

Hisense Electric Co., Ltd

Application
For
Certification
FCC ID: W9HLCDC0025

LED TV

Model: LHD32D33US Additional Model: LHD32D31US, LHD32D30US, 32D33, 32D31, 32D30

Computer Peripheral

Report No.: 130826033SZN-002

Prepared and Checked by: Approved by:

Sign on file

Jenner Liu Robert Li
Testing Engineer Project Engineer

Date: September 09, 2013

The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.

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TRF No.: FCC 15C_PC_b

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MEASUREMENT / TECHNICAL REPORT

Hisense Electric Co., Ltd MODEL: LHD32D33US

Additional Model: LHD32D31US, LHD32D30US, 32D33, 32D31, 32D30

FCC ID: W9HLCDC0025

This report concerns (check one:)	Original Grant _	X Class	II Change	
Equipment Type: <u>JBP-Class B Computing</u>	ng Device Periphe	<u>eral</u>		
Deferred grant requested per 47 CFR 0.	.457(d)(1)(ii)?	Yes	No _	<u>X</u>
	If yes, de	fer until:	date	
Company Name agrees to notify the Cor	mmission by:			
of the intended date of announcement of that date.	of the product so	date that the grant o	can be issued	d on
Transition Dulas Danuart non 45 272			A I	~
Transition Rules Request per 15.37?		Yes	NO _	<u>X</u>
If no, assumed Part 15, Subpart B for u Edition] provision.	ınintentional radia			
If no, assumed Part 15, Subpart B for u	ınintentional radia			

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List of attached file

Exhibit Type	File Description	Filename
Test Report	Test Report	report.pdf
Test Setup Photo	Radiated photos	radiated photos.pdf
Test Setup Photo	Conducted photos	conducted photos.pdf
External Photo	External Photos	external photos.pdf
Internal Photo	Internal Photos	internal photos.pdf
Block Diagram	Block Diagram	block.pdf
ID Label / Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf
Cover Letter	Confidential Letter	request.pdf
Cover Letter	Letter of Agency	agency.pdf

EXHIBIT 1 GENERAL DESCRIPTION

1.0 **General Description**

1.1 Product Description

The Equipment Under Test (EUT) is a LED TV. The device can be used to connect PC by HDMI and VGA port. The EUT is powered by 120V/60Hz.

The Models: LHD32D31US, LHD32D30US, 32D33, 32D31, 32D30 are the same as the Model: LHD32D33US in hardware aspect. The difference in decoration, model number serves as marketing strategy.

1.2 Related Submittal(s) Grants

This is an application for certification of a computer peripheral. Other digital functions were reported in the verification report: 130826033SZN-001.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). Radiated emission measurement was performed in Semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Justification Section" of this Application.

1.4 Test Facility

The Semi-anechoic chamber and shielding room used to collect the radiated data and conducted data are **Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: 242492).

EXHIBIT 2 SYSTEM TEST CONFIGURATION

2.0 **System Test Configuration**

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2009).

The device was powered by AC 120V/60Hz during the test. The worst case data was reported in this report.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. The step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The rear of unit shall be flushed with the rear of the table.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

The frequency range from 30MHz to 5GHz was searched for spurious emissions from the device. Only those emissions reported were detected. All other emissions were at least 20 dB below the applicable limits.

2.2 EUT Exercising Software

N/A

2.3 Special Accessories

N/A

2.4 Equipment Modification

Any modifications installed previous to testing by Hisense Electric Co., Ltd will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch.

