Hisense Electric Co., Ltd. FCC ID: W9HLCDE0007 Page 1 of 21

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

#### LED LCD TV

Model No.	Serial No.	Brand
LTDN46K316XWUS3D	E1204417-02/02	Hisansa
46K316DW		Hisense

FCC ID: W9HLCDE0007

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-F12086 Date of Test: May 14, 2012 Date of Report: May 16, 2012

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#### TEST REPORT FOR FCC CERTIFICATION

Applicant : Hisense Electric Co., Ltd.

Manufacturer : Hisense Electric Co., Ltd..

EUT Description : LED LCD TV

Model No.	Serial No.	Brand	Power Supply	
LTDN46K316XWUS3D	E1204417-02/02	Hisansa	120V/60Hz	
46K316DW		Hisense		

Test Procedure Used:

#### FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2011 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 C limits radiated emission.

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; S/N: Refer to Sec2.1), which was tested in 3m anechoic chamber on May. 14, 2012 to be technically compliant 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 to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government by the client.

Date of Test:	May. 14, 2012	_ Date of Report : _	May. 16, 2012
Producer:	YENNY YU / Assistant	-	•
Review:	DIO YANG/ Assistant Manager	-	
UDIX® For a	and on behalf of		

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

Authorized Signature EMC SAMMY CHEN / Deputy Manager

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# 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 / Test Item	Test Standard	Meets Limit	Results		
Conducted Emission at the Mains Terminal	FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2011 AND ANSI C63.4:2003	15.207	N/A		
Radiated Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2011 AND ANSI C63.4:2003	15.209	Pass		
Fundamental and Harmonics Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2011 AND ANSI C63.4:2003	15.249	Pass		
Band-Edge Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2011 AND ANSI C63.4:2003	15.249	Pass		
N/A is an abbreviation for Not Applicable.					

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#### 2 GENERAL INFORMATION

2.1 Description of Equipment Under Test

Description : LED LCD TV

Type of EUT :  $\square$  Production  $\square$  Pre-product  $\square$  Pro-type

Model No.	Serial No.	Brand
LTDN46K316XWUS3D	E1204417-02/02	Higanga
46K316DW		Hisense

Note : The above models are all the same except for the

different model name.

The LTDN46K316XWUS3D was tested and

reported in the report.

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

Modulation : MSK 500kbps

Operation Frequency : 2458 MHz

Frequency Channel : Total 1 Channel

Tested Frequency : 2458 MHz

Antenna Location : Top of the RF module

Please see Figure 21 in APPENDIX III

"Photographs of EUT" for further information.

Antenna Type : Internal permanently attached antenna

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# 2.2 Description of Test Facility

Site Description : Sept. 17, 1998 file on (Semi-Anechoic Chamber) : April 29, 2009 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

FCC registration Number : 91789

Accredited by NVLAP, Lab Code : 200371-0

#### 2.3 Measurement Uncertainty

Radiated Emission Expanded Uncertainty (30-200MHz):

U = 4.67 dB (Horizontal)

U = 4.72 dB (Vertical)

Radiated Emission Expanded Uncertainty (200M-1GHz):

U = 4.81 dB (Horizontal)

U = 4.69 dB (Vertical)

Radiated Emission Expanded Uncertainty (Above 1GHz):

U= 4.50 dB (Horizontal)

U= 4.16 dB (Vertical)

