

Application for FCC Certificate
On Behalf of
Hisense Electric Co., Ltd.

LED LCD TV

Model No.	Brand
55K2203W 55H5C 55H5C+	Hisense

FCC ID: W9HLCDF0090

Prepared For : Hisense Electric Co., Ltd.
No.218 Qianwangang Road, Economy & Technology
Development Zone, Qingdao, China

Prepared By : Audix Technology (Shanghai) Co., Ltd.
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Report No. : ACI-F16035A1
Date of Test : Jul 07- 13, 2016
Date of Report : Jul 21, 2016

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TEST REPORT FOR FCC CERTIFICATE

Applicant : Hisense Electric Co., Ltd.
Manufacturer : Hisense Electric Co., Ltd.
Factory #1 : Hisense Electric Co., Ltd.
Factory #2 : Tatung Mexico S.A. de C.V.
Factory #3 : HISENSE ELECTRONICA MEXICO, S.A. DE C.V.
EUT Description : LED LCD TV

Model No.	Brand	Power Supply
Refer to Sec.2.1	Hisense	120V/60Hz

Test Procedure Used:

*FCC RULES AND REGULATIONS PART 15 SUBPART B CLASS B OCTOBER 2015
AND ANSI C63.4-2014*

The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart B (Class B) limits both radiated and conducted emissions.

The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. This report shows that the EUT (M/N: Refer to Sec2.1) which was tested in 3m anechoic chamber Jul 07- 13, 2016 is technically compliance with the FCC official limits also.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.

This report contains data that are not covered by the NVLAP accreditation.


This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

The test results for EUT's TV functions are contained in No.F16034A1, a Verification report.

Date of Test : Jul 07- 13, 2016 Date of Report : Jul 21, 2016

Producer : Tina Liang
TINA LIANG / Assistant

Review : Byron Wu
BYRON WU / Deputy Assistant Manager

 For and on behalf of
Audix Technology (Shanghai) Co., Ltd.

Signatory : Sammy Chen
Authorized Signature EMC SAMMY CHEN / Manager

1 SUMMARY OF STANDARDS AND RESULTS

1.1 Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Description of Test Item	Standard	Limits	Results
EMISSION			
Conducted Disturbance at the Mains Terminal	FCC RULES AND REGULATIONS PART 15 SUBPART B OCTOBER 2015 AND ANSI C63.4-2014	15.107(a) Class B	Pass
Radiated Disturbance	FCC RULES AND REGULATIONS PART 15 SUBPART B OCTOBER 2015 AND ANSI C63.4-2014	15.109(a) Class B	Pass

2 GENERAL INFORMATION

2.1 Description of Equipment Under Test

Description : LED LCD TV

Type of EUT : ☒ Production ☐ Pre-product ☐ Pro-type

Model No : 55K2203W, 55H5C, 55H5C+

Note#1 : The above models are all the same except for model number. 55K2203W model is tested and recorded in the report.

Note#2 : “+ ” represents any numerals, for different sales area

Brand : Hisense

Note #3 : The modified histories of report are as follows:

Report No.	Model No.	Rev. Summary	Edition No.	Data of Rev.
ACI-F16035	55K2203W, 55H5C, 55H5C+	Original Report	0	Jan 29, 2016
ACI-F16035A1	55K2203W, 55H5C, 55H5C+	1. To change the Panel 2. To update the standard ANSI C63.4.	Rev. A1	Jul 21, 2016

Applicant : Hisense Electric Co., Ltd.
No.218 Qianwangang Road, Economy & Technology Development Zone, Qingdao, China

Manufacturer : same as Applicant

Factory #1 : same as Applicant

Factory #2 : Tatung Mexico S.A. de C.V.
Miguel Catalán 420, Parque Industrial Rio Bravo,
Cd. Juarez, Chih., CP 32557

Factory #3 : HISENSE ELECTRONICA MEXICO, S.A.DE C.V.
Blvd. Sharp #3510 Parque Industrial Rosarito,
C.P. 22710 Playas de Rosarito, B.C.

LCD Panel : Manufacturer : Hisense
M/N : HD550DF-E32

Tuner : Manufacturer : XuGuang Tech. Co., Ltd.
M/N : HFT-96S3/W11FJ4H\ROH

Max Resolution : 1920*1080@60Hz

HDMI Cable*3 (Lab provide)	:	Shielded, Detachable, 1.50m
Power Cord	:	Unshielded, Detachable, 1.80m, 2C
LAN Cable	:	Unshielded, Detachable, 1.50m
USB Cable*2	:	Shielded, Detachable, 1.00m

Remark:

The EUT is a LED LCD TV which input/output ports as follows:

Side Port:

(1) One ANT Port

: Connected with ATSC SG/TV SG

(2) One HDMI1 Port

: Connected with DVD PLAYER #2

(3) One HDMI 2 Port

: Connected with PC

(4) One USB #1 Port

: Connected with Hard-Disk #1

(5) One USB #2 Port

: Connected with Hard-Disk #2

(6) One Debug Port

: Do not open to the customers

(7) One AUDIO OUT Port

: Connected with Earphone #1

Back Port:

(8) One COMPONENT IN/AV IN Port

: Connected with DVD PLAYER #1

(9) One LAN Port

: Connected with PC

(10) One DIGITAL AUDIO OUT Port

: Connected with Audio Converter to Earphone

(11) One HDMI3 Port

: Connected with DVD PLAYER #1

2.2 Peripherals

2.2.1 PC

Manufacturer	:	HP
Model Number	:	dx7400MT
Serial Number	:	CNG8130K89
Power Cord	:	Unshielded, Detachable, 1.8m
Certificate	:	FCC DoC; CE/EMC; VCCI; C-Tick;

2.2.2 Keyboard

Manufacturer : Microsoft
Model Number : RT2300
Serial Number : 7668200662248
Data Cable : Shielded, Detachable, 1.5m
Certificate : CE/EMC, FCC DoC, VCCI, MIC,
C-Tick, BSMI

2.2.3 Mouse

Manufacturer : Microsoft
Model Number : RT2300
Serial Number : 6965712071551
Data Cable : Shielded, Detachable, 1.5m.
Certificate : CE/EMC, FCC DoC, VCCI, MIC,
C-Tick, BSMI

2.2.4 Modem

Manufacturer : TP-LINK
Model Number : TM-EC5658V
Serial Number : 07123301053
Data Cable : Shielded, Detachable, 1.5m
Certificate : CCC