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2.5 Measurement Uncertainty

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

2.6 Support Equipment List and Description

This product was tested in the following configuration:

Refer List:

Description	Manufacturer	Model No.
Laptop	Lenovo	T420
Laptop	Lenovo	X1
Hard Disk	Smart.drive	HD-003
USB Memory	SanDisk	SDCZ36-002G-P36
1394 Cable	Smart.drive	Unshielded, Length 180cm
USB Cable	Smart.drive	Unshielded, Length 155cm
Dummy Load	N/A	N/A
VGA Cable	HP	Unshielded, Length 180cm
HDMI Cable*3	N/A	Shielded, Length 110cm
PC Audio Cable	N/A	Unshielded, Length 150cm
AV Cable	N/A	Unshielded, Length 120cm
YPbPr Cable	N/A	Unshielded, Length 120cm
Digital Audio Out Cable	N/A	Unshielded, Length 120cm
Tuner Resister	N/A	75ohm
Headphone	N/A	Unshielded, Length 110cm
Remote controller	Hisense	N/A

EXHIBIT 3

EMISSION RESULTS

3.0 **Emission Results**

Data is included worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD + AV$$

where FS = Field Strength in $dB\mu V/m$

RA = Receiver Amplitude (including preamplifier) in $dB\mu V$

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB/m

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

3.1 Field Strength Calculation (cont'd)

Example

Assume a receiver reading of $62.0 dB_{\mu}V$ is obtained. The antenna factor of 7.4dB/m and cable factor of 1.6dB is added. The amplifier gain of 29dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0dB, and the resultant average factor was -10dB. The net field strength for comparison to the appropriate emission limit is $32dB_{\mu}V/m$. This value in $dB_{\mu}V/m$ was converted to its corresponding level in $\mu V/m$.

 $RA = 62.0dB\mu V$ AF = 7.4dB/mCF = 1.6dB

AG = 29.0dB

PD = 0dB

AV = -10dB

FS = $62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32dB\mu V/m$

Level in μ V/m = Common Antilogarithm [(32dB μ V/m)/20] = 39.8 μ V/m

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3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission At 519.785MHz (HDMI In Mode)

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos.pdf.

3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 4.0dB margin (HDMI In Mode)

TEST PERSONNEL:	
Sign on file	
Jenner Liu Testing Engineer Typed/Printed Name	
September 09, 2013	

Company: Hisense Electric Co., Ltd Date of Test: September 09, 2013

Model: LHD32D33US Operating Mode: HDMI In

Table 1

Radiated Emissions

Polarization	Frequency	Reading	Pre-	Antenna	Net	Limit	Margin
	(MHz)	(dBµV)	Amp	Factor	at 3m	at 3m	(dB)
			Gain	(dB)	(dBµV/m)	(dBµV/m)	
			(dB)				
Horizontal	519.763	43.5	20.0	16.3	39.8	46.0	-6.2
Horizontal	668.500	38.7	20.0	19.9	38.6	46.0	-7.4
Horizontal	965.565	35.6	20.0	23.9	39.5	54.0	-14.5
Horizontal	1113.000	38.8	20.0	26.2	45.0	54.0	-9.0
Vertical	371.440	41.9	20.0	15.6	37.5	46.0	-8.5
Vertical	519.785	45.7	20.0	16.3	42.0	46.0	-4.0
Vertical	668.260	38.7	20.0	19.9	38.6	46.0	-7.4
Vertical	1113.000	37.8	20.0	26.2	44.0	54.0	-10.0

NOTES:

- 1. Quasi-Peak detector is used for frequency up to 1GHz and Peak detector is used for frequency from 1-2GHz.
- 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3 meter distances were measured at 0.3- meter and an inverse proportional extrapolation was performed to compare the signal level to the 3 meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
- 3. Negative value in the margin column shows emission below limit.
- 4. All emissions up to 1GHz are below the QP limit and all emissions between 1-2GHz are below the AV limit.

