

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

LED LCD TV

Model No.	Brand
32K20DW, 32K21DW, 32K22DW, 32K23DW, 32K24DW, 32K25DW, 32H3, 32H3C	Hisense

FCC ID : W9HLCDC0031

Prepared For : Hisense Electric Co., Ltd.  
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Report No. : ACI-F14133  
Date of Test : Aug 11 – 12, 2014  
Date of Report : Aug 13, 2014

## TABLE OF CONTENTS

	Page
<b>1 SUMMARY OF STANDARDS AND RESULTS</b> .....	<b>4</b>
1.1 Description of Standards and Results.....	4
<b>2 GENERAL INFORMATION</b> .....	<b>5</b>
2.1 Description of Equipment Under Test.....	5
2.2 Peripherals.....	6
2.3 Description of Test Facility.....	8
2.4 Measurement Uncertainty.....	8
<b>3 CONDUCTED EMISSION TEST</b> .....	<b>9</b>
3.1 Test Equipment.....	9
3.2 Block Diagram of Test Setup.....	9
3.3 Conducted Emission Limit [FCC Part 15 Subpart B 15.107(a)].....	10
3.4 Test Configuration.....	10
3.5 Operating Condition of EUT.....	11
3.6 Test Procedures.....	11
3.7 Test Results.....	12
<b>4 RADIATED EMISSION TEST</b> .....	<b>19</b>
4.1 Test Equipment.....	19
4.2 Block Diagram of Test Setup.....	19
4.3 Radiated Emission Limit [FCC Part 15 Subpart B 15.109(a)].....	20
4.4 Test Configuration.....	20
4.5 Operating Condition of EUT.....	20
4.6 Test Procedures.....	21
4.7 Test Results.....	21
<b>5 DEBUG DESCRIPTION</b> .....	<b>30</b>
<b>6 DEVIATION TO TEST SPECIFICATIONS</b> .....	<b>31</b>

## 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.  
 EUT Description : LED LCD TV

Model No.	Brand	Power Supply
Refer to Sec2.1	Hisense	120V/60Hz

Test Procedure Used:

*FCC RULES AND REGULATIONS PART 15 SUBPART B CLASS B OCTOBER 2013  
AND ANSI C63.4-2003*

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 Aug 11 – 12, 2014 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.F14132, a Verification report.***

Date of Test : Aug 11 – 12, 2014 Date of Report : Aug 13, 2014

Producer :   
 EMILY ZHU / Assistant

Review :   
 DIO YANG / Deputy Manager

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

Signatory :   
 Authorized Signature EMC SAMMY CHEN / Deputy 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
<b>EMISSION</b>			
Conducted Disturbance at the Mains Terminal	FCC RULES AND REGULATIONS PART 15 SUBPART B OCTOBER 2013 AND ANSI C63.4-2003	15.107(a) Class B	Pass
Radiated Disturbance	FCC RULES AND REGULATIONS PART 15 SUBPART B OCTOBER 2013 AND ANSI C63.4-2003	15.109(a) Class B	Pass

## 2 GENERAL INFORMATION

### 2.1 Description of Equipment Under Test

Description	:	LED LCD TV
Type of EUT	:	<input checked="" type="checkbox"/> Production <input type="checkbox"/> Pre-product <input type="checkbox"/> Pro-type
Model No.	:	32K20DW, 32K21DW, 32K22DW, 32K23DW, 32K24DW, 32K25DW, 32H3, 32H3C
Note	:	The above models are all the same except for model name. 32K20DW model is tested and recorded in the report.
Brand Name	:	Hisense
Applicant	:	Hisense Electric Co., Ltd. No.218 Qianwangang Road, Economy & Technology Development Zone, Qingdao, China
Manufacturer	:	Hisense Electric Co., Ltd. No.218 Qianwangang Road, Economy & Technology Development Zone, Qingdao, China
Factory #1	:	Hisense Electric Co., Ltd. No.218 Qianwangang Road, Economy & Technology Development Zone, Qingdao, China
Factory #2	:	Tatung Mexico S.A. de C.V. Miguel Catalán 420, Parque Industrial Rio Bravo, Cd. Juarez, Chih., CP 32557
LCD Panel	:	Manufacturer : Hisense M/N : HD315DH-B11\S1
Max Resolution	:	1920*1080@60Hz
D-Sub Cable	:	Shielded, Detachable, 1.85m, with two cores on cable
HDMI Cable	:	Shielded, Detachable, 1.00m
Power Cord	:	Unshielded, Detachable, 1.80m

**Remark:**

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

## Bottom Port:

- (1) One HDMI2 Port : Connected with DVD PLAYER#2
- (2) One HDMI3/ARC Port : Connected with DVD PLAYER#1
- (3) One DIGITAL AUDIO OUT Port : Connected with DVD PLAYER #2
- (4) One component of Audio/YPbPr Audio Port : Connected with DVD PLAYER#1
- (5) One component of Video/YPbPr Port : Connected with DVD PLAYER#1
- (6) One LAN Port : Connected with PC

## Side Port:

- (1) Two USB Ports : Connected with U-Disk
- (2) One HDMI1/DVI Port : Connected with PC
- (3) One VGA Port : Connected with PC
- (4) One AUDIO IN Port : Connected with PC
- (5) One AUDIO OUT/Earphone Port : Connected with Earphone
- (6) One ANT/CABLE IN Port : Connected with Antenna or ATSC SG / TV SG

## 2.2 Peripherals

### 2.2.1 PC

Manufacturer : HP  
 Model Number : dx7200MT  
 Serial Number : CNG622017W  
 Power Cord : Unshielded, Detachable, 1.8m  
 Certificate : FCC DoC; CE/EMC; VCCI; C-Tick; BSMI, 3C, MIC

### 2.2.2 Printer

Manufacturer : HP  
 Model Number : C3990A  
 Serial Number : JPZX020487  
 Data Cable : Shielded, detachable, 1.5m  
 Certificate : GS, CE/EMC, C-Tick, FCC DoC

### 2.2.3 Keyboard

Manufacturer : Microsoft  
Model Number : RT2300  
Serial Number : 7668200662248  
Data Cable : Shielded, Undetachable, 1.8m  
Certificate : CE/EMC, FCC DoC, VCCI, MIC, C-Tick,  
BSMI