2.2.5 Earphone *2

Manufacturer : audio-technica
Model Number : ATH-CKL200

2.2.6 TV Signal Generator

Manufacturer : FLUKE
Model Number : 54200M01
Serial Number : 814008

2.2.7 ATSC Signal Generator

Manufacturer : SENCORE
Model Number : ATSC997
Serial Number : 6790071

2.2.8 DVD PLAYER #1

Manufacturer : PHILIPS
Model Number : DVP3986K/93
Serial Number : KX1A0902120108
Certificate : CCC

2.2.9 DVD PLAYER #2

Manufacturer : PHILIPS
Model Number : DVP3986K/93
Serial Number : KX1A0902120082
Certificate : CCC

2.2.10 Hard Disk #1

Manufacturer : Tetasys
Model Number : F12
Serial Number : A010022-4860010X
Data Cable : Shielded, Detachable, 1.5m
Certificate : CE, FCC DoC

2.2.11 Hard Disk #2

Manufacturer : Tetasys
Model Number : F12
Serial Number : A010022-4860010X
Data Cable : Shielded, Detachable, 1.5m.
Certificate : CE, FCC DoC

2.3 Description of Test Facility

Site Description : Sept. 17, 1998 file on
(No.3 3m Chamber) Jan.15, 2015 Renewed
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046, USA

Name of Firm : Audix Technology (Shanghai) Co., Ltd.

Site Location : 3F 34Bldg 680 Guiping Rd,
Caohejing Hi-Tech Park,
Shanghai 200233, China

NVLAP Lab Code : 200371-0

2.4 Measurement Uncertainty

Conducted Emission Expanded Uncertainty : U = 3.4dB

Radiated Emission Expanded Uncertainty (30-200MHz):
U = 4.6dB (Horizontal)
U = 4.3dB (Vertical)

Radiated Emission Expanded Uncertainty (200M-1GHz):
U = 4.5dB (Horizontal)
U = 5.4dB (Vertical)

Radiated Emission Expanded Uncertainty (1GHz-6GHz):
U = 5.1dB

3 CONDUCTED EMISSION TEST

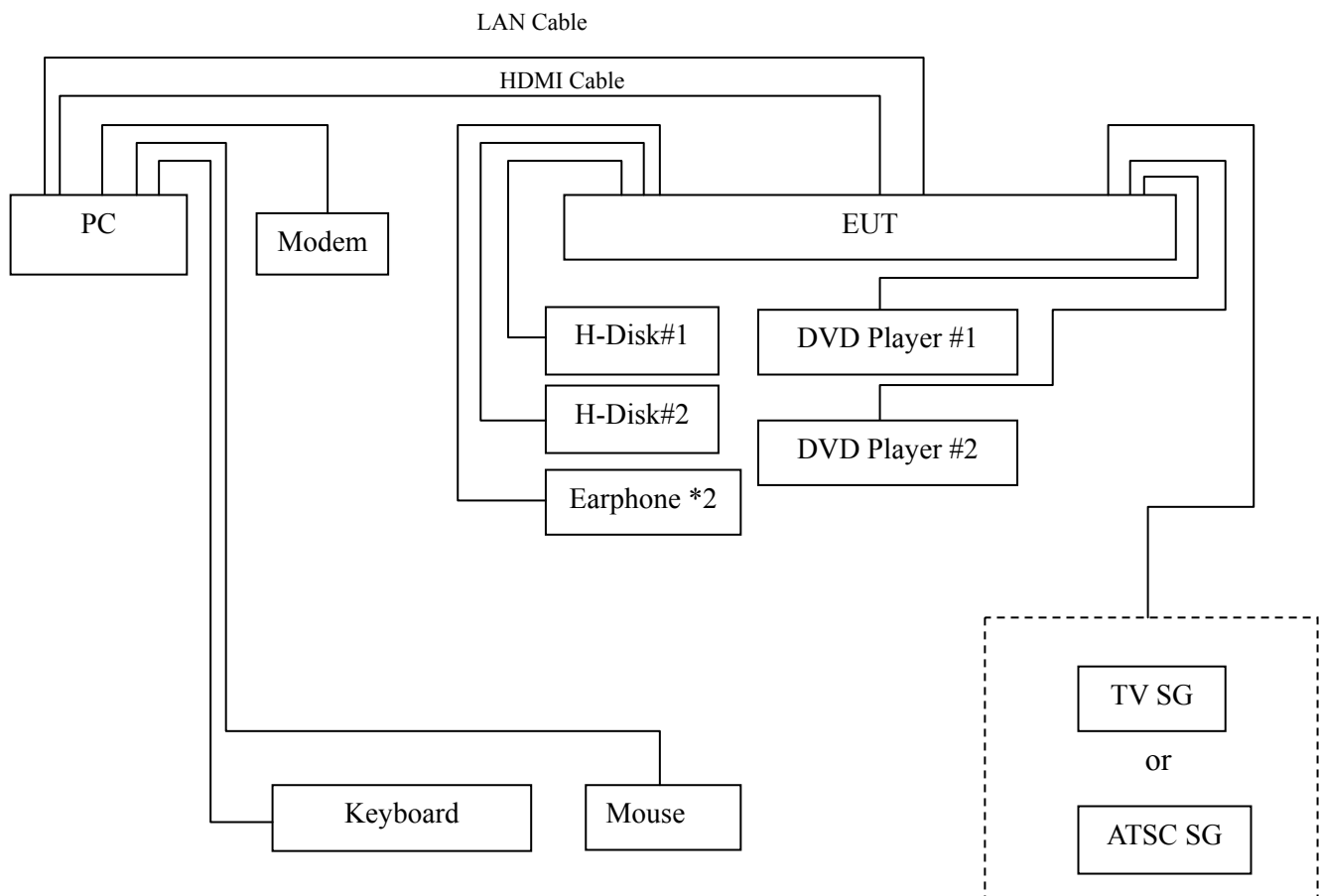
3.1 Test Equipment

The following test equipments are used during the conducted emission test in a shielded room:

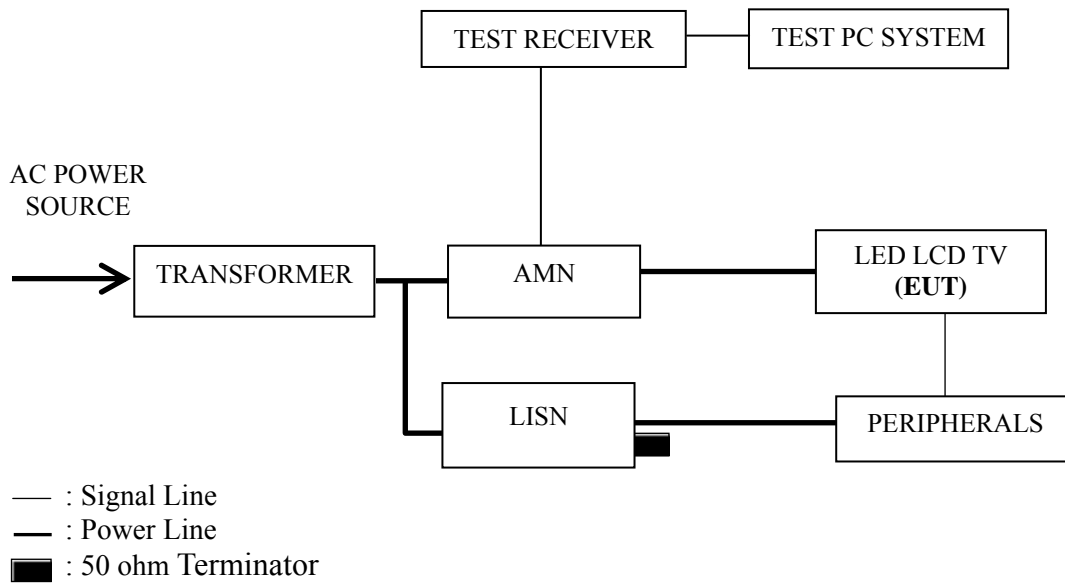
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESCI	101302	Jul 03, 2016	Jul 02, 2017
2.	Artificial Mains Network (AMN)	R&S	ENV4200	100125	Jun 27, 2016	Jun 26, 2017
3.	Line Impedance Stabilization Network (LISN)	Kyoritsu	KNW-407	8-1280-4	Mar 20, 2016	Mar 19, 2017
4.	50Ω Terminator	Anritsu	BNC	001	Mar 20, 2016	Mar 19, 2017
5.	Software	Audix	E3	6.111206	--	--

3.2 Block Diagram of Test Setup

3.2.1 EUT & Peripherals



3.2.2 Conducted Disturbance Test Setup



3.3 Conducted Emission Limit [FCC Part 15 Subpart B 15.107(a)]

Frequency Range (MHz)	Limits dB (μ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66~56	56~46
0.5 ~ 5	56	46
5 ~ 30	60	50
NOTE 1 – The lower limit shall apply at the transition frequencies. NOTE 2 – The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz~0.50 MHz		

3.4 Test Configuration

The EUT (listed in Sec.2.1) and the peripherals (listed in Sec 2.2) were installed as shown on Sec.3.2 to meet FCC requirement and operating in a manner that tends to maximize its emission level in a normal application.

3.5 Operating Condition of EUT

3.5.1 Setup the EUT and peripherals as shown in Sec. 3.2.

3.5.2 Turn on the power of all equipments and the EUT.

3.5.3 Set the contrast & brightness of EUT to maximum.

3.5.4 PC system ran the self-test program “EMC Test” by windows XP and sent “H” characters to EUT through graphic card, the EUT’s screen displayed and filled with “H” pattern by its resolution (Via HDMI Input).

3.5.5 PC system sent the 1kHz audio signal to EUT through audio port, the EUT speak out 1kHz audio signal.

3.5.6 In USB Play mode, set the EUT play digital media from Hard Disk.

3.5.7 In LAN Play mode, set the EUT play digital media through LAN port.

3.5.8 The other peripherals devices were driven and operated during the test.

3.5.9 The test modes are as follows:

Test Mode
HDMI 1920*1080@60Hz & 1kHz playing
HDMI 1280*1024@60Hz & 1kHz playing
HDMI 640*480@60Hz & 1kHz playing
HDMI1080P
USB Play
LAN Play

3.6 Test Procedures

The EUT and peripherals were connected to the power mains through an Artificial Mains Network (AMN). This provided a 50 ohm coupling impedance for the measuring equipment.

Both sides of AC line (Line & Neutral) were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed or manipulated according to ANSI C63.4:2014 during conducted emission test.

The bandwidth of R&S Test Receiver ESCI was set at 9 kHz.

The frequency range from 150 kHz to 30 MHz was checked.

The test modes were done on conducted disturbance test and all the test results are listed in Sec. 3.7.

3.7 Test Results

< PASS >

The frequency and amplitude of the highest conducted emission relative to the limit is reported. All emissions not reported below are too low against the prescribed limits.

Test Mode	Data Page
HDMI 1920*1080@60Hz & 1kHz playing	P13
HDMI 1280*1024@60Hz & 1kHz playing	P14
HDMI 640*480@60Hz & 1kHz playing	P15
HDMI1080P	P16
USB Play	P17
LAN Play	P18

NOTE 1 – Factor = Cable Loss + AMN Factor.

NOTE 2 – Emission Level = Meter Reading + Factor.

NOTE 3 – “QP” means “Quasi-Peak” values, “AV” means “Average” values.

NOTE 4 – The worst case is for HDMI1080P test mode. The worst emission is detected at 0.180MHz (Average Value) with corrected signal level of 58.74 dB (μV) (limit is 64.50 dB (μV)), when the Neutral of the EUT is connected to AMN.

EUT : LED LCD TV Temperature : 22

Model No. : 55K2203W Humidity : 48%RH

Test Mode : HDMI 1920*1080@60Hz Date of Test : Jul 07, 2016
& 1kHz Playing

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)	Remark
Line	0.178	47.39	10.56	57.95	64.57	6.62	QP
	0.400	29.40	10.43	39.83	57.86	18.03	
	0.626	31.51	10.39	41.90	56.00	14.10	
	1.247	26.89	10.41	37.30	56.00	18.70	
	3.403	21.60	10.43	32.03	56.00	23.97	
	17.300	27.90	10.57	38.47	60.00	21.53	
	0.178	33.19	10.56	43.75	54.57	10.82	AV
	0.400	17.80	10.43	28.23	47.86	19.63	
	0.626	19.61	10.39	30.00	46.00	16.00	
	1.247	13.29	10.41	23.70	46.00	22.30	
	3.403	8.30	10.43	18.73	46.00	27.27	
	17.300	22.51	10.57	33.08	50.00	16.92	
Neutral	0.180	46.42	10.54	56.96	64.47	7.51	QP
	0.414	33.50	10.42	43.92	57.57	13.65	
	0.623	31.91	10.38	42.29	56.00	13.71	
	1.244	28.20	10.41	38.61	56.00	17.39	
	2.710	22.29	10.46	32.75	56.00	23.25	
	16.340	26.70	10.67	37.37	60.00	22.63	
	0.180	34.60	10.54	45.14	54.47	9.33	AV
	0.414	20.90	10.42	31.32	47.57	16.25	
	0.623	19.61	10.38	29.99	46.00	16.01	
	1.244	14.60	10.41	25.01	46.00	20.99	
	2.710	10.89	10.46	21.35	46.00	24.65	
	16.340	21.50	10.67	32.17	50.00	17.83	