Test Engineer: Jenner Liu

Company: Hisense Electric Co., Ltd Date of Test: September 09, 2013

Model: LHD32D33US Operating Mode: VGA

Table 1

Radiated Emissions

Polarization	Frequency	Reading	Pre-	Antenna	Net	Limit	Margin
	(MHz)	(dBµV)	Amp	Factor	at 3m	at 3m	(dB)
			Gain	(dB)	(dBµV/m)	(dBµV/m)	
			(dB)				
Horizontal	85.290	42.4	20.0	7.5	29.9	40.0	-10.1
Horizontal	162.890	41.5	20.0	9.3	30.8	43.5	-12.7
Horizontal	318.575	39.5	20.0	13.3	32.8	46.0	-13.2
Horizontal	1379.000	22.2	20.0	29.9	41.0	54.0	-13.0
Vertical	31.940	36.3	20.0	16.1	32.1	40.0	-7.9
Vertical	88.000	45.9	20.0	7.2	32.4	40.0	-7.6
Vertical	254.070	46.8	20.0	13.2	33.1	46.0	-12.9
Vertical	1386.000	30.3	20.0	29.7	40.0	54.0	-14.0

NOTES:

- 1. Quasi-Peak detector is used for frequency up to 1GHz and PEAK detector is used for frequency from 1-2GHz.
- 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3 meter distances were measured at 0.3- meter and an inverse proportional extrapolation was performed to compare the signal level to the 3 meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
- 3. Negative value in the margin column shows emission below limit.
- 4. All emissions up to 1GHz are below the QP limit and all emissions between 1-2GHz are below the AV limit.

Test Engineer: Jenner Liu

- 3.4 Conducted Emission at Mains Terminal
- 3.5 Conducted Emission Configuration Photograph

Worst Case Conducted Configuration at 0.314 MHz(HDMI In Mode)

For electronic filing, the worst case conducted emission configuration photograph is saved with filename: conducted photos.pdf.

3.6 Conducted Emission Data

Judgement: Passed by 7.6 dB margin (HDMI In Mode)

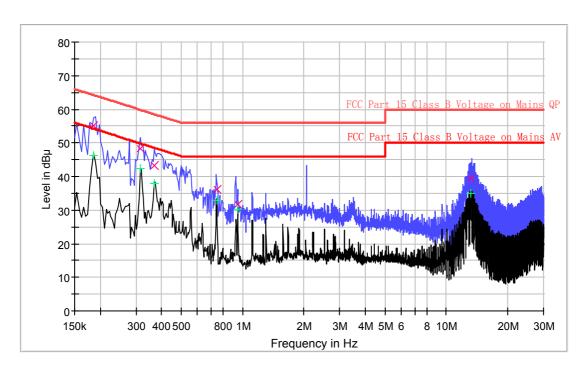
TEST PERSONNEL:
Sign on file
Jenner Liu Testing Engineer Typed/Printed Name
September 09, 2013
Date

Company: Hisense Electric Co., Ltd Date of Test: September 09, 2013

Model: LHD32D33US Operating Mode: HDMI In

Phase: Live

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.186	55.2	L1	9.7	9.0	64.2
0.314	48.3	L1	9.7	11.6	59.9
0.370	43.2	L1	9.7	15.3	58.5
0.746	36.2	L1	9.7	19.8	56.0
0.950	31.8	L1	9.8	24.2	56.0
13.158	39.3	L1	10.1	20.7	60.0

Result Table AV

Frequency	Average	Line	Corr.	Margin	Limit
(MHz)	(dB µ V)		(dB)	(dB)	(dB µ V)
0.186	46.3	L1	9.7	7.9	54.2
0.314	42.3	L1	9.7	7.6	49.9
0.370	37.9	L1	9.7	10.6	48.5
0.746	32.9	L1	9.7	13.1	46.0
0.950	30.3	L1	9.8	15.7	46.0
13.158	35.0	L1	10.1	15.0	50.0