### 2.2.4 Mouse

Manufacturer : Microsoft  
Model Number : RT2300  
Serial Number : 6965712071551  
Data Cable : Shielded, Undetachable, 1.8m.  
Certificate : CE/EMC, FCC DoC, VCCI, MIC, C-Tick,  
BSMI

### 2.2.5 Modem

Manufacturer : TP-LINK  
Model Number : TM-EC5658V  
Serial Number : 07123301053  
Data Cable : Shielded, Detachable, 1.8m  
Certificate : FCC DoC, CE/EMC, CCC

### 2.2.6 TV Signal Generator

Manufacturer : FLUKE  
Model Number : 54200m01  
Serial Number : 814008  
Data Cable : Shielded, detachable, 2.0m  
Power Cord : Unshielded, detachable, 2.0m  
Certificate : CE/EMC, FCC DoC, CCC

### 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 : FCC DoC, CE/EMC, CCC

### 2.2.9 DVD PLAYER#2

Manufacturer : PHILIPS  
Model Number : DVP3986K/93  
Serial Number : KX1A0902120082  
Certificate : FCC DoC, CE/EMC, CCC

### 2.2.10 Earphone

Manufacturer : audio-technica  
Model Number : ATH-CKL200

## 2.2.11 U-DISK \*2

Manufacturer : LG  
Model Number : 1GB

## 2.3 Description of Test Facility

Site Description (No.3 3m Chamber) : Sept. 17, 1998 file on  
Mar 16, 2012 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 = 2.77 dB

Radiated Emission Expanded Uncertainty (30-200MHz):  
U = 4.17 dB (Horizontal)  
U = 4.02 dB (Vertical)

Radiated Emission Expanded Uncertainty (200M-1GHz):  
U = 3.38 dB (Horizontal)  
U = 3.28 dB (Vertical)

Radiated Emission Expanded Uncertainty (Above 1GHz):  
U = 4.68 dB (Horizontal)  
U = 4.87 dB (Vertical)



### 3 CONDUCTED EMISSION TEST

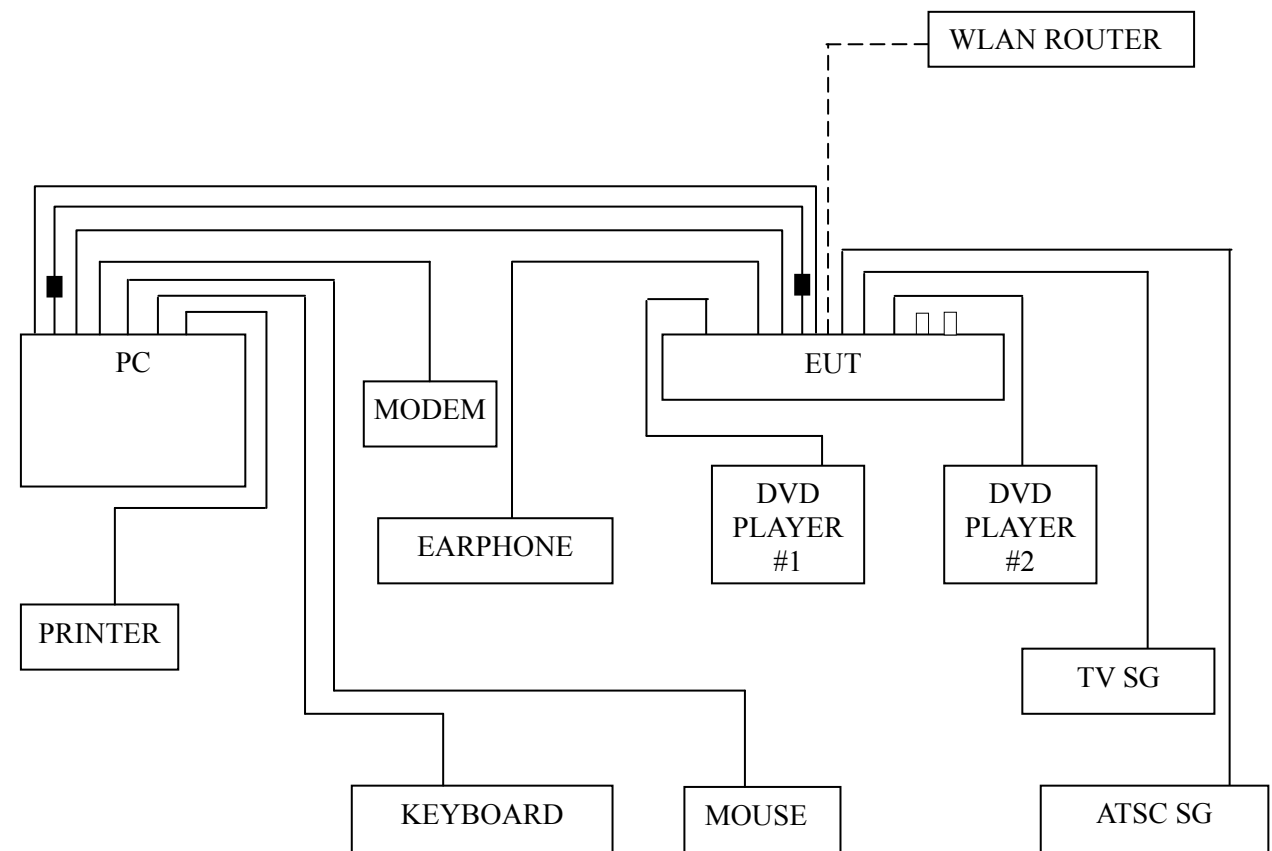
#### 3.1 Test Equipment

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	100841	Mar 20, 2014	Mar 19, 2015
2.	Artificial Mains Network (AMN)	R&S	ENV4200	100125	Jun 27, 2014	Jun 26, 2015
3.	Line Impedance Stabilization Network (LISN)	Kyoritsu	KNW-407	8-1280-4	Mar 20, 2014	Mar 19, 2015
4.	50 $\Omega$ Coaxial Switch	Anritsu	MP59B	6200426389	Mar 18, 2014	Sep 17, 2014
5.	50 $\Omega$ Terminator	Anritsu	BNC	001	Mar 20, 2014	Mar 19, 2015
6.	Software	Audix	E3	6.111206	--	--