TEST ENGINEER: SEVEN LU

EUT : LED LCD TV Temperature : 22

Model No. : 55K2203W Humidity : 48%RH

Test Mode : HDMI 1280*1024@60Hz Date of Test : Jul 07, 2016
& 1kHz Playing

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)	Remark
Line	0.180	47.69	10.56	58.25	64.49	6.24	QP
	0.398	29.50	10.43	39.93	57.90	17.97	
	0.622	29.81	10.39	40.20	56.00	15.80	
	1.447	26.81	10.40	37.21	56.00	18.79	
	2.874	21.70	10.43	32.13	56.00	23.87	
	17.390	27.50	10.58	38.08	60.00	21.92	
	0.180	34.49	10.56	45.05	54.49	9.44	AV
	0.398	17.70	10.43	28.13	47.90	19.77	
	0.622	18.21	10.39	28.60	46.00	17.40	
	1.447	14.31	10.40	24.71	46.00	21.29	
	2.874	11.20	10.43	21.63	46.00	24.37	
	17.390	22.10	10.58	32.68	50.00	17.32	
Neutral	0.181	48.10	10.54	58.64	64.45	5.81	QP
	0.414	33.60	10.42	44.02	57.57	13.55	
	0.625	32.71	10.38	43.09	56.00	12.91	
	1.238	27.90	10.41	38.31	56.00	17.69	
	3.776	22.71	10.47	33.18	56.00	22.82	
	17.050	26.71	10.67	37.38	60.00	22.62	
	0.181	34.70	10.54	45.24	54.45	9.21	AV
	0.414	21.00	10.42	31.42	47.57	16.15	
	0.625	19.91	10.38	30.29	46.00	15.71	
	1.238	13.50	10.41	23.91	46.00	22.09	
	3.776	12.11	10.47	22.58	46.00	23.42	
	17.050	22.01	10.67	32.68	50.00	17.32	

TEST ENGINEER: SEVEN LU

EUT : LED LCD TV Temperature : 22

Model No. : 55K2203W Humidity : 48%RH

Test Mode : HDMI 640*480@60Hz & 1kHz Playing Date of Test : Jul 07, 2016

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)	Remark
Line	0.179	47.69	10.56	58.25	64.55	6.30	QP
	0.403	29.50	10.43	39.93	57.78	17.85	
	0.626	31.81	10.39	42.20	56.00	13.80	
	1.244	27.19	10.41	37.60	56.00	18.40	
	3.126	21.10	10.43	31.53	56.00	24.47	
	17.390	27.30	10.58	37.88	60.00	22.12	
	0.179	34.19	10.56	44.75	54.55	9.80	AV
	0.403	17.40	10.43	27.83	47.78	19.95	
	0.626	19.61	10.39	30.00	46.00	16.00	
	1.244	13.89	10.41	24.30	46.00	21.70	
	3.126	10.70	10.43	21.13	46.00	24.87	
	17.390	22.00	10.58	32.58	50.00	17.42	
Neutral	0.180	48.10	10.54	58.64	64.48	5.84	QP
	0.409	33.50	10.42	43.92	57.66	13.74	
	0.626	33.01	10.38	43.39	56.00	12.61	
	1.460	28.70	10.42	39.12	56.00	16.88	
	2.856	22.50	10.46	32.96	56.00	23.04	
	17.260	27.11	10.67	37.78	60.00	22.22	
	0.180	34.70	10.54	45.24	54.48	9.24	AV
	0.409	20.60	10.42	31.02	47.66	16.64	
	0.626	19.71	10.38	30.09	46.00	15.91	
	1.460	16.20	10.42	26.62	46.00	19.38	
	2.856	11.60	10.46	22.06	46.00	23.94	
	17.260	21.81	10.67	32.48	50.00	17.52	

TEST ENGINEER: SEVEN LU

EUT : LED LCD TV Temperature : 22

Model No. : 55K2203W Humidity : 48%RH

Test Mode : HDMI1080P Date of Test : Jul 07, 2016

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)	Remark
Line	0.179	47.79	10.56	58.35	64.53	6.18	QP
	0.382	28.50	10.44	38.94	58.23	19.29	
	0.628	31.51	10.39	41.90	56.00	14.10	
	1.238	26.89	10.41	37.30	56.00	18.70	
	3.762	21.71	10.43	32.14	56.00	23.86	
	16.950	27.90	10.57	38.47	60.00	21.53	
	0.179	34.29	10.56	44.85	54.53	9.68	AV
	0.382	18.20	10.44	28.64	48.23	19.59	
	0.628	18.91	10.39	29.30	46.00	16.70	
	1.238	14.79	10.41	25.20	46.00	20.80	
	3.762	12.51	10.43	22.94	46.00	23.06	
	16.950	22.60	10.57	33.17	50.00	16.83	
Neutral	0.180	48.19	10.55	58.74	64.50	5.76	QP
	0.402	32.80	10.42	43.22	57.82	14.60	
	0.625	32.81	10.38	43.19	56.00	12.81	
	1.247	28.30	10.41	38.71	56.00	17.29	
	3.043	24.00	10.46	34.46	56.00	21.54	
	16.950	27.21	10.67	37.88	60.00	22.12	
	0.180	34.59	10.55	45.14	54.50	9.36	AV
	0.402	19.90	10.42	30.32	47.82	17.50	
	0.625	19.61	10.38	29.99	46.00	16.01	
	1.247	15.40	10.41	25.81	46.00	20.19	
	3.043	11.30	10.46	21.76	46.00	24.24	
	16.950	22.01	10.67	32.68	50.00	17.32	