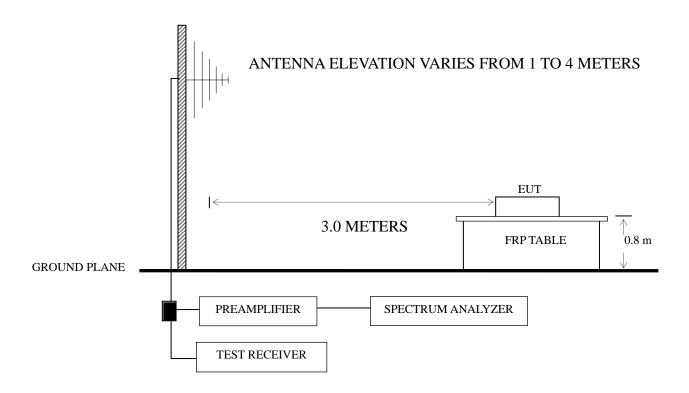
# 3 RADIATED EMISSION TEST

# 3.1 Test Equipment

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

Item	Туре	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E7405A	MY45106600	Mar 22, 2012	Mar 22, 2013
2.	Bi-log Antenna	TESEQ	CBL6112D	23192	Dec 01, 2011	Dec 01, 2012
3.	Horn Antenna	EMCO	3115	9607-4878	May 06, 2012	May 06, 2013
4.	Horn Antenna	EMCO	3116	00062643	Jul 21, 2012	Jul 21, 2013
5.	Test Receiver	R&S	ESVS10	844594/001	Mar 22, 2012	Mar 22, 2013
6.	Preamplifier	HP	8447D	2944A10548	Mar 18, 2012	Sep 18, 2012
7.	Preamplifier	HP	8449B	3008A00864	Apr 29, 2012	Apr 29, 2013
8.	50Ω Coaxial Switch	Anritsu	MP59B	6200426390	Mar 18, 2012	Sep 18, 2012
9.	Software	Audix	ЕЗ	SET00200 9912M295-2		

# 3.2 Block Diagram of Test Setup



■ : 50 ohm Coaxial Switch

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# 3.3 Radiated Emission Limit [FCC Part 15 Subpart C 15.209]

Frequency	Distance	Field strength limits ( $\mu V/m$ )		
(MHz)	(m)	(µV/m)	dB (μV/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 ( $\mu$ V/m) = 20 lg Emission Level ( $\mu$ 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 below or equal to 1GHz and Average value detector above 1GHz.
- NOTE 5 Above 1 GHz, the limit on peak emission is 20 dB above the maximum permitted average emission limit applicable to the EUT

#### 3.4 Test Configuration

The EUT was installed as show on Sec. 3.2 in radiated emission test to meet FCC requirement and operating in a manner, which tend to maximize emission level in a normal application.

# 3.5 Operating Condition of EUT

- 3.5.1 Setup the EUT as shown in Sec. 3.2.
- 3.5.2 Turn on the power of all equipment.
- 3.5.3 Set the EUT on the test mode (Transmitting) and then test.

#### 3.6 Test Procedures

The EUT was 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) and horn 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 bandwidth of Test Receiver R&S ESVS10 was set at 120 kHz for frequency range from 30MHz to 1000MHz.

The bandwidth of the VBW was set at 1MHz and RBW was set at 1MHz for peak emission measurement above 1GHz and 1MHz RBW, 10Hz VBW for average emission above 1GHz for Spectrum Agilent E7405A.

The frequency range from 30 MHz to 25 GHz (Up to 10<sup>th</sup> harmonics from fundamental frequency) was checked.

The test mode (Transmitting) was done on radiated emission test.

Please refer to Sec.3.7.

#### 3.7 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.

```
NOTE 1 - \text{Level} = \text{Read Level} + \text{Antenna Factor} + \text{Cable Loss} (<1\text{GHz})
```

NOTE 2 – Level = Read Level + Antenna Factor + Cable Loss

- Preamp Factor (>1GHz)

- NOTE  $3-0^{\circ}$  was the table front facing the antenna. Degree is calculated from  $0^{\circ}$  clockwise facing the antenna.
- NOTE 4 The emission levels which not reported are too low against the official limit.
- NOTE 5 All reading are Quasi-Peak values below or equal to 1GHz and Peak values and Average values above 1GHz. For above 1GHz test, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.