#### 3.2 Block Diagram of Test Setup

##### 3.2.1 EUT & Peripherals

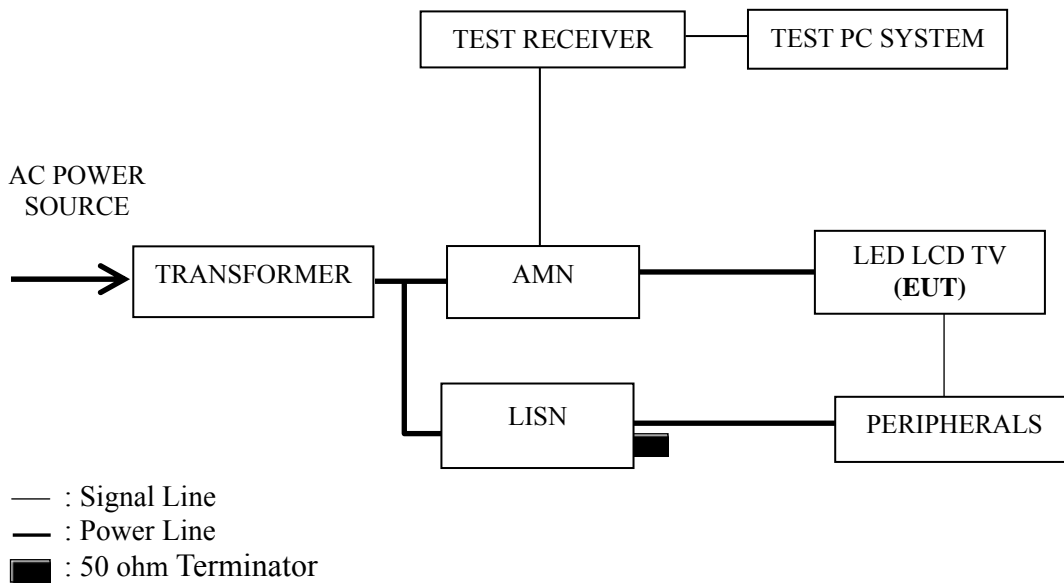


--- : WLAN signal

■ : Ferrite core

□ : U-Disk

### 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 ( $\mu$ 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 D-Sub & HDMI Input).

3.5.5 In USB Play mode, set the EUT play digital media from U-Disk.

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

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

3.5.8 The test modes are as follows:

Test Mode
HDMI 1920*1080@60Hz & 1kHz Playing
D-Sub 1024*768@60Hz & 1kHz Playing
D-Sub 800*600@60Hz & 1kHz Playing
D-Sub 640*480@60Hz & 1kHz Playing
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 C63.4:2003 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
D-Sub 1024*768@60Hz & 1kHz Playing	P14
D-Sub 800*600@60Hz & 1kHz Playing	P15
D-Sub 640*480@60Hz & 1kHz Playing	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 LAN Play test mode. The worst emission is detected at 0.196 MHz (Average Value) with corrected signal level of 46.53 dB ( $\mu$ V) (limit is 53.79 dB ( $\mu$ V)), when the Neutral of the EUT is connected to AMN.

EUT : LED LCD TV Temperature : 22

Model No. : 32K20DW Humidity : 48%RH

Test Mode : HDMI 1920\*1080@60Hz Date of Test : Aug 11, 2014  
& 1kHz Playing

Test Line	Frequency (MHz)	Meter Reading dB( $\mu$ V)	Factor (dB)	Emission Level dB( $\mu$ V)	Limits dB( $\mu$ V)	Margin (dB)	Remark
Line	0.194	45.09	10.55	55.64	63.88	8.24	QP
	0.246	31.60	10.52	42.12	61.88	19.76	
	0.323	27.30	10.48	37.78	59.63	21.85	
	3.517	17.90	10.44	28.34	56.00	27.66	
	7.376	20.60	10.46	31.06	60.00	28.94	
	14.750	27.80	10.54	38.34	60.00	21.66	
	AV	0.194	33.79	10.55	44.34	53.88	9.54
		0.246	9.20	10.52	19.72	51.88	32.16
		0.323	13.80	10.48	24.28	49.63	25.35
		3.517	8.00	10.44	18.44	46.00	27.56
7.376		15.00	10.46	25.46	50.00	24.54	
14.750		21.90	10.54	32.44	50.00	17.56	
Neutral	<b>0.194</b>	<b>45.49</b>	<b>10.54</b>	<b>56.03</b>	<b>63.86</b>	<b>7.83</b>	QP
	0.257	33.80	10.50	44.30	61.53	17.23	
	0.641	21.10	10.42	31.52	56.00	24.48	
	3.028	15.20	10.48	25.68	56.00	30.32	
	14.580	20.90	10.66	31.56	60.00	28.44	
	20.520	22.00	10.73	32.73	60.00	27.27	
	AV	0.194	34.89	10.54	45.43	53.86	8.43
		0.257	18.40	10.50	28.90	51.53	22.63
		0.641	4.80	10.42	15.22	46.00	30.78
		3.028	5.40	10.48	15.88	46.00	30.12
14.580		13.80	10.66	24.46	50.00	25.54	
	20.520	17.30	10.73	28.03	50.00	21.97	