TEST ENGINEER: SEVEN LU

EUT : LED LCD TV Temperature : 22

Model No. : 55K2203W Humidity : 48%RH

Test Mode : USB Play Date of Test : Jul 07, 2016

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)	Remark
Line	0.180	47.50	10.55	58.05	64.47	6.42	QP
	0.383	28.30	10.44	38.74	58.22	19.48	
	0.626	31.31	10.39	41.70	56.00	14.30	
	1.131	25.20	10.40	35.60	56.00	20.40	
	2.161	23.50	10.41	33.91	56.00	22.09	
	16.670	26.80	10.57	37.37	60.00	22.63	
	0.180	34.40	10.55	44.95	54.47	9.52	AV
	0.383	18.20	10.44	28.64	48.22	19.58	
	0.626	18.61	10.39	29.00	46.00	17.00	
	1.131	14.60	10.40	25.00	46.00	21.00	
	2.161	13.40	10.41	23.81	46.00	22.19	
	16.670	22.00	10.57	32.57	50.00	17.43	
Neutral	0.181	47.60	10.54	58.14	64.42	6.28	QP
	0.415	33.70	10.42	44.12	57.54	13.42	
	0.627	32.81	10.38	43.19	56.00	12.81	
	1.246	28.20	10.41	38.61	56.00	17.39	
	3.405	23.10	10.47	33.57	56.00	22.43	
	16.340	25.90	10.67	36.57	60.00	23.43	
	0.181	34.70	10.54	45.24	54.42	9.18	AV
	0.415	21.00	10.42	31.42	47.54	16.12	
	0.627	19.31	10.38	29.69	46.00	16.31	
	1.246	15.00	10.41	25.41	46.00	20.59	
	3.405	9.20	10.47	19.67	46.00	26.33	
	16.340	20.80	10.67	31.47	50.00	18.53	

TEST ENGINEER: SEVEN LU

EUT : LED LCD TV Temperature : 22

Model No. : 55K2203W Humidity : 48%RH

Test Mode : LAN Play Date of Test : Jul 07, 2016

Test Line	Frequency (MHz)	Meter Reading dB(μV)	Factor (dB)	Emission Level dB(μV)	Limits dB(μV)	Margin (dB)	Remark
Line	0.180	47.60	10.55	58.15	64.47	6.32	QP
	0.403	29.50	10.43	39.93	57.80	17.87	
	0.626	31.61	10.39	42.00	56.00	14.00	
	1.243	27.09	10.41	37.50	56.00	18.50	
	2.171	23.00	10.41	33.41	56.00	22.59	
	16.270	26.29	10.57	36.86	60.00	23.14	
	0.180	34.50	10.55	45.05	54.47	9.42	AV
	0.403	17.20	10.43	27.63	47.80	20.17	
	0.626	18.71	10.39	29.10	46.00	16.90	
	1.243	13.49	10.41	23.90	46.00	22.10	
	2.171	12.60	10.41	23.01	46.00	22.99	
	16.270	21.39	10.57	31.96	50.00	18.04	
Neutral	0.180	48.10	10.54	58.64	64.47	5.83	QP
	0.409	33.20	10.42	43.62	57.66	14.04	
	0.626	32.61	10.38	42.99	56.00	13.01	
	1.243	28.20	10.41	38.61	56.00	17.39	
	2.696	23.29	10.46	33.75	56.00	22.25	
	17.140	26.81	10.67	37.48	60.00	22.52	
	0.180	34.60	10.54	45.14	54.47	9.33	AV
	0.409	20.30	10.42	30.72	47.66	16.94	
	0.626	19.31	10.38	29.69	46.00	16.31	
	1.243	15.00	10.41	25.41	46.00	20.59	
	2.696	10.99	10.46	21.45	46.00	24.55	
	17.140	21.91	10.67	32.58	50.00	17.42	