EUT : LED LCD TV Temperature :  $25^{\circ}$ C

Model No. : LTDN46K316XWUS3D Humidity : 50%RH

Serial No. : E1204417-02/02 Date of Test : May. 14, 2012

Test Mode : Transmitting 2458 MHz

Polarization	Frequency (MHz)	Read Level dB (µV)	Antenna Factor (dB/m)	Preamp Factor (dB)	Cable Loss (dB)	Level dB (µV/m)	Limits dB (µV/m)	Margin (dB)	Remark
	33.880	9.10	16.26		0.83	26.19	40.00	13.81	
	50.370	16.33	8.51		0.93	25.77	40.00	14.23	
	108.570	16.89	11.21		1.93	30.03	43.50	13.47	OD
	412.180	10.63	16.45		3.02	30.10	46.00	15.90	QP
	482.990	9.62	17.42		3.23	30.27	46.00	15.73	
Homizontol	871.960	10.59	20.38		4.60	35.57	46.00	10.43	
Horizontal	2116.000	46.54	27.91	36.17	6.56	44.84	74.00	29.16	
	3808.000	45.87	32.89	35.73	7.75	50.78	74.00	23.22	PK
	7192.000	46.77	37.64	34.73	9.83	59.51	74.00	14.49	
	9484.000	45.00	39.50	34.93	12.55	62.12	74.00	11.88	
	7192.000	27.33	37.64	34.73	9.83	40.07	54.00	13.93	AV
	9484.000	25.77	39.50	34.93	12.55	42.89	54.00	11.11	AV
	106.630	13.02	11.24	-	1.92	26.18	43.50	17.32	
	137.670	16.06	10.66		2.15	28.87	43.50	14.63	
	167.740	16.26	10.14	1	2.31	28.71	43.50	14.79	OD
	276.380	9.46	13.02	1	2.68	25.16	46.00	20.84	QP
	429.640	20.18	16.69	-	3.08	39.95	46.00	6.05	
Vertical	875.840	10.26	20.37		4.75	35.38	46.00	10.62	
vertical	1660.000	46.20	27.13	36.64	6.03	42.72	74.00	31.28	
	3928.000	45.43	33.14	35.71	8.01	50.87	74.00	23.13	PK
	6832.000	46.70	36.99	34.76	9.57	58.50	74.00	15.50	PK
	9136.000	46.72	39.50	34.88	12.15	63.49	74.00	10.51	
	6832.000	28.91	36.99	34.76	9.57	40.71	54.00	13.29	AV
	9136.000	27.11	39.50	34.88	12.15	43.88	54.00	10.12	AV

TEST ENGINEER: RAVEN JIN

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#### 4 FUNDAMENTAL AND HARMONICS EMISSIONS TEST

### 4.1 Test Equipment

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

Item	Туре	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Preamplifier	HP	8449B	3008A00864	Apr 29, 2012	Apr 29, 2013
2.	Spectrum Analyzer	Agilent	E7405A	MY45106600	Mar 22, 2012	Mar 22, 2013
3.	Horn Antenna	EMCO	3115	9607-4878	May 06, 2012	May 06, 2013
4.	Horn Antenna	EMCO	3116	00062643	Jul 21, 2012	Jul 21, 2013

# 4.2 Block Diagram of Test Setup

Same as Sec 3.2

# 4.3 Fundamental and Harmonics Emission Limit [FCC Part 15 Subpart C 15.249(a)]

Fundamental	Distance	Field Streng	gth of	Field Strength of		
Frequency	Distance	Fundame	ntal	Harmonics		
(MHz) (m)		(millivolts/meter)	$dB (\mu V/m)$	(microvolts/meter)	$dB (\mu V/m)$	
2400 ~ 2483.5	3	50	94	500	54	

- NOTE 1 Emission Level dB ( $\mu$ V/m) = 20 lg Emission Level ( $\mu$ V/m)
- NOTE 2 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 3 The limits shown are based on Average value detector.
- NOTE 4 The limit on peak emission is 20 dB above the maximum permitted average emission limit applicable to the EUT

#### 4.4 Test Configuration

The EUT was installed as show on Sec. 3.2 in fundamental and spurious emission test to meet ANSI C63.4:2003 requirements and operating in a manner that tend to maximize emission level in a normal application.

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# 4.5 Operating Condition of EUT

- 4.5.1 Setup the EUT as shown in Sec. 3.2.
- 4.5.2 Turn on the power of all equipment.
- 4.5.3 Set the EUT on the test mode (Transmitting) and then test.

#### 4.6 Test Procedures

The EUT was placed on a FRP turntable that is 0.8 meter above ground. The 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. Both horizontal and vertical polarization of the antenna was set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to FCC PART 15 Subpart C and ANSI C63.4:2003 requirements during fundamental and harmonics emission test.

The frequency range from 2.4 GHz to 25 GHz (Up to 10<sup>th</sup> harmonics from fundamental frequency) was checked.

The test mode (Transmitting) was done on Fundamental and Harmonics Emission test.