TEST ENGINEER: WENCY YANG

EUT : LED LCD TV Temperature : 22

Model No. : 32K20DW Humidity : 48%RH

Test Mode : D-Sub 1024\*768@60Hz & 1kHz Playing Date of Test : Aug 11, 2014

Test Line	Frequency (MHz)	Meter Reading dB( $\mu$ V)	Factor (dB)	Emission Level dB( $\mu$ V)	Limits dB( $\mu$ V)	Margin (dB)	Remark
Line	0.194	45.49	10.55	56.04	63.85	7.81	QP
	0.256	32.70	10.51	43.21	61.56	18.35	
	0.767	16.19	10.42	26.61	56.00	29.39	
	3.310	18.20	10.44	28.64	56.00	27.36	
	10.290	23.60	10.52	34.12	60.00	25.88	
	14.810	28.20	10.54	38.74	60.00	21.26	
	0.194	34.89	10.55	45.44	53.85	8.41	AV
	0.256	16.60	10.51	27.11	51.56	24.45	
	0.767	2.39	10.42	12.81	46.00	33.19	
	3.310	7.30	10.44	17.74	46.00	28.26	
	10.290	18.20	10.52	28.72	50.00	21.28	
	14.810	22.40	10.54	32.94	50.00	17.06	
Neutral	<b>0.195</b>	<b>45.69</b>	<b>10.54</b>	<b>56.23</b>	<b>63.84</b>	<b>7.61</b>	QP
	0.258	33.50	10.50	44.00	61.49	17.49	
	0.332	27.81	10.46	38.27	59.40	21.13	
	0.642	21.10	10.42	31.52	56.00	24.48	
	4.476	12.70	10.52	23.22	56.00	32.78	
	14.800	20.80	10.66	31.46	60.00	28.54	
	0.195	35.49	10.54	46.03	53.84	7.81	AV
	0.258	19.60	10.50	30.10	51.49	21.39	
	0.332	17.61	10.46	28.07	49.40	21.33	
	0.642	5.30	10.42	15.72	46.00	30.28	
	4.476	2.80	10.52	13.32	46.00	32.68	
	14.800	14.40	10.66	25.06	50.00	24.94	

TEST ENGINEER: WENCY YANG

EUT : LED LCD TV Temperature : 22

Model No. : 32K20DW Humidity : 48%RH

Test Mode : D-Sub 800\*600@60Hz & 1kHz Playing Date of Test : Aug 11, 2014

Test Line	Frequency (MHz)	Meter Reading dB( $\mu$ V)	Factor (dB)	Emission Level dB( $\mu$ V)	Limits dB( $\mu$ V)	Margin (dB)	Remark
Line	0.192	45.50	10.55	56.05	63.93	7.88	QP
	0.257	32.90	10.51	43.41	61.53	18.12	
	0.621	17.50	10.43	27.93	56.00	28.07	
	3.270	17.20	10.44	27.64	56.00	28.36	
	7.368	19.90	10.46	30.36	60.00	29.64	
	14.560	28.20	10.54	38.74	60.00	21.26	
	AV	0.192	32.80	10.55	43.35	53.93	10.58
		0.257	19.00	10.51	29.51	51.53	22.02
		0.621	2.60	10.43	13.03	46.00	32.97
		3.270	8.00	10.44	18.44	46.00	27.56
7.368		15.00	10.46	25.46	50.00	24.54	
14.560		22.40	10.54	32.94	50.00	17.06	
Neutral	0.195	45.79	10.54	56.33	63.83	7.50	QP
	0.262	33.30	10.50	43.80	61.38	17.58	
	0.648	20.50	10.42	30.92	56.00	25.08	
	2.527	14.39	10.48	24.87	56.00	31.13	
	6.698	14.09	10.52	24.61	60.00	35.39	
	14.630	19.80	10.66	30.46	60.00	29.54	
	AV	<b>0.195</b>	<b>35.89</b>	<b>10.54</b>	<b>46.43</b>	<b>53.83</b>	<b>7.40</b>
		0.262	20.90	10.50	31.40	51.38	19.98
		0.648	5.60	10.42	16.02	46.00	29.98
		2.527	4.79	10.48	15.27	46.00	30.73
6.698		8.79	10.52	19.31	50.00	30.69	
14.630	13.70	10.66	24.36	50.00	25.64		

TEST ENGINEER: WENCY YANG

EUT : LED LCD TV Temperature : 22

Model No. : 32K20DW Humidity : 48%RH

Test Mode : D-Sub 640\*480@60Hz & 1kHz Playing Date of Test : Aug 11, 2014

Test Line	Frequency (MHz)	Meter Reading dB( $\mu$ V)	Factor (dB)	Emission Level dB( $\mu$ V)	Limits dB( $\mu$ V)	Margin (dB)	Remark
Line	0.194	45.39	10.55	55.94	63.84	7.90	QP
	0.260	32.70	10.51	43.21	61.43	18.22	
	0.708	16.80	10.43	27.23	56.00	28.77	
	3.025	17.70	10.45	28.15	56.00	27.85	
	10.905	22.30	10.52	32.82	60.00	27.18	
	14.770	29.20	10.54	39.74	60.00	20.26	
	0.194	34.79	10.55	45.34	53.84	8.50	AV
	0.260	19.40	10.51	29.91	51.43	21.52	
	0.708	6.00	10.43	16.43	46.00	29.57	
	3.025	7.80	10.45	18.25	46.00	27.75	
	10.905	16.70	10.52	27.22	50.00	22.78	
	14.770	22.60	10.54	33.14	50.00	16.86	
Neutral	<b>0.193</b>	<b>46.00</b>	<b>10.54</b>	<b>56.54</b>	<b>63.89</b>	<b>7.35</b>	QP
	0.258	33.30	10.50	43.80	61.49	17.69	
	0.325	27.60	10.47	38.07	59.57	21.50	
	0.647	20.50	10.42	30.92	56.00	25.08	
	2.678	14.70	10.48	25.18	56.00	30.82	
	14.550	20.00	10.66	30.66	60.00	29.34	
	0.193	34.60	10.54	45.14	53.89	8.75	AV
	0.258	20.10	10.50	30.60	51.49	20.89	
	0.325	16.80	10.47	27.27	49.57	22.30	
	0.647	5.70	10.42	16.12	46.00	29.88	
	2.678	2.50	10.48	12.98	46.00	33.02	
	14.550	13.50	10.66	24.16	50.00	25.84	