TEST ENGINEER: SEVEN LU

4 RADIATED EMISSION TEST

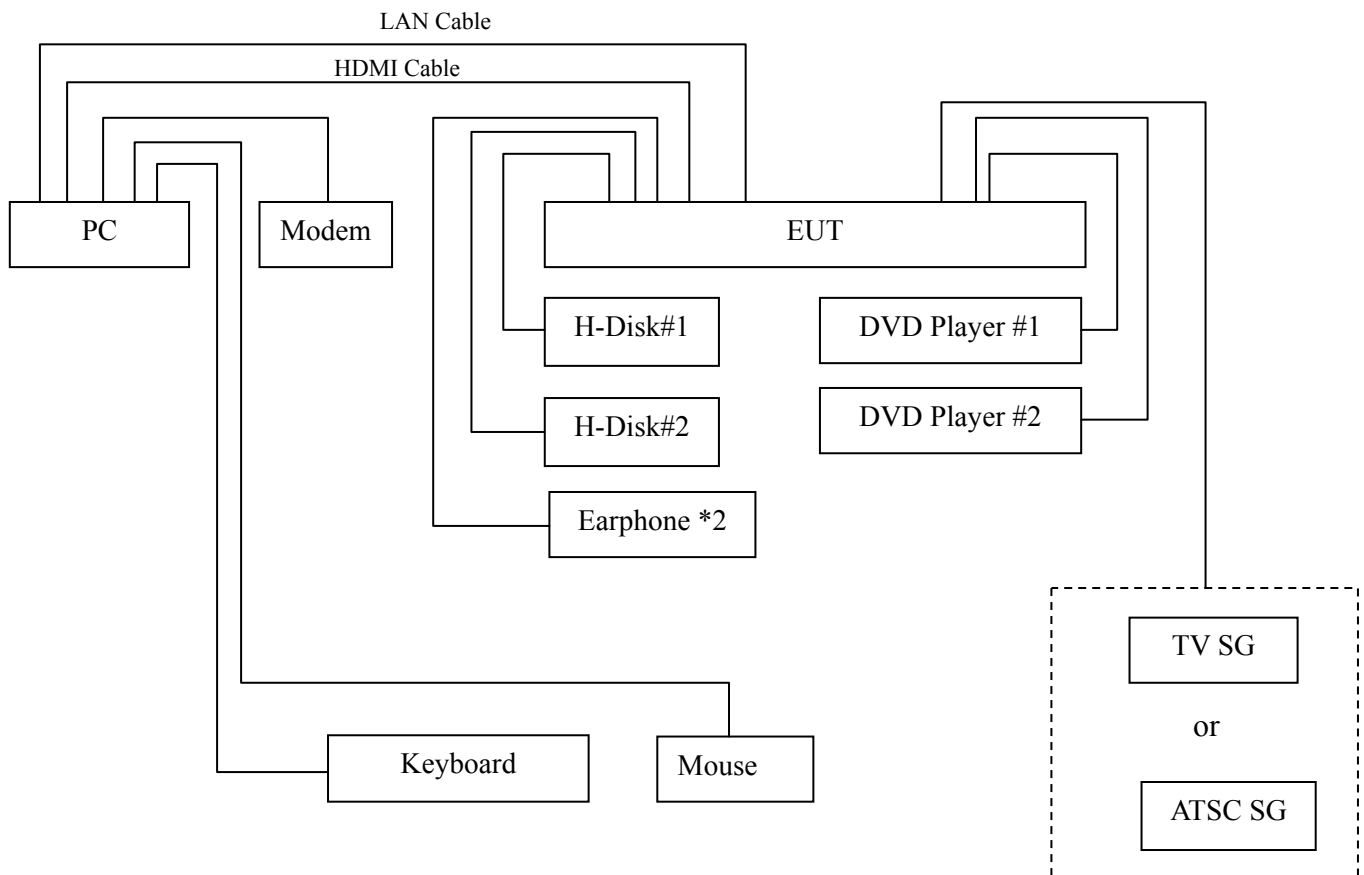
4.1 Test Equipment

The following test equipments are used during the radiated emission test in a semi-anechoic chamber:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESCI	101303	May 07, 2016	May 06, 2017
2.	Preamplifier	Agilent	8447D	2944A06664	Apr 27, 2016	Apr 26, 2017
3.	Preamplifier	HP	8449B	3008A00864	Mar 20, 2016	Mar 19, 2017
4.	Bi-log Antenna	TESEQ	CBL6112D	23193	May 10, 2016	May 09, 2017
5.	Horn Antenna	EMCO	3115	9607-4878	May 31, 2016	May 30, 2017
6.	Spectrum	Agilent	E7405A	MY45106600	Feb 26, 2016	Feb 25, 2017
7.	Spectrum	HP	8591EM	3628A00908	May 07, 2016	May 06, 2017
8.	50 Coaxial Switch	Anritsu	MP59B	6200426390	Mar 18, 2016	Sep 17, 2016
9.	Software	Audix	E3	6.2007-9-10	--	--

