072	57.6	1000.0	1000.000	100.0	V	197.0	-14.4	16.4	74.0
1199.392786	44.3	1000.0	1000.000	126.0	V	221.0	-14.1	29.8	74.0
1346.885371	44.6	1000.0	1000.000	100.0	V	225.0	-13.4	29.4	74.0
1499.997996	41.7	1000.0	1000.000	100.0	V	198.0	-13.2	32.3	74.0
1574.542285	49.9	1000.0	1000.000	100.0	H	183.0	-12.8	24.1	74.0
1644.682565	43.4	1000.0	1000.000	150.0	V	178.0	-12.6	30.6	74.0
1790.583166	44.8	1000.0	1000.000	100.0	V	234.0	-12.0	29.2	74.0
1934.067735	40.7	1000.0	1000.000	116.0	H	197.0	-11.8	33.3	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)
1020.236072	33.7	1000.0	1000.000	100.0	V	197.0	-14.4	20.3	54.0
1199.392786	25.8	1000.0	1000.000	126.0	V	221.0	-14.1	28.2	54.0
1346.885371	25.7	1000.0	1000.000	100.0	V	225.0	-13.4	28.3	54.0
1499.997996	32.6	1000.0	1000.000	100.0	V	198.0	-13.2	21.4	54.0
1574.542285	31.3	1000.0	1000.000	100.0	H	183.0	-12.8	22.7	54.0
1644.682565	25.5	1000.0	1000.000	150.0	V	178.0	-12.6	28.5	54.0
1790.583166	25.8	1000.0	1000.000	100.0	V	234.0	-12.0	28.2	54.0
1934.067735	26.4	1000.0	1000.000	116.0	H	197.0	-11.8	27.6	54.0

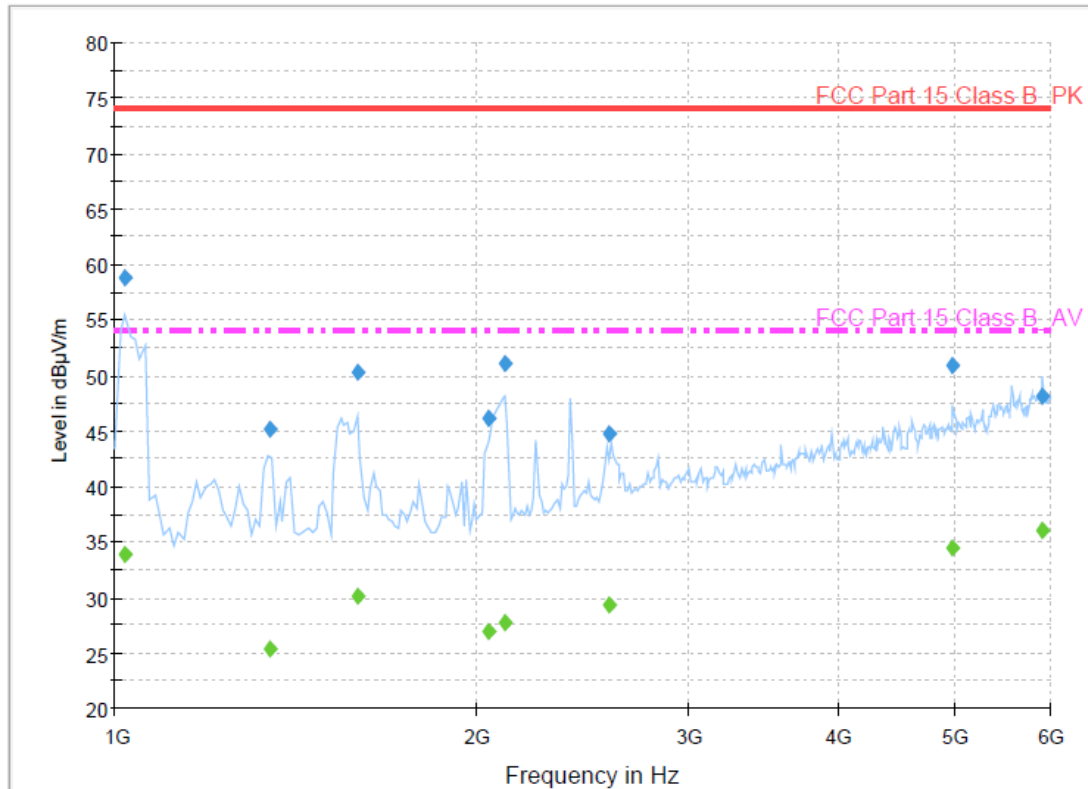
< Fig 17. Radiated emission result (1 000 MHz ~ 2 000 MHz) >