TEST ENGINEER: WENCY YANG



EUT : LED LCD TV Temperature : 22

Model No. : 32K20DW Humidity : 48%RH

Test Mode : USB Play Date of Test : Aug 11, 2014

Test Line	Frequency (MHz)	Meter Reading dB( $\mu$ V)	Factor (dB)	Emission Level dB( $\mu$ V)	Limits dB( $\mu$ V)	Margin (dB)	Remark
Line	0.194	45.19	10.55	55.74	63.87	8.13	QP
	0.256	32.50	10.51	43.01	61.56	18.55	
	0.627	17.80	10.43	28.23	56.00	27.77	
	2.839	17.29	10.45	27.74	56.00	28.26	
	7.368	20.60	10.46	31.06	60.00	28.94	
	14.570	28.90	10.54	39.44	60.00	20.56	
	0.194	34.39	10.55	44.94	53.87	8.93	AV
	0.256	16.40	10.51	26.91	51.56	24.65	
	0.627	2.70	10.43	13.13	46.00	32.87	
	2.839	5.89	10.45	16.34	46.00	29.66	
	7.368	15.80	10.46	26.26	50.00	23.74	
	14.570	22.30	10.54	32.84	50.00	17.16	
Neutral	<b>0.192</b>	<b>45.30</b>	<b>10.54</b>	<b>55.84</b>	<b>63.93</b>	<b>8.09</b>	QP
	0.260	33.30	10.50	43.80	61.44	17.64	
	0.332	27.71	10.46	38.17	59.40	21.23	
	0.647	20.50	10.42	30.92	56.00	25.08	
	2.527	14.39	10.48	24.87	56.00	31.13	
	14.480	20.10	10.66	30.76	60.00	29.24	
	0.192	33.20	10.54	43.74	53.93	10.19	AV
	0.260	20.20	10.50	30.70	51.44	20.74	
	0.332	17.31	10.46	27.77	49.40	21.63	
	0.647	5.60	10.42	16.02	46.00	29.98	
	2.527	3.69	10.48	14.17	46.00	31.83	
	14.480	13.50	10.66	24.16	50.00	25.84	

TEST ENGINEER: WENCY YANG

EUT : LED LCD TV Temperature : 22

Model No. : 32K20DW Humidity : 48%RH

Test Mode : LAN Play Date of Test : Aug 11, 2014

Test Line	Frequency (MHz)	Meter Reading dB( $\mu$ V)	Factor (dB)	Emission Level dB( $\mu$ V)	Limits dB( $\mu$ V)	Margin (dB)	Remark
Line	0.191	45.10	10.55	55.65	63.99	8.34	QP
	0.260	32.70	10.51	43.21	61.43	18.22	
	0.727	17.30	10.42	27.72	56.00	28.28	
	3.030	18.10	10.45	28.55	56.00	27.45	
	7.370	19.90	10.46	30.36	60.00	29.64	
	14.640	28.70	10.54	39.24	60.00	20.76	
	0.191	32.50	10.55	43.05	53.99	10.94	AV
	0.260	19.30	10.51	29.81	51.43	21.62	
	0.727	2.00	10.42	12.42	46.00	33.58	
	3.030	8.00	10.45	18.45	46.00	27.55	
	7.370	15.00	10.46	25.46	50.00	24.54	
	14.640	22.10	10.54	32.64	50.00	17.36	
Neutral	0.196	45.19	10.54	55.73	63.79	8.06	QP
	0.256	33.00	10.50	43.50	61.56	18.06	
	0.641	21.00	10.42	31.42	56.00	24.58	
	3.509	13.50	10.49	23.99	56.00	32.01	
	6.698	14.09	10.52	24.61	60.00	35.39	
	14.517	19.60	10.66	30.26	60.00	29.74	
	<b>0.196</b>	<b>35.99</b>	<b>10.54</b>	<b>46.53</b>	<b>53.79</b>	<b>7.26</b>	AV
	0.256	17.40	10.50	27.90	51.56	23.66	
	0.641	4.70	10.42	15.12	46.00	30.88	
	3.509	4.10	10.49	14.59	46.00	31.41	
	6.698	8.89	10.52	19.41	50.00	30.59	
	14.517	13.40	10.66	24.06	50.00	25.94	