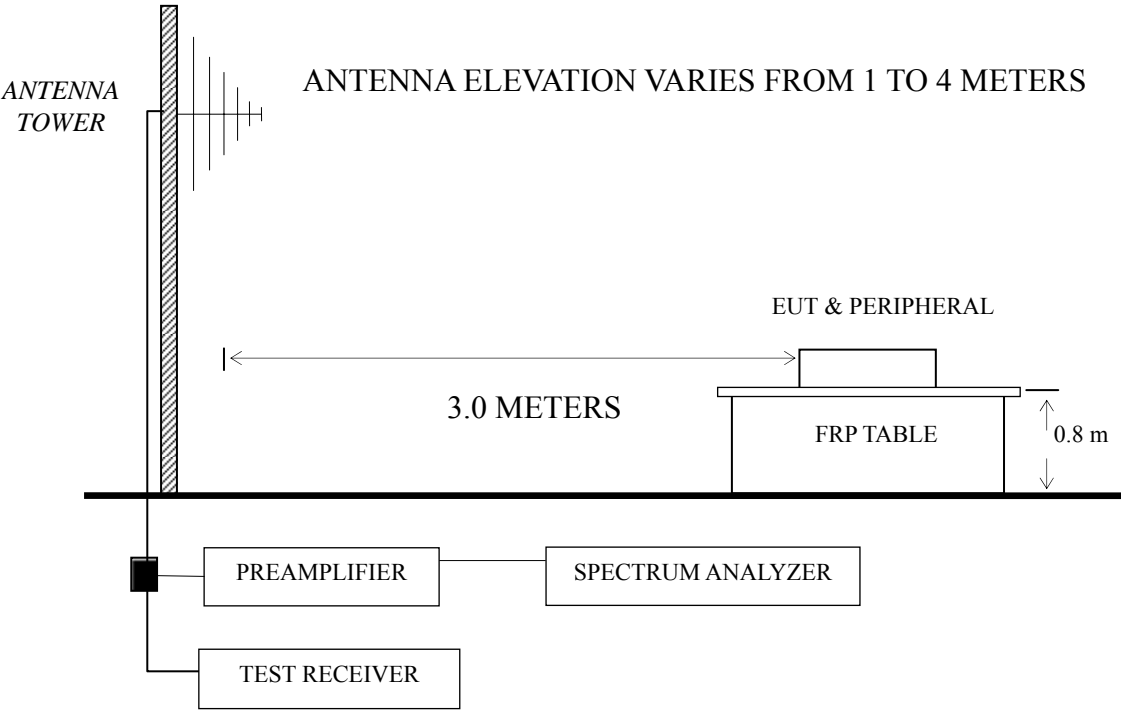
4.2 Block Diagram of Test Setup

4.2.1 EUT & Peripherals



4.2.2 Test Setup

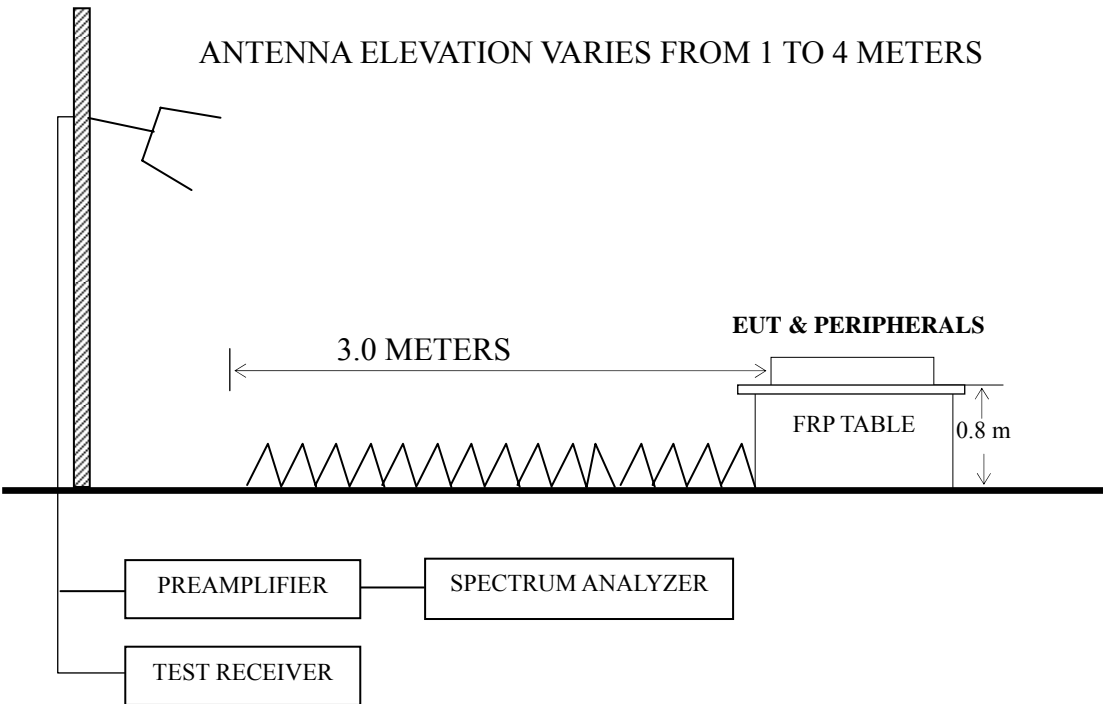
4.2.2.1 Below 1GHz



■ : 50 ohm Coaxial Switch

4.2.2.2 Above 1GHz

BORE-SIGHT ANTENNA TOWER



4.3 Radiated Emission Limit [FCC Part 15 Subpart B 15.109(a)]

Frequency (MHz)	Distance (m)	Field strength limits	
		($\mu\text{V/m}$)	dB ($\mu\text{V/m}$)
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
NOTE 1 - Emission Level dB ($\mu\text{V/m}$) = 20 log Emission Level ($\mu\text{V/m}$) NOTE 2 - The tighter limit applies at the band edges. NOTE 3 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system. NOTE 4 - The limits shown are based on Quasi-peak value detector. NOTE 5 - Above 1 GHz, the limit on peak emission is 20 dB above the maximum permitted average emission limit applicable to the EUT.			

4.4 Test Configuration

The configuration of the EUT and peripherals are same as those used in conducted emission test.

Please refer to Sec.3.4.

4.5 Operating Condition of EUT

Same as conducted emission test which is listed in Sec.3.5, except for the test setup replaced by Sec.4.2.

4.6 Test Procedures

The EUT and peripherals were placed on a FRP turntable that is 0.8 meter above ground. The FRP turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. Broadband antenna (Calibrated Bilog Antenna) was used as receiving antenna. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarizations of the antenna were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to ANSI C63.4:2014 requirements during radiated emission test.

The I.F. bandwidth of Test Receiver R&S ESCI was set at 120 kHz.

The frequency range from 30 MHz to 1000MHz was checked for all test modes.

The frequency range from 1 GHz to 2 GHz was checked for the maximum resolution test mode.

The test modes were done on radiated disturbance test and all the test results are listed in Sec.4.7.

4.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

Test Mode	Data Page
HDMI 1920*1080@60Hz & 1kHz playing	P23 - P24
HDMI 1280*1024@60Hz & 1kHz playing	P25
HDMI 640*480@60Hz & 1kHz playing	P26
HDMI1080P	P27
USB Play	P28
LAN Play	P29

NOTE 1 – Emission Level = Antenna Factor + Cable Loss + Meter Reading.
($< 1\text{GHz}$);

Emission Level = Antenna Factor + Cable Loss – Preamp Factor
+ Meter Reading. ($> 1\text{GHz}$)

NOTE 2 – All readings are Quasi-Peak values below or equal to 1GHz, Peak and Average values above 1GHz.

NOTE 3 – 0° was the table front facing the antenna. Degree is calculated from 0° clockwise facing the antenna.

NOTE 4 – The worst case is for HDMI 1920*1080@60Hz & 1kHz playing test mode. The worst emission at horizontal polarization was detected at 796.183 MHz with corrected signal level of 44.42 dB ($\mu\text{V/m}$) (limit is 46.00 dB ($\mu\text{V/m}$)), when the antenna was 1.5 m height and the turntable was at 80° . The worst emission at vertical polarization was detected at 790.619 MHz with corrected signal level of 44.24dB ($\mu\text{V/m}$) (limit is 46.00 dB ($\mu\text{V/m}$)), when the antenna was 1.3m height and the turntable was at 260° .

EUT : LED LCD TV Temperature : 22

Model No. : 55K2203W Humidity : 60%RH

Test Mode : HDMI 1920*1080@60Hz & 1kHz Playing Date of Test : Jul 13, 2016

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	97.798	23.77	12.03	0.99	--	36.79	43.50	6.71	QP
	203.523	24.22	10.23	1.49	--	35.94	43.50	7.56	
	280.024	26.01	13.50	1.71	--	41.22	46.00	4.78	
	399.030	21.64	16.27	2.03	--	39.94	46.00	6.06	
	796.183	21.16	20.37	2.89	--	44.42	46.00	1.58	
	890.728	16.33	21.10	3.07	--	40.50	46.00	5.50	PK
	1174.989	59.37	24.34	3.63	36.44	50.90	74.00	23.10	
	1380.598	49.67	25.18	3.74	36.07	42.52	74.00	31.48	
	1783.786	56.48	26.74	4.15	35.48	51.89	74.00	22.11	AV
	1174.989	39.75	24.34	3.63	36.44	31.28	54.00	22.72	
	1380.598	30.26	25.18	3.74	36.07	23.11	54.00	30.89	
	1783.786	36.63	26.74	4.15	35.48	32.04	54.00	21.96	

TEST ENGINEER: CAESAR WU

EUT : LED LCD TV Temperature : 22

Model No. : 55K2203W Humidity : 60%RH

Test Mode : HDMI 1920*1080@60Hz & 1kHz Playing Date of Test : Jul 13, 2016

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Vertical	32.520	19.43	16.89	0.58	--	36.90	40.00	3.10	QP
	206.398	25.67	10.36	1.50	--	37.53	43.50	5.97	
	280.024	24.02	13.50	1.71	--	39.23	46.00	6.77	
	397.633	24.28	16.23	2.03	--	42.54	46.00	3.46	
	478.846	22.98	17.20	2.22	--	42.40	46.00	3.60	
	790.619	21.05	20.30	2.89	--	44.24	46.00	1.76	
	1209.161	64.58	24.49	3.54	36.38	56.23	74.00	17.77	PK
	1540.049	53.44	25.77	3.95	35.78	47.38	74.00	26.62	
	1916.324	55.25	27.22	4.35	35.37	51.45	74.00	22.55	
	1209.161	44.34	24.49	3.54	36.38	35.99	54.00	18.01	AV
	1540.049	32.48	25.77	3.95	35.78	26.42	54.00	27.58	
	1916.324	35.34	27.22	4.35	35.37	31.54	54.00	22.46	