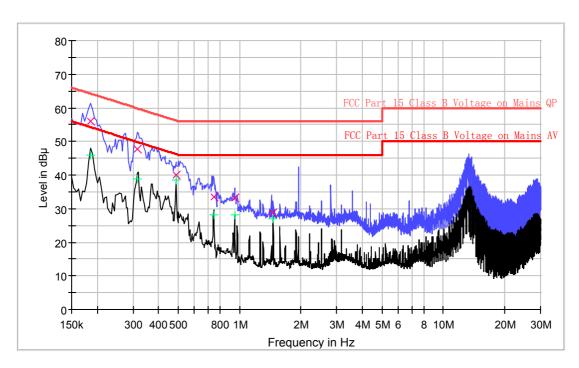
Test Engineer: Jenner Liu

Company: Hisense Electric Co., Ltd Date of Test: September 09, 2013

Model: LHD32D33US Operating Mode: HDMI In

Phase: Neutral

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.186	55.9	N	10.2	8.3	64.2
0.314	47.6	N	10.2	12.3	59.9
0.486	39.9	N	10.2	16.3	56.2
0.746	33.4	N	10.3	22.6	56.0
0.946	33.3	N	10.3	22.7	56.0
1.462	28.8	N	10.3	27.2	56.0

Result Table AV

Frequency	Average	Line	Corr.	Margin	Limit
(MHz)	(dB µ V)		(dB)	(dB)	(dB µ V)
0.186	45.8	N	10.2	8.4	54.2
0.314	38.9	N	10.2	11.0	49.9
0.486	38.6	N	10.2	7.6	46.2
0.746	28.1	N	10.3	17.9	46.0
0.946	28.1	N	10.3	17.9	46.0
1.462	26.9	N	10.3	19.1	46.0

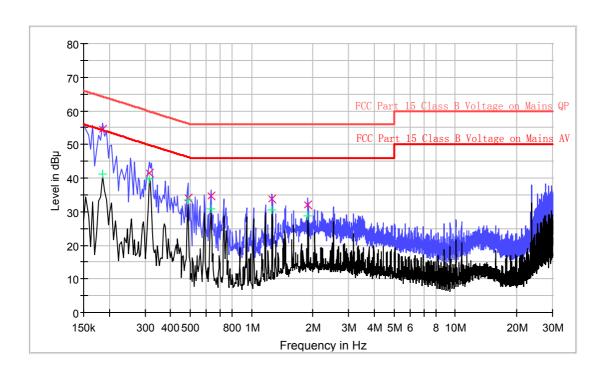
Test Engineer: Jenner Liu

Company: Hisense Electric Co., Ltd Date of Test: September 09, 2013

Model: LHD32D33US Operating Mode: VGA

Phase: Live

Conducted Emission Test - FCC



Result Table QP

Frequency	QuasiPeak	Line	Corr.	Margin	Limit
(MHz)	(dB μ V)		(dB)	(dB)	(dB μ V)
0.186	54.5	L1	9.7	9.7	64.2
0.314	41.6	L1	9.7	18.3	59.9
0.486	34.0	L1	9.7	22.2	56.2
0.630	34.6	L1	9.7	21.4	56.0
1.262	33.8	L1	9.8	22.2	56.0
1.894	32.0	L1	9.8	24.0	56.0

Result Table AV

Frequency	Average	Line	Corr.	Margin	Limit
(MHz)	(dB µ V)	Line	(dB)	(dB)	(dB µ V)
0.186	41.1	L1	9.7	13.1	54.2
0.314	39.7	L1	9.7	10.2	49.9
0.486	33.6	L1	9.7	12.6	46.2
0.630	30.9	L1	9.7	15.1	46.0
1.262	30.5	L1	9.8	15.5	46.0
1.894	28.9	L1	9.8	17.1	46.0