TEST ENGINEER: WENCY YANG

## 4 RADIATED EMISSION TEST

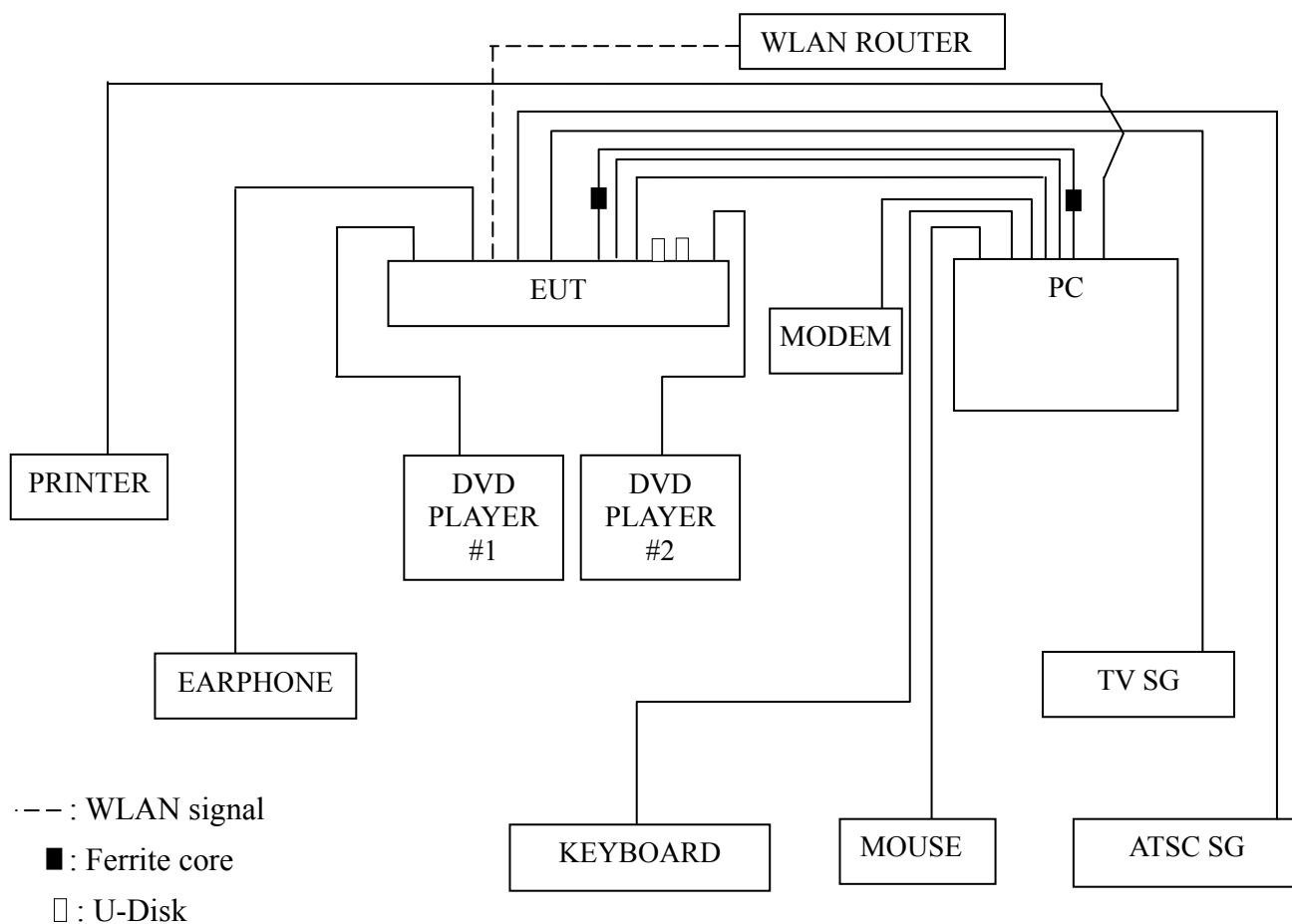
### 4.1 Test Equipment

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

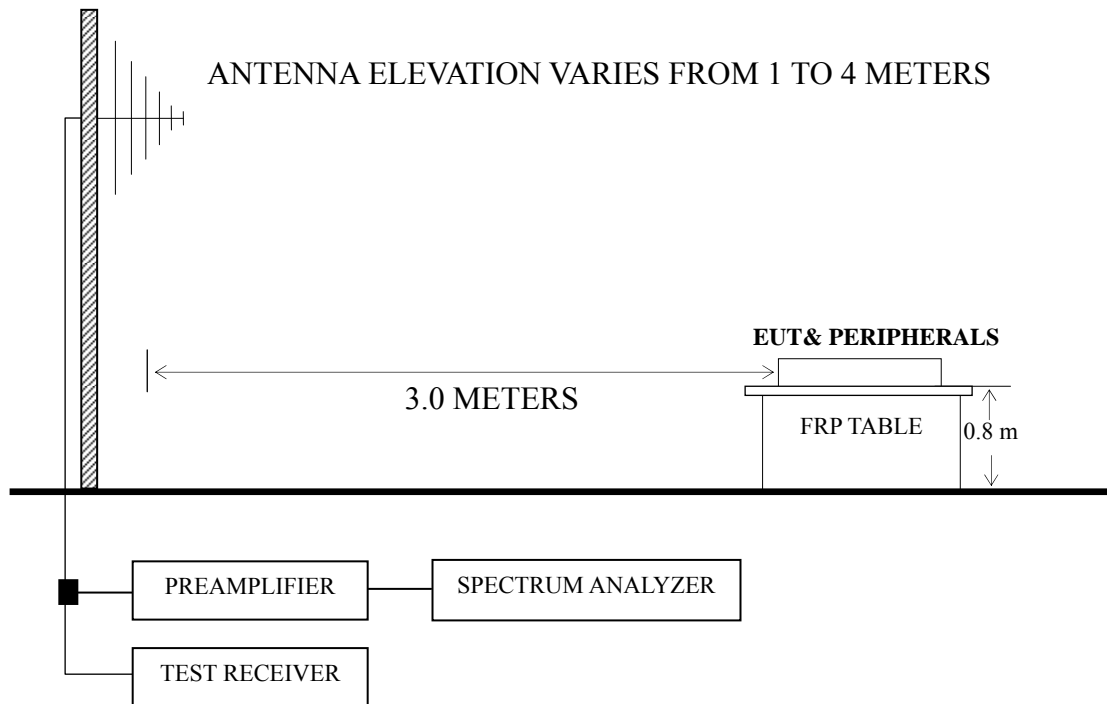
Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESCI	101302	Sep 03, 2013	Sep 02, 2014
2.	Preamplifier	Agilent	8447D	2944A10548	Sep 18, 2014	Mar 17, 2015
3.	Preamplifier	HP	8449B	3008A00864	Mar 20, 2014	Mar 19, 2015
4.	Bi-log Antenna	TESEQ	CBL6112D	23193	May 03, 2014	May 02, 2015
5.	Horn Antenna	EMCO	3115	9607-4878	May 11, 2014	May 10, 2015
6.	Spectrum	Agilent	E7405A	MY45106600	Nov 11, 2013	Nov 10, 2014
7.	50 Coaxial Switch	Anritsu	MP59B	6200426390	Mar 18, 2014	Sep 17, 2014
8.	Software	Audix	E3	6.2007-9-10	--	--

### 4.2 Block Diagram of Test Setup

#### 4.2.1 EUT & Peripherals



#### 4.2.2 Radiated emission test setup



■ : 50 ohm Coaxial Switch

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

Frequency (MHz)	Distance (m)	Field strength limits	
		( $\mu\text{V}/\text{m}$ )	dB ( $\mu\text{V}/\text{m}$ )
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 ( $\mu\text{V}/\text{m}$ ) = 20 log Emission Level ( $\mu\text{V}/\text{m}$ )

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 C63.4:2003 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 1024*768@60Hz & 1kHz Playing	P25
HDMI 640*480@60Hz & 1kHz Playing	P26
D-Sub 1024*768@60Hz & 1kHz Playing	P27
USB Play	P28
LAN Play	P29

NOTE 1 – Emission Level = Antenna Factor + Cable Loss + Meter Reading. (< 1GHz);

Emission Level = Antenna Factor + Cable Loss – Preamp Factor + Meter Reading. (> 1GHz)

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 1024\*768@60Hz & 1kHz Playing test mode. The worst emission at horizontal polarization was detected at 87.230 MHz with corrected signal level of 30.82 dB ( $\mu\text{V/m}$ ) (limit is 40.00 dB ( $\mu\text{V/m}$ )), when the antenna was 1.20 m height and the turntable was at 132°. The worst emission at vertical polarization was detected at 270.000 MHz with corrected signal level of 42.90 dB ( $\mu\text{V/m}$ ) (limit is 46.00 dB ( $\mu\text{V/m}$ )), when the antenna was 1.00 m height and the turntable was at 212°.