#### 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.

- NOTE 1 All readings are Peak values.
- NOTE 2 The harmonics emission levels which not reported are too low against the official limit.
- NOTE 3 PK Level = Read Level + Factor AV Level = PK Level - Correction Factor.
- NOTE 4 Factor = Antenna Factor + Cable Loss Preamp Factor
- NOTE 5 Correction factor is measured as follows:

```
Duty Cycle x = Tx on / (Tx on + Tx off) = 0.9691 / 16.76 = 0.0578

Correction Factor = |20\log(\text{Duty Cycle})| = 24.76 \text{ dB}
```

NOTE 6 - The duty cycle was calculated according to the plot in Appendix I

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EUT : LED LCD TV Temperature :  $25^{\circ}$ C

Model No. : LTDN46K316XWUS3D Humidity : 50% RH

Serial No. : E1204417-02/02 Date of Test : May. 14, 2012

Test Mode Transmitting 2458 MHz

Polarization	Frequency (MHz)	Read Level dB (µV)	Factor (dB/m)	Correction factor (dB)	Level dB (µV/m)	Limits dB $(\mu V/m)$	Margin (dB)	Remark
	2458.00	93.92	0.34		94.26	114.00	19.74	
	4916.00	44.11	10.17		54.28	74.00	19.72	PK
	7374.00	45.83	13.86		59.69	74.00	14.31	PK
Horizontal	9832.00	44.40	16.99		61.39	74.00	12.61	
Horizontai	2458.00		1	24.76	69.50	94.00	24.50	
	4916.00		-	24.76	29.52	54.00	24.48	AV
	7374.00			24.76	34.93	54.00	19.07	AV
	9832.00			24.76	36.63	54.00	17.37	
	2458.00	85.60	0.34		85.97	114.00	28.03	
	4916.00	44.34	10.17		54.82	74.00	19.18	PK
	7374.00	45.41	13.86		59.27	74.00	14.73	PK
Vantical	9832.00	44.78	16.99		61.68	74.00	12.32	
Vertical	2458.00			24.76	61.21	94.00	32.79	
	4916.00			24.76	30.06	54.00	23.94	
	7374.00			24.76	34.51	54.00	19.49	AV
	9832.00			24.76	36.92	54.00	17.08	

TEST ENGINEER: RAVEN JIN

Hisense Electric Co., Ltd. FCC ID: W9HLCDE0007 Page 14 of 21

# 5 BAND-EDGE MEASUREMENT

# 5.1 Test Equipment

Item	Туре	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Spectrum Analyzer	Agilent	E7405A	MY45106600	Mar 22, 2012	Mar 22, 2013
2.	Horn Antenna	EMCO	3115	9607-4878	May 06, 2012	May 06, 2013
3.	Preamplifier	HP	8449B	3008A00864	Apr 29, 2012	Apr 29, 2013
4.	Software	Audix	E3	SET00200 9912M295-2		

# 5.2 Band-Edge Limit [FCC Part 15 Subpart C 15.249(d)]

Emissions radiated outside of the specified frequency bands, except for harmonic, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209 whichever is the lesser attenuation.

For peak value, The RBW of Spectrum Analyzer Agilent E7405A was set at 1MHz and the VBW was set at 3MHz.

#### 5.3 Test Results

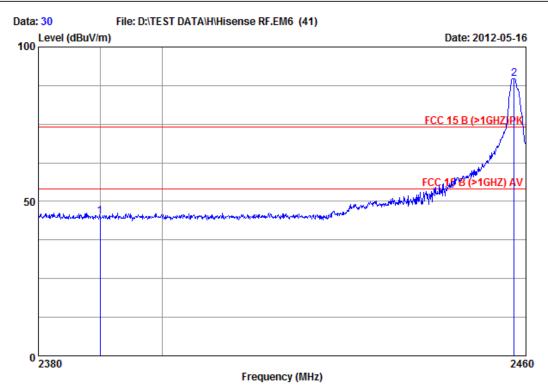
<PASS>

All the test results are attached in next pages.