◆ Operating Condition: 1 920 × 1080 / 60 Hz (HDMI: Digital)

Green trace: Average detector, Blue trace: Peak detector

Radiated emission_above 1GHz-6GHz



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)
1021.440080	58.7	1000.0	1000.000	100.0	V	201.0	-14.4	15.3	74.0
1343.681363	45.1	1000.0	1000.000	100.0	V	186.0	-13.4	28.9	74.0
1593.382365	50.4	1000.0	1000.000	100.0	H	179.0	-12.7	23.6	74.0
2042.684168	46.2	1000.0	1000.000	100.0	H	179.0	-11.3	27.8	74.0
2110.824449	51.0	1000.0	1000.000	188.0	H	125.0	-10.9	23.0	74.0
2581.766333	44.7	1000.0	1000.000	100.0	H	131.0	-8.6	29.3	74.0
4977.355912	50.9	1000.0	1000.000	127.0	V	220.0	-0.8	23.1	74.0
5912.019639	48.2	1000.0	1000.000	100.0	H	190.0	1.9	25.8	74.0

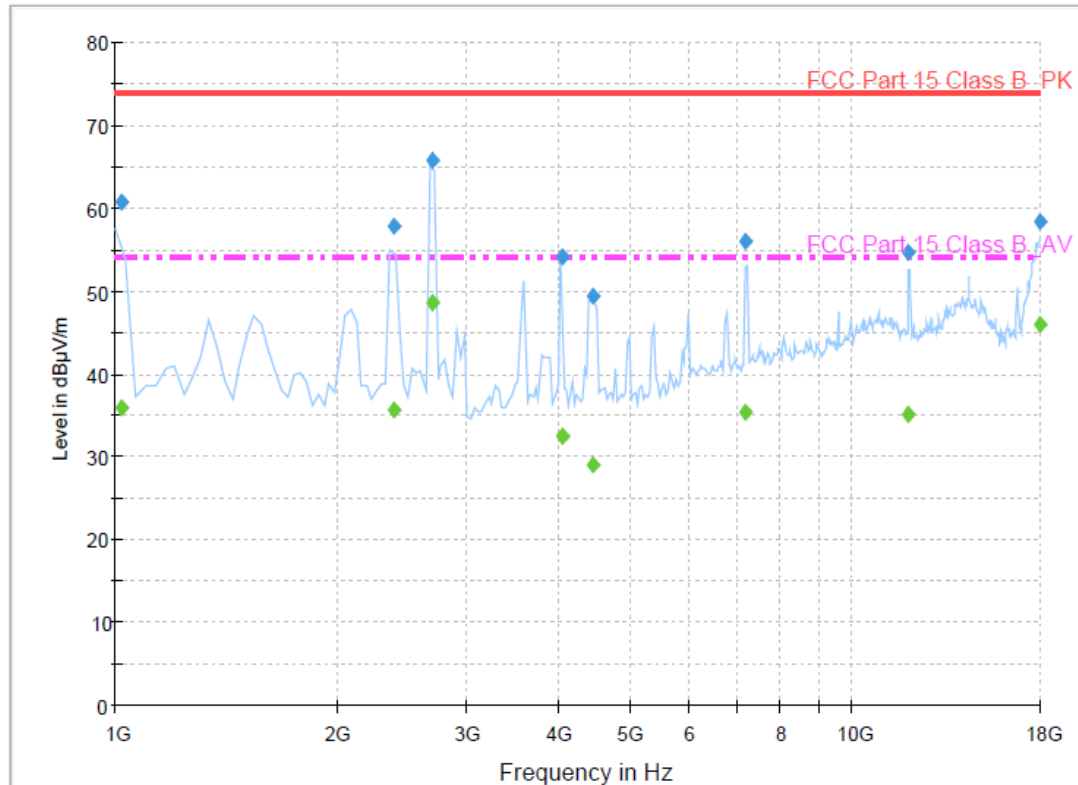
Final Result 2

Frequency (MHz)	CAverage (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1021.440080	33.8	1000.0	1000.000	100.0	V	201.0	-14.4	20.2	54.0
1343.681363	25.3	1000.0	1000.000	100.0	V	186.0	-13.4	28.7	54.0
1593.382365	30.1	1000.0	1000.000	100.0	H	179.0	-12.7	23.9	54.0
2042.684168	27.0	1000.0	1000.000	100.0	H	179.0	-11.3	27.0	54.0
2110.824449	27.8	1000.0	1000.000	188.0	H	125.0	-10.9	26.2	54.0
2581.766333	29.4	1000.0	1000.000	100.0	H	131.0	-8.6	24.6	54.0
4977.355912	34.4	1000.0	1000.000	127.0	V	220.0	-0.8	19.6	54.0
5912.019639	36.1	1000.0	1000.000	100.0	H	190.0	1.9	17.9	54.0

< Fig 18. Radiated emission result (1 000 MHz ~ 6 000 MHz) >



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (DP: Digital)