EUT : LED LCD TV Temperature : 22

Model No. : 32K20DW Humidity : 60%RH

Test Mode : HDMI 1920\*1080@60Hz & 1kHz Playing Date of Test : Aug 12, 2014

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Horizontal	33.880	3.81	16.73	0.68	--	21.22	40.00	18.78	QP
	61.040	15.67	5.28	0.89	--	21.84	40.00	18.16	
	87.890	26.47	8.11	1.12	--	35.70	40.00	4.30	
	167.740	22.11	8.81	1.63	--	32.55	43.50	10.95	
	558.650	13.61	19.10	3.10	--	35.81	46.00	10.19	
	<b>704.700</b>	<b>19.27</b>	<b>20.07</b>	<b>3.50</b>	--	<b>42.84</b>	<b>46.00</b>	<b>3.16</b>	
	1085.000	49.56	23.62	4.29	36.57	40.90	74.00	33.10	PK
	1209.000	48.56	24.36	3.57	36.38	40.11	74.00	33.89	
	1385.000	46.59	25.29	3.69	36.07	39.50	74.00	34.50	
	1458.000	46.59	25.56	3.78	35.92	40.01	74.00	33.99	
	1536.000	47.60	25.81	3.86	35.78	41.49	74.00	32.51	
	1789.000	45.87	26.77	4.14	35.48	41.30	74.00	32.70	AV
	1085.000	32.15	23.62	4.29	36.57	23.49	54.00	30.51	
	1209.000	34.26	24.36	3.57	36.38	25.81	54.00	28.19	
	1385.000	34.27	25.29	3.69	36.07	27.18	54.00	26.82	
	1458.000	36.47	25.56	3.78	35.92	29.89	54.00	24.11	
1536.000	34.58	25.81	3.86	35.78	28.47	54.00	25.53		
1789.000	35.47	26.77	4.14	35.48	30.90	54.00	23.10		

TEST ENGINEER: NEAL WANG

EUT : LED LCD TV Temperature : 22

Model No. : 32K20DW Humidity : 60%RH

Test Mode : HDMI 1920\*1080@60Hz & 1kHz Playing Date of Test : Aug 12, 2014

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
Vertical	34.850	17.97	16.47	0.69	--	35.13	40.00	4.87	QP
	66.860	21.56	5.39	0.91	--	27.86	40.00	12.14	
	93.050	23.26	8.97	1.17	--	33.40	43.50	10.10	
	146.400	21.80	10.47	1.50	--	33.77	43.50	9.73	
	287.050	14.72	12.70	2.41	--	29.83	46.00	16.17	
	<b>700.500</b>	<b>17.70</b>	<b>20.20</b>	<b>3.49</b>	--	<b>41.39</b>	<b>46.00</b>	<b>4.61</b>	
	1016.000	48.59	23.27	4.70	36.68	39.88	74.00	34.12	PK
	1236.000	48.58	24.52	3.59	36.33	40.36	74.00	33.64	
	1358.000	46.76	25.17	3.68	36.12	39.49	74.00	34.51	
	1430.000	48.25	25.47	3.73	35.97	41.48	74.00	32.52	
	1489.000	46.25	25.67	3.80	35.86	39.86	74.00	34.14	
	1784.000	54.26	26.75	4.14	35.48	49.67	74.00	24.33	
	1016.000	34.58	23.27	4.70	36.68	25.87	54.00	28.13	AV
	1236.000	34.57	24.52	3.59	36.33	26.35	54.00	27.65	
	1358.000	36.46	25.17	3.68	36.12	29.19	54.00	24.81	
	1430.000	37.45	25.47	3.73	35.97	30.68	54.00	23.32	
	1489.000	37.45	25.67	3.80	35.86	31.06	54.00	22.94	
	1784.000	36.47	26.75	4.14	35.48	31.88	54.00	22.12	

TEST ENGINEER: NEAL WANG



EUT : LED LCD TV Temperature : 22

Model No. : 32K20DW Humidity : 60%RH

Test Mode : HDMI 1024\*768@60Hz & 1kHz Playing Date of Test : Aug 12, 2014

Polarization	Frequency (MHz)	Meter Reading dB ( $\mu$ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB ( $\mu$ V/m)	Limits dB ( $\mu$ V/m)	Margin (dB)
Horizontal	34.850	3.82	16.47	0.69	20.98	40.00	19.02
	<b>87.230</b>	<b>21.71</b>	<b>7.99</b>	<b>1.12</b>	<b>30.82</b>	<b>40.00</b>	<b>9.18</b>
	165.800	20.04	9.03	1.62	30.69	43.50	12.81
	288.020	21.75	12.60	2.41	36.76	46.00	9.24
	429.640	11.28	18.10	2.75	32.13	46.00	13.87
694.450	8.33	20.47	3.49	32.29	46.00	13.71	
Vertical	35.820	18.03	16.24	0.71	34.98	40.00	5.02
	74.620	20.66	7.29	0.98	28.93	40.00	11.07
	149.310	18.48	10.66	1.52	30.66	43.50	12.84
	<b>270.000</b>	<b>28.30</b>	<b>12.30</b>	<b>2.30</b>	<b>42.90</b>	<b>46.00</b>	<b>3.10</b>
	450.980	7.08	16.40	2.80	26.28	46.00	19.72
704.800	18.27	20.07	3.50	41.84	46.00	4.16	