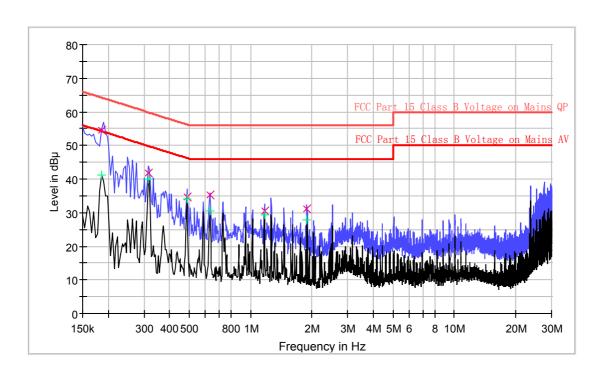
Test Engineer: Jenner Liu

Company: Hisense Electric Co., Ltd Date of Test: September 09, 2013

Model: LHD32D33US Operating Mode: VGA

Phase: Neutral

Conducted Emission Test - FCC



Result Table QP

Frequency (MHz)	QuasiPeak (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.186	54.4	N	10.2	9.8	64.2
0.314	41.9	N	10.2	18.0	59.9
0.486	34.6	N	10.2	21.6	56.2
0.630	35.3	N	10.2	20.7	56.0
1.170	30.5	N	10.3	25.5	56.0
1.894	31.0	N	10.3	25.0	56.0

Result Table AV

Frequency	Average	Line	Corr.	Margin	Limit
(MHz)	(dB µ V)		(dB)	(dB)	(dB µ V)
0.186	41.2	N	10.2	13.0	54.2
0.314	40.1	N	10.2	9.8	49.9
0.486	34.1	N	10.2	12.1	46.2
0.630	30.6	N	10.2	15.4	46.0
1.170	29.4	N	10.3	16.6	46.0
1.894	27.9	N	10.3	18.1	46.0

Test Engineer: Jenner Liu

EXHIBIT 4 EQUIPMENT PHOTOGRAPHS

4.0 **Equipment Photographs**

For electronic filing, photographs of the tested EUT are saved with filename: external photos.pdf and internal photos.pdf.

EXHIBIT 5 PRODUCT LABELLING

5.0 **Product Labelling**

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

EXHIBIT 6 TECHNICAL SPECIFICATIONS

6.0 <u>Technical Specifications</u>

For electronic filing, the block diagram of the tested EUT is saved with filename: block.pdf.

EXHIBIT 7 INSTRUCTION MANUAL

7.0 **Instruction Manual**

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold / leased in the United States.

EXHIBIT 8

MISCELLANEOUS INFORMATION

8.0 <u>Miscellaneous Information</u>

This miscellaneous information includes emission measuring procedure.

8.1 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of computer peripheral operating under Part 15, Subpart B rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 – 2009.

The computer peripheral equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The antenna height and polarization are varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions are in QP mode from the frequency band 30MHz to 1GHz with RBW setting 120kHz and in PK & AV mode from frequency band 1GHz to 6GHz with RBW setting 1MHz. Detector function for conducted emissions are in QP & AV mode and IFBW setting is 9kHz from the frequency band 150kHz to 30MHz.

For radiated emission, the frequency range scanned is 30MHz to 6GHz. For line-conducted emissions, the range scanned is 150kHz to 30MHz.

8.1 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

Conducted measurements are made as described in ANSI C63.4 – 2009.

EXHIBIT 9

TEST EQUIPMENT LIST

9.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	Biconilog Antenna	ETS	3142C	00066460	29-Jun-13	29-Jun-2014
SZ185-01	EMI Receiver	R&S	ESCI	100547	12-Mar-2013	12-Mar-2014
SZ188-01	Anechoic Chamber	ETS	RFD-F/A- 100	02 Mar 2013	02-Mar-2013	02-Mar-2014
SZ062-04	RF Cable	RADIALL	RG 213U		20-Jul-2013	20-Jan-2014
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	05-Nov-2012	05-Nov-2013
SZ187-01	Two-Line V- Network	R&S	ENV216	100072	05-Nov-2012	05-Nov-2013
SZ187-02	Two-Line V- Network	R&S	ENV216	100073	05-Nov-2012	05-Nov-2013
SZ188-03	Shielding Room	ETS	RFD-100	4100	23-Aug-2013	23-Aug-2014

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