TEST ENGINEER: CAESAR WU

EUT : LED LCD TV Temperature : 22

Model No. : 55K2203W Humidity : 60%RH

Test Mode : HDMI 1280*1024@60Hz & 1kHz Playing Date of Test : Jul 13, 2016

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)
Horizontal	97.115	22.46	11.97	0.99	35.42	43.50	8.08
	278.067	26.23	13.35	1.71	41.29	46.00	4.71
	397.633	22.30	16.23	2.03	40.56	46.00	5.44
	539.960	23.10	17.60	2.36	43.06	46.00	2.94
	647.386	20.01	19.27	2.61	41.89	46.00	4.11
	796.183	17.30	20.37	2.89	40.56	46.00	5.44
Vertical	31.620	16.87	17.27	0.58	34.72	40.00	5.28
	204.238	26.86	10.27	1.49	38.62	43.50	4.88
	396.242	24.47	16.23	2.03	42.73	46.00	3.27
	478.846	22.70	17.20	2.22	42.12	46.00	3.88
	539.478	23.70	17.60	2.36	43.66	46.00	2.34
	790.619	19.24	20.30	2.89	42.43	46.00	3.57

TEST ENGINEER: CAESAR WU

EUT : LED LCD TV Temperature : 22

Model No. : 55K2203W Humidity : 60%RH

Test Mode : HDMI 640*480@60Hz & 1kHz Playing Date of Test : Jul 13, 2016

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)
Horizontal	96.775	24.26	11.91	0.99	37.16	43.50	6.34
	151.597	22.78	11.88	1.29	35.95	43.50	7.55
	279.044	25.26	13.43	1.71	40.40	46.00	5.60
	399.030	20.90	16.27	2.03	39.20	46.00	6.80
	475.499	20.34	17.16	2.22	39.72	46.00	6.28
	796.183	17.93	20.37	2.89	41.19	46.00	4.81
Vertical	31.510	16.56	17.36	0.57	34.49	40.00	5.51
	54.452	25.15	7.71	0.73	33.59	40.00	6.41
	204.238	25.55	10.27	1.49	37.31	43.50	6.19
	396.242	22.57	16.23	2.03	40.83	46.00	5.17
	475.499	22.03	17.16	2.22	41.41	46.00	4.59
	790.619	18.66	20.30	2.89	41.85	46.00	4.15

TEST ENGINEER: CAESAR WU

EUT : LED LCD TV Temperature : 22

Model No. : 55K2203W Humidity : 60%RH

Test Mode : HDMI1080P Date of Test : Jul 13, 2016

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)
Horizontal	97.115	24.22	11.97	0.99	37.18	43.50	6.32
	149.486	21.34	12.16	1.28	34.78	43.50	8.72
	279.044	25.80	13.43	1.71	40.94	46.00	5.06
	397.633	22.56	16.23	2.03	40.82	46.00	5.18
	741.660	20.06	19.57	2.79	42.42	46.00	3.58
	796.183	17.60	20.37	2.89	40.86	46.00	5.14
Vertical	32.067	16.47	17.05	0.58	34.10	40.00	5.90
	55.027	24.71	7.62	0.74	33.07	40.00	6.93
	204.238	27.34	10.27	1.49	39.10	43.50	4.40
	279.044	21.59	13.43	1.71	36.73	46.00	9.27
	470.523	22.14	17.10	2.20	41.44	46.00	4.56
	793.396	18.97	20.33	2.89	42.19	46.00	3.81

TEST ENGINEER: CAESAR WU

EUT : LED LCD TV Temperature : 22

Model No. : 55K2203W Humidity : 60%RH

Test Mode : USB Play Date of Test : Jul 13, 2016

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)
Horizontal	86.260	21.17	9.95	1.16	32.28	40.00	7.72
	143.490	22.44	12.20	1.60	36.24	43.50	7.26
	246.310	24.81	12.34	2.14	39.29	46.00	6.71
	458.740	20.08	17.04	2.85	39.97	46.00	6.03
	542.160	16.55	18.56	2.63	37.74	46.00	8.26
	820.550	12.95	20.70	3.88	37.53	46.00	8.47
Vertical	41.640	19.58	12.41	0.75	32.74	40.00	7.26
	100.810	22.11	12.34	1.33	35.78	43.50	7.72
	137.670	20.93	12.54	1.56	35.03	43.50	8.47
	255.040	22.78	12.70	2.22	37.70	46.00	8.30
	399.570	19.66	16.60	2.72	38.98	46.00	7.02
	550.890	17.91	18.80	2.57	39.28	46.00	6.72

TEST ENGINEER: CAESAR WU

EUT : LED LCD TV Temperature : 22

Model No. : 55K2203W Humidity : 60%RH

Test Mode : LAN Play Date of Test : Jul 13, 2016

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)
Horizontal	97.798	21.73	12.03	0.99	34.75	43.50	8.75
	151.597	23.00	11.88	1.29	36.17	43.50	7.33
	279.044	24.70	13.43	1.71	39.84	46.00	6.16
	396.242	21.74	16.23	2.03	40.00	46.00	6.00
	741.700	17.66	19.57	2.79	40.02	46.00	5.98
	890.728	16.24	21.10	3.07	40.41	46.00	5.59
Vertical	31.843	16.02	17.19	0.58	33.79	40.00	6.21
	62.431	26.51	6.76	0.79	34.06	40.00	5.94
	147.921	24.01	12.29	1.27	37.57	43.50	5.93
	207.123	26.32	10.42	1.50	38.24	43.50	5.26
	473.835	18.86	17.14	2.20	38.20	46.00	7.80
	793.396	17.19	20.33	2.89	40.41	46.00	5.59

TEST ENGINEER: CAESAR WU

5 DEBUG DESCRIPTION

The following components are used during the countermeasure procedures:

Name	M/N	Manufacturer	Location
Conductive foam	SMR-TSL-4-3.5-5R\ROH	Qingdao Joinset Co., Ltd	See Internal Photos Figure 20
Conductive cloth	DCF40\ROH	Qingdao Joinset Co., Ltd Shenzhen antai technology Co., Ltd	See Internal Photos Figure 21

Note: We had required the applicant and manufacturer that all electrical and mechanical devices employed for spurious radiation suppression, including any modifications made during certification testing, must be incorporated in each unit marked

TEST ENGINEER:



(BYRON WU)

6 DEVIATION TO TEST SPECIFICATIONS

None