Green marker: Average detector, Blue marker: Peak detector
Radiated emission_above 1GHz-18GHz



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)
1020.000000	60.8	1000.0	1000.000	100.0	V	197.0	-12.3	13.2	74.0
2387.325451	57.8	1000.0	1000.000	126.0	H	192.0	-10.3	16.2	74.0
2694.338677	65.8	1000.0	1000.000	100.0	V	173.0	-9.8	8.2	74.0
4050.264128	54.3	1000.0	1000.000	100.0	V	142.0	-6.9	19.7	74.0
4463.149900	49.3	1000.0	1000.000	100.0	V	182.0	-5.9	24.7	74.0
7181.000802	56.0	1000.0	1000.000	199.0	V	354.0	2.3	18.0	74.0
11935.671743	54.7	1000.0	1000.000	150.0	V	327.0	10.4	19.3	74.0
17997.400000	58.3	1000.0	1000.000	150.0	H	228.0	21.2	15.7	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)
1020.000000	35.8	1000.0	1000.000	100.0	V	197.0	-12.3	18.2	54.0
2387.325451	35.8	1000.0	1000.000	126.0	H	192.0	-10.3	18.2	54.0
2694.338677	48.6	1000.0	1000.000	100.0	V	173.0	-9.8	5.4	54.0
4050.264128	32.4	1000.0	1000.000	100.0	V	142.0	-6.9	21.6	54.0
4463.149900	28.9	1000.0	1000.000	100.0	V	182.0	-5.9	25.1	54.0
7181.000802	35.3	1000.0	1000.000	199.0	V	354.0	2.3	18.7	54.0
11935.671743	35.1	1000.0	1000.000	150.0	V	327.0	10.4	18.9	54.0
17997.400000	45.9	1000.0	1000.000	150.0	H	228.0	21.2	8.1	54.0

< Fig 19. Radiated emission result (1 000 MHz ~ 18 000 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. Digital Signage Display (Model Name: HSTND-3101-G, LD4201)** was complies with §15.107 and 15.109 of the FCC Rules.