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Site no : Audix ACI (3m Chamber) Data no. : 30

Dis. / Ant. : 3m /EMCO 3115

Limit : FCC 15 B (>1GHZ) PK Ant. pol. : HORIZONTAL Env. / Ins. : 22'C 60%RH/ E7405A Engineer : Raven

EUT : LED LCD TV
M/N : LTDN46K316XWUS3D
S/N : E1204417-02/02

Power Rating: 120V/60Hz Test Mode : Transmitting

_		Factor	Loss	_	Emission Level (dBuV/m)		_	Remark
1 2390.000	29.19	36.09		45.17	45.16	74.00	28.84	Peak
2 2458.000	29.45	36.07		89.48	89.82	74.00	-15.82	Peak

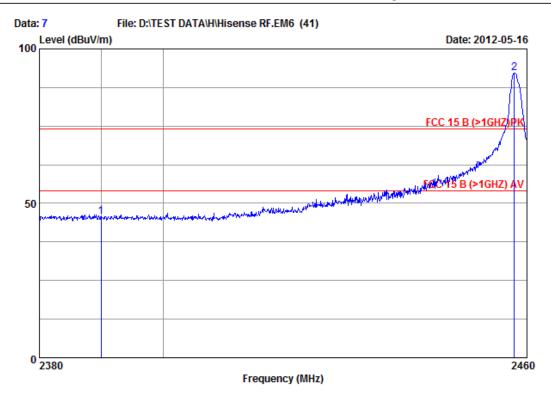
Remarks: Emission Level= Antenna Factor + Cable Loss - Preamp Factor + Reading.

```
Average value @ 2390MHz = Peak value - Correction Factor = 45.16 \text{ dBuV/m} - 24.76 \text{ dB} = 20.40 \text{ dBuV/m} (Average limit = 54.00 \text{ dBuV/m})
```

Hisense Electric Co., Ltd. FCC ID: W9HLCDE0007 Page 16 of 21



Audix Technology (Shanghai) Co., Ltd. 3F #34Bldg. No.680 GuiPing Rd., CaoHeJing Hi-Tech Park, Shanghai 200233, China Tel:+86-21-64955500 Fax:+86-21-64955491 audixaci@audix.com



Site no : Audix ACI (3m Chamber) Data no. : 7

Dis. / Ant. : 3m /EMCO 3115

Limit : FCC 15 B (>1GHZ) PK Ant. pol. : VERTICAL Env. / Ins. : 22'C 60%RH/ E7405A Engineer : Raven

EUT : LED LCD TV
M/N : LTDN46K316XWUS3D
S/N : E1204417-02/02
Power Rating: 120V/60Hz
Test Mode : Transmitting

	Freq.		Preamp Factor		Reading	Emission Level	Limits	Margin	Remark
	(MHz)	(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m	) (dB)	
1 2	390.000	29.19	36.09	6.89	45.73	45.72	74.00	28.28	Peak
2 2	457.920	29.45	36.07	6.96	91.73	92.07	74.00	-18.07	Peak

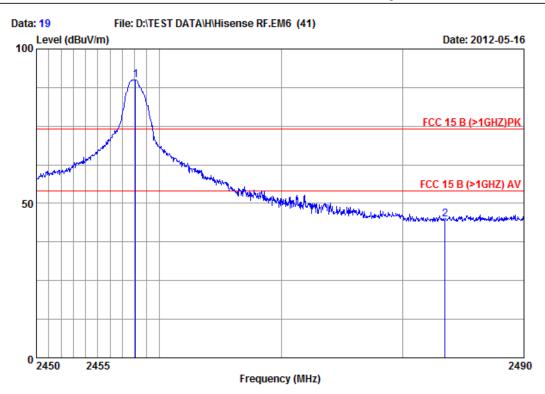
Remarks: Emission Level= Antenna Factor + Cable Loss - Preamp Factor + Reading.

```
Average value @ 2390MHz = Peak value - Correction Factor
= 45.72 \text{ dBuV/m} - 24.76 \text{ dB}
= 20.96 \text{ dBuV/m}
( Average limit = 54.00 \text{ dBuV/m})
```

Hisense Electric Co., Ltd. FCC ID: W9HLCDE0007 Page 17 of 21



Audix Technology (Shanghai) Co., Ltd. 3F #34Bldg. No.680 GuiPing Rd., CaoHeJing Hi-Tech Park, Shanghai 200233, China Tel:+86-21-64955500 Fax:+86-21-64955491 audixaci@audix.com