TEST ENGINEER: NEAL WANG

EUT : LED LCD TV Temperature : 22

Model No. : 32K20DW Humidity : 60%RH

Test Mode : HDMI 640\*480@60Hz & 1kHz Playing Date of Test : Aug 12, 2014

Polarization	Frequency (MHz)	Meter Reading dB ( $\mu$ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB ( $\mu$ V/m)	Limits dB ( $\mu$ V/m)	Margin (dB)
Horizontal	36.790	7.12	15.74	0.72	23.58	40.00	16.42
	<b>93.050</b>	<b>26.00</b>	<b>8.97</b>	<b>1.17</b>	<b>36.14</b>	<b>43.50</b>	<b>7.36</b>
	146.400	18.51	10.47	1.50	30.48	43.50	13.02
	287.050	23.25	12.70	2.41	38.36	46.00	7.64
	439.340	9.37	17.90	2.77	30.04	46.00	15.96
Vertical	691.540	8.51	20.60	3.47	32.58	46.00	13.42
	<b>34.490</b>	<b>18.25</b>	<b>16.58</b>	<b>0.69</b>	<b>35.52</b>	<b>40.00</b>	<b>4.48</b>
	74.620	20.54	7.29	0.98	28.81	40.00	11.19
	146.400	20.40	10.47	1.50	32.37	43.50	11.13
	252.130	17.49	11.72	2.17	31.38	46.00	14.62
	428.670	9.54	17.80	2.74	30.08	46.00	15.92
	697.360	8.06	20.33	3.49	31.88	46.00	14.12

TEST ENGINEER: NEAL WANG

EUT : LED LCD TV Temperature : 22

Model No. : 32K20DW Humidity : 60%RH

Test Mode : D-Sub 1024\*768@60Hz & 1kHz Playing Date of Test : Aug 12, 2014

Polarization	Frequency (MHz)	Meter Reading dB ( $\mu$ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB ( $\mu$ V/m)	Limits dB ( $\mu$ V/m)	Margin (dB)
Horizontal	<b>73.650</b>	<b>22.86</b>	<b>6.97</b>	<b>0.97</b>	<b>30.80</b>	<b>40.00</b>	<b>9.20</b>
	141.550	14.31	10.62	1.48	26.41	43.50	17.09
	220.120	20.43	8.12	1.94	30.49	46.00	15.51
	351.070	14.64	14.27	2.60	31.51	46.00	14.49
	573.200	7.57	20.00	3.13	30.70	46.00	15.30
	838.980	5.24	21.40	3.98	30.62	46.00	15.38
Vertical	<b>35.820</b>	<b>14.71</b>	<b>16.24</b>	<b>0.71</b>	<b>31.66</b>	<b>40.00</b>	<b>8.34</b>
	72.680	19.56	6.66	0.95	27.17	40.00	12.83
	144.460	19.18	10.44	1.49	31.11	43.50	12.39
	287.050	15.60	12.70	2.41	30.71	46.00	15.29
	528.580	10.25	17.90	3.00	31.15	46.00	14.85
	870.020	8.52	20.80	4.19	33.51	46.00	12.49

TEST ENGINEER: NEAL WANG

EUT : LED LCD TV Temperature : 22

Model No. : 32K20DW Humidity : 60%RH

Test Mode : USB Play Date of Test : Aug 12, 2014

Polarization	Frequency (MHz)	Meter Reading dB ( $\mu$ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB ( $\mu$ V/m)	Limits dB ( $\mu$ V/m)	Margin (dB)
Horizontal	93.050	26.00	8.97	1.17	36.14	43.50	7.36
	148.340	20.41	10.62	1.51	32.54	43.50	10.96
	260.860	24.68	12.28	2.22	39.18	46.00	6.82
	322.940	20.83	14.73	2.55	38.11	46.00	7.89
	573.200	10.86	20.00	3.13	33.99	46.00	12.01
	<b>878.750</b>	<b>15.39</b>	<b>19.87</b>	<b>4.30</b>	<b>39.56</b>	<b>46.00</b>	<b>6.44</b>
Vertical	<b>34.490</b>	<b>18.25</b>	<b>16.58</b>	<b>0.69</b>	<b>35.52</b>	<b>40.00</b>	<b>4.48</b>
	93.050	23.04	8.97	1.17	33.18	43.50	10.32
	163.860	17.64	9.10	1.61	28.35	43.50	15.15
	289.960	17.80	12.50	2.41	32.71	46.00	13.29
	429.640	9.76	18.10	2.75	30.61	46.00	15.39
	810.850	11.12	20.60	3.70	35.42	46.00	10.58

TEST ENGINEER: NEAL WANG

EUT : LED LCD TV Temperature : 22

Model No. : 32K20DW Humidity : 60%RH

Test Mode : LAN Play Date of Test : Aug 12, 2014

Polarization	Frequency (MHz)	Meter Reading dB ( $\mu$ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB ( $\mu$ V/m)	Limits dB ( $\mu$ V/m)	Margin (dB)
Horizontal	73.650	22.86	6.97	0.97	30.80	40.00	9.20
	<b>156.100</b>	<b>24.87</b>	<b>9.10</b>	<b>1.56</b>	<b>35.53</b>	<b>43.50</b>	<b>7.97</b>
	233.700	19.80	9.64	2.05	31.49	46.00	14.51
	326.820	17.80	14.77	2.56	35.13	46.00	10.87
	571.260	9.10	20.00	3.13	32.23	46.00	13.77
	880.690	13.04	19.40	4.30	36.74	46.00	9.26
Vertical	<b>35.820</b>	<b>14.71</b>	<b>16.24</b>	<b>0.71</b>	<b>31.66</b>	<b>40.00</b>	<b>8.34</b>
	73.650	21.59	6.97	0.97	29.53	40.00	10.47
	156.100	23.95	9.10	1.56	34.61	43.50	8.89
	233.700	19.64	9.64	2.05	31.33	46.00	14.67
	354.950	12.64	14.61	2.60	29.85	46.00	16.15
	529.550	10.50	17.80	3.00	31.30	46.00	14.70

TEST ENGINEER: NEAL WANG

## 5 DEBUG DESCRIPTION

The following components are used during the countermeasure procedures:

Name	M/N	Manufacturer	Location
No Tape	5x30MM\ROH	Qingdao Joinset S&T Co., Ltd.	See Internal Photo Appendix Figure 21, 22, 23
	RSAG8.610.011\ROH		

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:

*Neal Wang*

**(NEAL WANG)**

## **6 DEVIATION TO TEST SPECIFICATIONS**

None.