Site no : Audix ACI (3m Chamber) Data no. : 19

Dis. / Ant. : 3m /EMCO 3115

Limit : FCC 15 B (>1GHZ)PK Ant. pol. : HORIZONTAL Env. / Ins. : 22'C 60%RH/ E7405A Engineer : Raven

EUT : LED LCD TV
M/N : LTDN46K316XWUS3D
S/N : E1204417-02/02
Power Rating: 120V/60Hz
Test Mode : Transmitting

Freq.	Antenna	Preamp	Cable	Reading	Emission	Limits	Margin	Remark
	Factor	Factor	Loss		Level			
(MHz)	(dB/m)	(dB)	(dB)	(dBuV)	(dBuV/m)	(dBuV/m	) (dB)	
1 2458.080	29.45	36.07	6.96	89.75	90.09	74.00	-16.09	Peak
2 2483.500	29.55	36.07	6.96	44.37	44.81	74.00	29.19	Peak

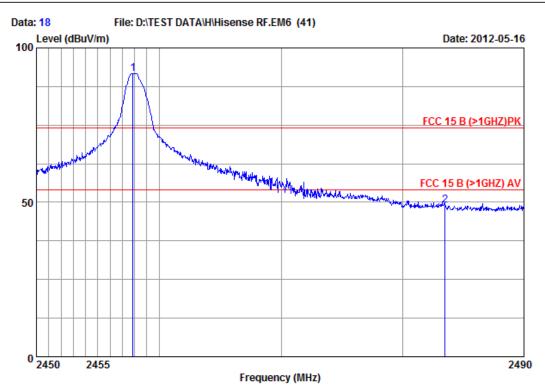
Remarks: Emission Level= Antenna Factor + Cable Loss - Preamp Factor + Reading.

```
Average value @ 2483.5MHz = Peak value - Correction Factor = 44.81 \text{ dBuV/m} - 24.76 \text{ dB} = 20.05 \text{ dBuV/m} ( Average limit = 54.00 \text{ dBuV/m} )
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Site no : Audix ACI (3m Chamber) Data no. : 18

Dis. / Ant. : 3m /EMCO 3115

Limit : FCC 15 B (>1GHZ) PK Ant. pol. : VERTICAL Env. / Ins. : 22'C 60%RH/ E7405A Engineer : Raven

EUT : LED LCD TV
M/N : LTDN46K316XWUS3D
S/N : E1204417-02/02
Power Rating: 120V/60Hz
Test Mode : Transmitting

Freq. Antenna Preamp Cable Reading Emission Limits Margin Remark
Factor Factor Loss Level
(MHz) (dB/m) (dB) (dB) (dBuV) (dBuV/m) (dBuV/m) (dB)

1 2457.880 29.45 36.07 6.96 91.44 91.78 74.00 -17.78 Peak
2 2483.500 29.55 36.07 6.96 48.53 48.97 74.00 25.03 Peak

Remarks: Emission Level= Antenna Factor + Cable Loss - Preamp Factor + Reading.

Average value @ 2483.5MHz = Peak value - Correction Factor = 48.97 dBuV/m - 24.76 dB = 24.21 dBuV/m (Average limit = 54.00 dBuV/m)

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6	DEVIA	TION TO	TEST	<b>SPECIFICA</b>	TIONS

None.

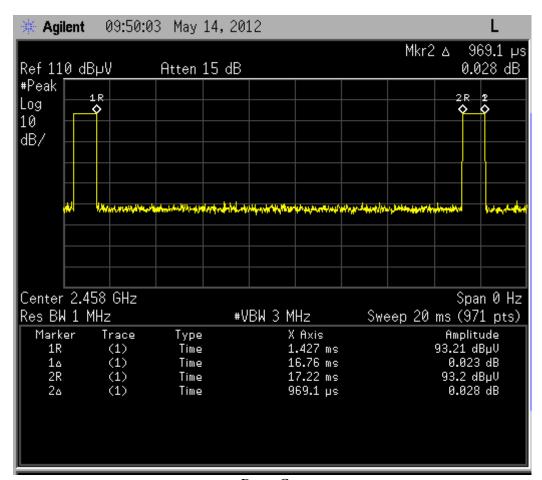
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# **APPENDIX I**

PLOT OF DUTY CYCLE

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DUTY CYCLE